

- a) Unicast streams Up to 2
- b) Multicast streams Unlimited
- 4) Video Resolutions NTSC
 - a) 4CIF 704 x 480
 - b) 2CIF 704 x 240
 - c) CIF 352 x 240
- 5) Video Inputs/Connector
 - a) Types 4 BNC inputs; 1 Vp-p; Hi-Z/75 ohms
- 6) Audio
 - a) Audio Encoding G.711 speech codec
 - b) Audio Bit Rate 64 kbps
 - c) Audio Line In 4 Vp-p (0 dBV) nominal
 - d) Audio Connectors 3.5 mm monaural
 - e) Audio Inputs 4, line level inputs
- 7) System
 - a) Operating System Linux®
 - b) User Interface From supported video management system or integrated web client
- 8) Network interface 2, Ethernet RJ-45 port
(100/1000Base-T); 1, PoE (1- and 2-channel models)
- 9) PTZ Protocols Pelco D (RS-422), Coaxitron
- 10) Alarms/Relays
- 11) Alarm Inputs 1 configurable alarm input per camera input 5.0 VDC 10 kohms
- 12) Relay Output 1, form-C relay, 30 VDC, 1 A; uses 3 of 16 pins on terminal block connector
- 13) Video Activity Detection
 - a) Zones 3 plus 1 background zone
 - b) Zone Types Any shape, user-definable in 16 x 16 pixel blk
- 14) Sensitivity/Threshold Adjustable per zone
- 15) PTZ Interfaces Coaxitron, Rs-422
- 16) PTZ Protocols Pelco D, Coaxitron
- 17) Terminal Block Connector 16-pin
- 18) Front Panel Indicators/Functions

- a) Network Connector 2 RJ-45, 10/100/1000Base-T
 - 1) Power
 - 2) Status Green, amber, red
 - 3) Network Activity Green, amber, red
 - 4) Video inputs Green, red
- e. Certifications and Regulations
 - 1) UL/cUL Listed
- f. Warranty
 - 1) 36 months, parts and labor
- g. Pelco Model Number
 - 1) Pelco NET5400 series, Video Encoders, or approved equal.

2.5 IP VIDEO MANAGEMENT SYSTEM AND NETWORK VIDEO RECORDER

- A. The IP video management system shall consist of Digital Sentry® NVs version 7 software operating on an optimized Pelco-supplied hardware platform. The NVs software shall consist of base software with individual, non-expiring licenses in the required quantity.
- B. The IP video management system software updates shall be downloadable from a publicly available website.
- C. The IP video management system shall support up to 128 combined IP and analog video streams, with up to 64 direct-attached analog cameras. Analog streams shall be supported using Pelco and/or third-party encoders.
- D. The IP video management system shall provide 280 Mbps throughput for recording of analog and IP video streams, playback and export.
- E. The IP video management system shall support recording of JPEG, MPEG-4 and H.264 IP streams.
- F. The IP video management system shall support Pelco and third-party H.264 Megapixel video streams up to 10 Megapixel resolution with quantities based on a total system of 280 Mbps throughput for recording of analog and IP video streams, playback and export.
- G. The IP video management system shall have a fully open architecture with support for both IP-specific camera as well as cameras with ONVIF compliance.
- H. The IP video management system shall support automatic detection of Pelco IP cameras. Third-party IP cameras shall be automatically detected dependent on IP driver versions and manufacturers specifications.

- I. The IP video management system shall support up to 64 looping analog camera inputs with direct-attached 16-channel encoders; up to four direct-attached units. The direct-attached 16-channel encoders shall support H.264 compression, CIF, 2CIF, and D1 resolutions at maximum 30ips, 16 audio inputs and RS422/485 PTZ control with Pelco P and D protocols.
- J. The IP video management system shall support an unlimited number of systems connected over a network. Each system shall contain two 1GB network ports; one for IP camera/encoder data, and one to connect to a network for client computer access.
- K. The IP video management system shall be viewed, managed, and played back through a single user interface simultaneously with other Digital Sentry digital video management systems through supplied DS Admin or DS ControlPoint Client software.
- L. The IP video management system shall operate on a 2nd Generation Intel® Core™ i7 processor and 8 GB of RAM.
- M. The IP video management system shall utilize a Windows® 7 Ultimate 64-bit operating system.
- N. The IP video management system shall support and have an option for an internal DVD+/-RW.
- O. The IP video management system shall contain two DVI-D ports.
- P. The IP video management system shall allow expansion of IP video channel capacity through a licensing without any hardware modification.
- Q. The IP video management system shall support multiple models of IP cameras and encoders including Pelco cameras and encoders with Sarix technology and multiple third-party manufacturers.
- R. The IP video management system shall support audio recording from Pelco cameras with Sarix technology in addition to third-party manufacturer's audio recording.
- S. The IP video management system shall support recording the internal server with additional storage utilizing SCSI attached Pelco DX8100-HDDI storage.
- T. The IP video management system shall be capable of continuous scheduled alarm/event and motion recording. Pre- and post- alarm recording shall also be available and shall be fully programmable on a per channel basis.

- U. The IP video management system shall allow archival of video data to computers or SAN storage devices over a network connection with the optional DS Archive Utility. The archival schedule shall be either automatic at user-defined intervals or manual and shall be configurable per connected camera.
- V. The IP video management system shall support network health and monitoring utilizing third-party SNMP monitoring tools.
- W. The IP video management system shall indicate system performance and operation status utilizing a variety of HTML reports.
- X. The IP video management system shall display system health monitoring data utilizing front panel LED displays and display popups.
- Y. The IP video management system shall optionally support on-board video analytics in quantities of two or four channels with Active Alert software and the DS DataPoint interface. The DS DataPoint interface shall provide video analytics monitoring including tracking and counting objects and people.
- Z. The IP video management system shall support Lightweight Directory Access Protocol (LDAP).

AA. System Specifications

- | | |
|---------------------|--|
| 1. Processor | 2nd Generation Intel® Core™ i7 |
| 2. Internal Memory | 8 GB RAM |
| 3. Network | 2 Gigabit Ethernet RJ-45 (1000Base-T) |
| 4. User Interface | DS Control Point |
| 5. Internal Storage | (JBOD or RAID 5) |
| 6. DS-SRV | 12 TB |
| 7. DS-SRV-DVD | 12 TB |
| 8. Raid Level | RAID 5 (required optional DS-SRV-RAID controller card) |
| 9. External Storage | Up to 24 TB JBOD or RAID 5 through DX8100HDDI |
| 10. System Drives | |
| a. DS-SRV | 6, 3.5-inch hard drive bays, hot swappable |
| b. DS-SRV-DVD | 4, 3.5-inch hard drive bays, hot swappable |
| c. Optical Drive | DVD±RW and 4 HDD configuration |
| 11. PCI-E Slots | 1 PCI-E x 16 and 1 PCI-E x 4 |

12. Auxiliary Interfaces

- a. USB Ports 1 front (USB 2.0), 4 rear (2 USB 3.0; 2 USB 2.0)
- 13. Power Input 100 to 240 VAC, 50/60 Hz, Autoranging
- 14. Video Out Connections 2 DVI-D connectors, 1 VGA connector
- 15. Audio Out 1, 1/8-inch audio jack connector

BB. Environmental Specifications

- 1. Operating Temperature 10° to 35°C (50° to 95°F)
- 2. Operating Humidity 20% to 80%, noncondensing
- 3. Maximum Humidity Gradient 10% per hour
- 4. Operating Altitude -15 to 3,048 m (-50 to 10,000 ft)
- 5. Operating Vibration 0.25 G at 3 Hz to 200 Hz at a rate of 0.5 octave/minute
- 6. Dimensions 50.8 x 43.4 x 8.9 cm

CC. Certifications

- 1. FCC, Class A
- 2. UL/cUL Listed

DD. IP Video Management Client Software requirements

- 1. The IP video management system shall provide the capability of running a client application in addition to the video management system.
- 2. A client computer with system compatible software shall be the user interface for viewing one or more systems. Live and recorded video and current event video shall be displayed on any client computer using a proper login and password. The client computer shall be able to connect to an unlimited number of recorders simultaneously to display live and recorded video.
- 3. Client Software shall be unlicensed and available to be installed on as many clients as required by the user.
- 4. Client Software shall be compatible with multiple DVR and NVR platforms to include all Pelco Digital Sentry®, Pelco DX8000/DX8100, and Pelco DX4100, DX4500/DX4600, DX4700/DX4800.
- 5. Client Software shall be password controlled such that password functionality set at each connected system will be recognized at the client. Password shall limit the ability to access live or recorded video as well as the ability to export video.

6. Client Software shall allow multiple monitor support for up to four displays per client workstation, providing virtual matrix functionality.
7. Client Software shall allow the connection of Pelco KBD5000 keyboard controllers to the client workstation to control PTZ operations and camera call-up.
8. Client Software shall allow video streams to be selectable from a system tree on an individual camera, individual system, client defined local groups, or from predefined recorder based groups.
9. Client Software shall be a tab based work environment with the ability to undock the tabs creating a virtual workspace on single or multiple monitor clients.
10. Client tabs shall include system management, live, and search options. Tabs can be displayed simultaneously on the client.
11. Systems Tab shall display and sort available systems, connection status, system names, system IP addresses, and custom categories. This tab shall additionally allow:
 - a. Manual connect and disconnect of systems to the client
 - b. Virtual systems naming
 - c. Auto Connecting
 - d. Adding, deleting, and editing available systems
 - e. Live video tab shall have the ability to be created up to four times on a single client workstation providing for video display combinations and simultaneous video streams from as many different systems with consideration for maximum client bandwidth.
12. Live video tab shall provide the following functionalities:
 - a. Quick Review which shall display recorded video from the last 1, 5, 15, 30, 60 or 90 minutes, providing near instantaneous review of recent events
 - b. One week graphical display of recorded video
 - c. Borderless display option
 - d. Screen layout selection
 - e. On the fly on-screen display changes including time, date, camera name, frame rate, frame size, alarm display, and border indicators
 - f. Digital zoom

- g. User selectable in-video PTZ control or dashboard style control
- h. Drag and drop audio support associating any audio with any video
- i. Search video tab shall allow for the search of one or multiple cameras from one or multiple systems simultaneously. Search tab shall provide the following functionalities:
 - 1) Time and date search
 - 2) Advanced data search with DataPoint interfaced software to Active Alert Intelligent Video and POS
 - 3) Drag and drop audio support to associate audio with any video
- 13. Video export to any system accessible media including locally to HDD, CD/DVD, Flash USB device or to network storage
- 14. Video authentication of exported video via check sum verification
- 15. Alarm video tab shall allow for alarm pop-up and playback of active alarms. Alarms may be based on motion activity, an external software trigger from Active Alert analytics or a preset data alarm from DS DataPoint. An alarm list pane shall be displayed for playback of queued alarms.
- 16. The Client shall incorporate virtual matrix functionality whereby camera sequences may be created on the monitoring workstation with the following functionalities:
 - 17. Each sequence shall have a maximum of 500 cameras
 - 18. Each camera in the sequence shall have its own individual dwell time, from 1 to 60 seconds
 - 19. Each entry in a sequence shall have the capacity to trigger PTZ camera presets, patterns, or auxiliaries
- 20. The Client shall have the capability to display recorded video with full VCR controls. This feature shall display video from multiple cameras simultaneously. The user shall be able to play video as fast as possible (all images), in real time, or by skipping a selectable number of seconds
- 21. The Client shall support simultaneous playback of up to sixteen cameras all synchronized with each other. Non-synchronous playback of multiple cameras shall not be acceptable
- 22. The Client shall support tours of multi-camera displays
- 23. Remote Client Minimum PC Requirements
 - a. Processor 2nd Generation Intel® Core i7 processor with integrated graphics

- b. Memory 4 GB or higher
- c. Graphics Card Graphics controller card with 512 MB (or greater) dedicated video memory
- d. Optical Drive DVD
- e. Operating System Windows XP Professional SP2, Windows Vista (32 or 64 -bit), Windows 7 (32 or 64 bit)

EE. Warranty

- 1. 3 year parts and labor

FF. Provide the following Accessories:

- 1. Power Cord 1, all cables are 3 prong, connector, 1.8 m (6 ft)
- 2. USB Keyboard and Mouse 1
- 3. Bezel key 2
- 4. Rack Mount Kit Brackets, rails, and hardware for rack mounting
- 5. DS-SRV-LIT Documentation, resource and recovery disc
- 6. IP licenses for all cameras

2.6 HIGH DEFINITION LED MONITORS

- A. The high definition LED monitor shall offer VGA and digital visual interface (DVI) inputs, picture-in-picture (PIP), looping BNC outputs.
- B. The high definition LED monitor shall provide a front panel that allows the user to adjust image quality, brightness, size, position, and geometry for optimal viewing.
- C. The high definition LED monitor shall have improved airflow and thermal reduction allowing for longer component life, ensuring reliability in a 24/7 security installation environment.
- D. The high definition LED monitor shall be constructed of a SECC-frame composition for desktop or wall-mount installations.
- E. The high definition LED monitor shall provide a minimum of 1920 x 1080p native resolution compatible with the latest megapixel video security cameras.
- F. Refer to the Contract Drawings for locations of Monitors and corresponding screen sizes.
- G. The high definition LED monitor shall meet or exceed the following design and performance specifications.
 - 1. General Specifications
 - a. Dimensions (without stand)

- 1) PMCL532BL 3.0" D x 29.3" W x 17.3" H
(76.7 x 745.2 x 439.4 mm)
- 2) PMCL542BL 3.3" D x 38.5" W x 22.4" H
(82.8 x 977.0 x 568.9 mm)
- b. Unit Weight
 - 1) PMCL532BL 27.6 lb (12.5 kg)
 - 2) PMCL542BL 44.1 lb (20.0 kg)
- 2. Electrical Specifications
 - a. Input Voltage 100 to 240 VAC, 50/60 Hz
 - b. Power Consumption
 - 1) PMCL532BL 120 W
 - 2) PMCL542BL 150 W
 - c. Video Input Interfaces
 - 1) PMCL532BL S-video; 1 component video; 1 video in, 1 video out; 1 HDMI; 1 DVI in; 1 VGA out, 1 VGA in
 - 2) PMCL542BL S-video; 1 component video; 1 video in, 1 video out; 1 display port; 1 HDMI; 1 DVI in; 1 VGA out, 1 VGA in
 - d. Audio Input Interfaces 1 audio out, L/R; 1 PC audio in; 2 audio in, L/R; 1 speaker, L/R
 - e. Control 1 RS-232 input, 1 RS-232 output
 - f. Horizontal Frequency 31 to 69 kHz
 - g. Vertical Frequency 56 to 85 Hz
 - h. Sync Format NTSC/PAL
- 3. Environmental Specifications
 - a. Operating Temperature 0° to 40°C (32° to 104°F)
 - b. Operating Humidity 10% to 90%, noncondensing
- 4. Mechanical Specifications
 - a. Native Resolution 1920 x 1080 at 60 Hz
 - b. Optimum Resolution (RGB mode)
 - 1) VGA 640 x 480 at 56/60/72/75/85/Hz
 - 2) SVGA 800 x 600 at 60/70/75/85 Hz
 - 3) XGA 1024 x 768 at 60/75/85 Hz
 - 4) SXGA 120 x 1024 at 60/75/85 Hz
 - 5) WXGA 1360 x 768 at 60 Hz
 - 6) UXGA 1600 x 1200 at 60 Hz

- 7) SDTV (480i/576i/480p/576p) 720 x 480 at 60 Hz; 720 x 576 at 50 Hz
 - 8) HDTV (750p/1080i/1080p) 1280 x 720 at 50/60 Hz;
1920 x 7080p at 50/60 Hz;
1920 x 1080i at 50/60 Hz
 - c. Panel Aspect Ration 16:9
 - d. Viewing Area
 - 1) PMCL532BL 698.4 x 392.8 mm
 - 2) PMCL542BL 930.2 x 523.3 mm
 - e. Pixel Pitch
 - 1) PMCL532BL 0.363 x 0.363 mm
 - 2) PMCL542BL 0.485 x 0.485 mm
 - f. Video Formats 480p, 576p, 720p, 1080i, 1080p
 - g. Brightness
 - 1) PMCL532BL 350 cd/m²
 - 2) PMCL542BL 500 cd/m²
 - h. Contrast Ratio
 - 1) PMCL532BL 3000:1
 - 2) PMCL542BL 4000:1
 - i. Backlight Type LED
 - j. Refresh Rate 60 Hz
 - k. Panel Life 50,000 plus hours
 - l. Viewing Angle (H/V) 178°/178°
 - m. Displayable Colors
 - 1) PMCL532BL 16.7 million
 - 2) PMCL542BL 1.07 million
 - n. Response Time 6.5 ms (typ.)
 - o. PIP (Picture-in-Picture) Selectable, sizeable, swappable, moveable
 - p. Speakers N/A
 - q. Back Panel Controls Menu, source, up/down, power, and volume ±
 - r. Indicators (front/back) LED (power off/on)
5. Certifications
- a. CE, Class B
 - b. FCC, Class B
 - c. UL/cUL Listed

- d. C-Tick
- e. CCC
- f. GOST-R
- g. NOM
- h. ENERGY STAR Level 5.1 Compliance
- H. Warranty
 - 1. 36 months, parts and labor
- I. Pelco Model Numbers
 - 1. PMCL532BL 32-inch (813 mm) LED monitor, 1920 x 1080 resolution
 - 2. PMCL542BL 42-inch (1,067 mm) LED monitor, 1920 x 1080 resolution

2.7 INDOOR, NETWORK, 1.3 MEGAPIXEL (MPx) HIGH DEFINITION INTEGRATED DIGITAL CAMERA

- A. The cameras shall be high-resolution color video cameras with wide dynamic range capturing capability.
- B. The network camera shall offer dual video streams with up to 1.3 MPx resolution (1280 x 1024) in progressive scan format. Color and day/night models shall be available.
- C. The network camera shall be a compact size with a 3-inch class bubble. It shall also include a compact indoor enclosure and an integrated varifocal 2.8~10 mm lens.
- D. The network camera shall be capable of firmware upgrades through a network using a software-based device utility.
- E. The network camera enclosure shall offer an impact resistance rating of IK10++ per EN62262 (50J). The enclosure shall also be vandal and tamper resistant featuring a tamper-resistant screw that can be opened only with a special tool.
- F. The network camera shall provide an accessory port for hardware expansion.
- G. The network camera shall provide advanced low-light capabilities for day/night models with sensitivity down to 0.12 lux in color and 0.03 lux in black-white (B-W).
- H. The network camera shall have an autofocus lens, which can be activated through a standard Web browser interface.
- I. The network camera shall provide line-in and line-out audio and built-in microphone.

- J. The network camera shall support two simultaneous, configurable video streams. H.264 and MJPEG compression formats shall be available for primary and secondary streams with selectable Unicast and Multicast protocols. The streams shall be configurable in a variety of frame rates and bit rates.
- K. The network camera (day/night model) shall have a removable IR cut filter mechanism for increased sensitivity in low-light installations. IR cut filter removal shall be configurable through a Web browser.
- L. The network camera shall support industry standard Power over Ethernet (PoE), IEEE 802.3af to supply power to the camera over the network.
- M. The network camera shall use a standard Web browser interface for remote administration and configuration of camera parameters. The browser interface shall support multiscreen remote monitoring for up to 16 cameras on the same virtual local area network (VLAN).
- N. The network camera shall offer a video output port providing an NTSC/PAL analog video output signal for adjusting the field of view and when focusing the camera.
- O. The network camera shall have a window blanking feature to conceal user-defined privacy areas that cannot be viewed by an operator. The network camera shall support up to four blanked windows. A blanked area shall appear on the screen as a solid gray window.
- P. The network camera shall provide Camera Sabotage analytics to detect changes in the camera's field of view, including obstruction of the lens (examples include by cloth, spray paint, or a lens cap cover) and unauthorized movement of the camera. Such behaviors shall trigger an alarm.
- Q. The network camera shall support standard IT protocols.
- R. The network camera shall support open architecture best practices with a published API available to third-party network video recording and management systems.
- S. The network camera shall meet or exceed the following design and performance specifications:
 - 1. Imaging Device 1/3-inch, effective
 - 2. Imager Type CMOS
 - 3. Imager Readout Progressive scan
 - 4. Maximum Resolution 1280 x 1024
 - 5. Signal-to-Noise Ratio 50 dB

6. Auto Iris Lens Type	DC drive
7. Electronic Shutter Range	1~1/100,000 sec
8. Wide Dynamic Range	60 dB
9. White Balance Range	2,000° to 10,000°K
10. Sensitivity	f/1.3; 2,850°K; SNR >24dB
a. Color (1x/33ms)	0.50 lux
b. Color SENS (15x/500ms)	0.12 lux
c. Mono (1x/33ms)	0.25 lux
d. Mono SENS (15x/500ms)	0.03 lux
11. Dome Attenuation	Clear dome, zero light loss
12. Construction	
a. Back box	Alodine aluminum
b. Bubble	Polycarbonate plastic
c. Finish	Light gray powder coat
13. Weight	1.4 lb (0.6 kg)
14. Available Languages	Chinese, English, French, German, Italian, Portuguese, Russian, Spanish, and Turkish
S. Video Encoding	H.264 in Base profile and MJPEG
T. Video Streams	Up to 2 simultaneous stream; the second stream is variable based on the setup of the primary stream
U. Frame Rate	Up to 30, 25, 24, 15, 12.5, 12, 10, 8, 7.5, 6, 5, 4, 3, 2, and 1 (dependent upon coding, resolution, and stream configuration)
V. Available Resolutions of Camera	
1. 1.3 MPx	1280 x 1024; 5:4 aspect ratio; 20.0 ips max., 10.0 Mbps bit rate for MJPEG; 8.0 ips max., 2.5 Mbps bit rate for H.264
2. 1.2 MPx	1280 x 960; 4:3 aspect ratio; 20.0 ips max., 9.8 Mbps bit rate for MJPEG; 8.0 ips max., 2.4 Mbps bit rate for H.264
3. 0.9 MPx	1280 x 720; 16:9 aspect ratio; 30.0 ips max., 10.0 Mbps bit rate for MJPEG; 12.5 ips max., 2.5 Mbps bit rate for H.264

4. 0.5 MPx	800 x 600; 4:3 aspect ratio; 30.0 ips max., 5.8 Mbps bit rate for MJPEG; 25.0 ips max., 2.0 Mbps bit rate for H.264
5. 0.3 MPx	640 x 480; 4:3 aspect ratio; 30.0 ips max., 3.7 Mbps bit rate for MJPEG; 30.0 ips max., 1.6 Mbps bit rate for H.264
6. 0.1 MPx	320 x 240; 4:3 aspect ratio; 30.0 ips max., 0.9 Mbps bit rate for MJPEG; 30.0 ips max., 0.4 Mbps bit rate for H.264
7. Additional	640 x 512, 640 x 352, 480 x 368, 480 x 272, 320 x 256, 320 x 176
W. Supported Protocols	TCP/IP, UDP/IP (Unicast, Multicast IGMP), UPnP, DNS, DHCP, RTP, RTSP, NTP, IPv4, SNMP v2c/v3, QoS, HTTP, HTTPS, LDAP (client), SSH, SSL, SMTP, FTP, Mdns (Bonjour®), and 802.1x (EAP)
X. Users	
1. Unicast	Up to 20 simultaneous users depending on resolution settings (2 guaranteed streams)
2 Multicast	Unlimited H.264
Y. Security Access	Password protected
Z. Software Interface	Web browser view and setup, up to 16 cameras
AA. Open IP Integration	Pelco IP camera API
BB. Minimum PC Requirements	
1. Processor	Intel® Pentium® 4 microprocessor, 1.6 GHz
2. Operating System	Microsoft® Windows® XP, Windows Vista®, or Mac OS® X 10.4 (or later)
3. Memory	512 MB RAM
4. Network Interface Card	100 Mbps or greater
5. Monitor	Minimum of 1024 x 768 resolution, 16- or 32-bit pixel color resolution
6. Web Browser*	Internet Explorer® 7.0 (or later); Mozilla® Firefox® 3.5 (or later); Internet Explorer 8.0 (or later) is recommended for configuring analytics

7. Media Player[†]

Pelco Media Player or QuickTime® 7.6.5 for
Microsoft Windows XP, Windows Vista, or
QuickTime 7.6.4 for Mac OS X 10.4

CC. Lens Specification:

1. Field of View in Degrees	High Resolution Streams (>800 x 600) Aspect Ratio:		
	<u>16:9</u>	<u>4:3</u>	<u>5:4</u>
a. 2.8 mm Horizontal	91	91	91
b. 2.8 mm Vertical	50	67	72
c. 10.0 mm Horizontal	25	25	25
d. 10.0 mm Vertical	14	19	20

DD. Electrical Specifications:

1. Port RJ-45 for 100Base-TX, Auto MDI/MDI-X
2. Cable Type Cat6 cable for 100Base-TX
3. Power Input PoE (IEEE802.3af class 2)
4. Power Consumption 3.3 W nominal
5. Service Port External 3-connector, 2.5 mm provides NTSC/PAL video output
6. Accessory Port Connects Pelco accessories
7. Audio
 - a. Streaming Bi-directional, full or half duplex
 - b. Input/Output Line level/ external microphone input;
600-ohm differential, 1 Vp-p max signal level
 - c. Compression G.711 PCM 8 bit, 8 kHz mono at 64 kbit/s

EE. Environmental Specifications:

1. Operational Temperature 32° to 122°F (0° to 50°C)
2. Operational Humidity 20% to 80%, noncondensing
3. Impact Resistance IK10++ per EN62262 (50J)
4. Shock and Vibration Meets EN50155 Category 1, Class B;
IEC60068: 2-6 and 2-27

FF. Mechanical Specifications:

1. Pan/Tilt Adjustment
 - a. Pan 355°
 - b. Tilt 180°
 - c. Rotate 220°

GG. Certifications:

1. FCC, Class A

2. UL/cUL Listed
3. C-Tick
4. KCC*
5. Meets NEMA Type 4 and IP66 standards

HH. Warranty:

1. 3 years, parts and labor.

II. PELCO Model numbers:

1. IM10DN10-1V Sarix vandal-resistant, mini indoor fixed
network camera, 1.3 MPx, day/night, 2.8~10 mm
varifocal megapixel lens, clear dome

JJ. Accessories:

1. IM-VESM Surface mount ring
2. IM-VEPM Pendant mount, light gray
3. WMVE-SR Wall mount light, gray
4. IM-VECM Corner mount, light gray
5. IM-VE4S 4S electrical box (deep) adapter plate
6. POE20U560G Single port PoE injector
7. PA101 Pole adapter for use with WMVE-SR wall mount
8. ALM-1 External alarm accessory

2.8 OUTDOOR PTZ CAMERA DOME IP SYSTEM

- A. The outdoor camera dome system shall provide a 100Base-TX network interface for live streaming to a standard Web browser.
- B. The outdoor camera dome system shall be a discreet camera dome system consisting of a dome drive with a variable speed/high speed pan/tilt drive unit with continuous 360° rotation; 1/4-inch high resolution color, monochrome, or color/black-white CCD camera; motorized zoom lens with optical and digital zoom; auto focus; and an enclosure consisting of a back box, lower dome, and a quick-install mounting.
- C. The outdoor network positioning camera shall support standard IT protocols.
- D. The outdoor network positioning camera shall use a standard Web browser interface for remote administration and configuration of camera parameters. The browser interface shall provide PTZ control including preset and pattern and on-screen display (OSD) for access to camera programming.
- E. The outdoor network positioning camera shall have a window blanking feature to conceal user-defined privacy areas that cannot be viewed by

an operator. The outdoor camera dome system shall support up to eight blanked windows. A blanked area shall appear on the screen as a solid gray window.

- F. The outdoor network positioning camera shall feature open architecture connectivity for third-party software recording solutions allowing integration into virtually any IP-based system. It is also compatible with Digital Sentry® video management systems. Record, manage, configure, and view multiple live streams.
- G. The network camera shall provide an additional processor for running Pelco Video analytics.
 - 1. Pelco Analytic Suites shall be configured and enabled using a standard Web browser.
 - 2. Pelco Analytic Suites shall allow remote operation and alarm notification when used with an Endura system or a third-party system that supports Pelco's Analytics API.
 - 3. Pelco Analytics for EP High Definition Digital Network Cameras including:
 - a. Abandoned Object: Detects objects placed in a defined zone and triggers an alarm if the object remains in the zone longer than the user-defined time allows. An airport terminal is a typical installation for this behavior. This behavior can also detect objects left behind at an ATM, signaling possible card skimming.
 - b. Adaptive Motion: Detects and tracks objects that enter a scene and then triggers an alarm when the objects enter a user-defined zone. This behavior is primarily used in outdoor environments with light traffic to reduce the number of false alarms caused by environmental changes.
 - c. Camera Sabotage: Detects contrast changes in the field of view. An alarm is triggered if the lens is obstructed with spray paint, a cloth, or a lens cap. Any unauthorized repositioning of the camera also triggers an alarm.
 - d. Directional Motion: Generates an alarm in a high traffic area when a person or object moves in a specified direction. Typical installations for this behavior include an airport gate or tunnel where cameras can detect objects moving in the opposite direction of the normal flow of traffic or an individual entering through an exit door.

- e. Loitering Detection: Identifies when people or vehicles remain in a defined zone longer than the user-defined time allows. This behavior is effective in real-time notification of suspicious behavior around ATMs, stairwells, and school grounds.
- f. Object Counting: Counts the number of objects that enter a defined zone or cross a tripwire. This behavior might be used to count the number of people at a store entrance/exit or inside a store where the traffic is light. This behavior is based on tracking and does not count people in a crowded setting.
- g. Object Removal: Triggers an alarm if an object is removed from a defined zone. This behavior is ideal for customers who want to detect the removal of high value objects, such as a painting from a wall or a statue from a pedestal.
- h. Stopped Vehicle: Detects vehicles stopped near a sensitive area longer than the user-defined time allows. This behavior is ideal for airport curbside drop-offs, parking enforcement, suspicious parking, traffic lane breakdowns, and vehicles waiting at gates.
- 4. Pelco Analytic Suites shall be preloaded or configuration and alarm notification when used with an Endura® system or a third-party system that supports Pelco's Analytics API.
- 5. Multiple Pelco behaviors can be scheduled to work during a certain time or condition.
- H. The outdoor fixed dome system shall meet or exceed the following design and performance specifications.

1. Camera Specifications

a. Sensor Type	1/3-inch, CCD
b. Optical Zoom	18X
c. Maximum Resolution	1280 x 960
d. Lens	f/1.6 (focal length, 4.7~84.6 mm optical)
e. Aspect Ratios	4:3 or 16:9
f. Light Sensitivity	f/1.6; 2,850°K; SNR >24dB
g. Color (33 ms)	0.70 lux
h. Color (250 ms)	0.07 lux
i. Mono (33 ms)	0.25 lux
j. Mono (250 ms)	0.02 lux
k. Day/Night Capabilities	Yes
l. IR Cut Filter	Yes

- m. IR Trace Curves 850 nm and 950 nm
- n. Wide Dynamic Range 60dB
- o. Iris Control Auto iris with manual override
- p. Backlight Compensation Yes
- 2. Video Specifications
 - a. Compression H.264 in High, Main, or Base profiles and MJPEG
 - b. Video Streams Up to 2 simultaneous streams, the second stream variable based on the setup of the primary stream
 - c. Frame Rate Up to 30, 25, 24, 15, 12.5, 12, 10, 8, 7.5, 6, 5, 4, 3, 2.5, 1 (depending upon coding, resolution, and stream configuration)
 - d. Available Resolutions
 - 1) 1.3 Megapixel 1280 x 1024; 5:4 aspect ratio; 20.0 ips max., 10.0 Mbps bit rate for MJPEG; 20.0 ips max., 3.4 Mbp4s bit rate for H.264
 - 2) 1.2 Megapixel 1280 x 960; 4:3 aspect ratio; 20.0 ips max., 9.8 Mbps bit rate for MJPEG; 20.0 ips max., 3.0 Mbps bit rate for H.264
 - 3) 0.9 Megapixel 1280 x 720; 16:9 aspect ratio; 30.0 ips max., 10.0 Mbps bit rate for MJPEG; 30.0 ips max., 2.9 Mbps bit rate for H.264
 - 4) 0.5 Megapixel 800 x 600; 4:3 aspect ratio; 30.0 ips max., 7.7 Mbps bit rate for MJPEG; 30.0 ips max., 2.0 Mbps bit rate for H.264
 - 5) 0.3 Megapixel 640 x 480; 4:3 aspect ratio; 30.0 ips max., 4.9 Mbps bit rate for MJPEG; 30.0 ips max., 1.5 Mbps bit rate for H.264
 - 6) 0.1 Megapixel 320 x 240; 4:3 aspect ratio; 30.0 ips max., 1.2 Mbps bit rate for MJPEG; 30.0 ips max., 0.5 Mbps bit rate for H.264
 - 7) Additional 640 x 512, 640 x 352, 480 x 368, 480 x 272, 320 x 256, 320 x 176
 - 8) Supported Protocols TCP/IP, UDP/IP (Unicast, Multicast IGMP), UPnP, DNS, DHCP, RTP, RTSP, NTP, IPv4,

SNMPv2c/v3, QoS, HTTP, HTTPS, LDAP
(client), SSH, SSL, SMTP, FTP, and 802.1x
(EAP)

- e. Users
 - 1) Unicast Up to 20 simultaneous users
 - 2) Multicast Unlimited H.264
- f. Security Access Password protected
- g. Software Interface Web browser view and setup
- h. Open IP Integration Pelco IP camera API
- i. Minimum PC Requirements
 - 1) Processor Intel Core® 2 Duo microprocessor, 2.6 GHz
 - 2) Operating System Windows® XP, Windows Vista®, or Mac OS® X 10.4 (or later)
 - 3) Web User Interface Requires QuickTime® 7.55 (or later)
 - 4) Memory 512 MB
 - 5) Network Interface Card 100 Mbps
 - 6) Monitor Minimum of 1024 x 768 resolution, 16- or 32-bit pixel color resolution
 - 7) Web Browser Internet Explorer® 7.0 (or later); Mozilla® Firefox® 3.5 (or later); Internet Explorer® 8.0 (or later) is recommended for configuring analytics
 - 8) Media Player Pelco Media Player or QuickTime® 7.6.5 for Microsoft Windows XP, Windows Vista, or QuickTime 7.6.4 for Mac OS X 10.4
- 3. Electrical Specifications
 - a. Ports RJ-45 for 100Base-TX; Auto MDI/MDI-X; auto negotiate/manual setting
 - b. Cabling Type Cat5 cable or better for 100Base-TX
 - c. Input Voltage 18 to 32 VAC; 24 VAC nominal 22 to 27 VDC; 24 VDC nominal
 - d. Input Power
 - 1) 24 VAC 23 VA nominal (without heater); 73 VA nominal (with heater)
 - 2) 24 VDC 0.7 A nominal (without heater); 3 A nominal (with heater)
 - 3) PoE IEEE802.3af (without heater)

- 4) Fuse 1.25 A
- 4. Dome Drive Specifications
 - a. Pan Speed Variable between 400 per second
continuous pan to 0.1° per second
 - b. Vertical Tilt Unobstructed tilt of +0° to -90°
 - c. Manual Control Speed Pan speed of 0.1° to 80° per second and
pan at 150° per second in turbo mode;
tilt operation shall range from 0.1° to
40° per second
 - d. Automatic Preset Speed Pan speed of 400° and a tilt speed of
160° per second
 - e. Presets 255 positions with 16 preset tours
 - f. Preset Accuracy $\pm 0.1^\circ$
 - g. Proportional Pan/Tilt Speed Speed decreases in proportion to
the increasing depth of zoom
 - h. Motor Continuous duty and variable speed,
operating at 18 to 32 VAC, 24 VAC nominal
 - i. Window Blanking 8, four-sided user-defined shapes, each
side with different lengths; window
blanking setting to turn off at user-
defined zoom ratio; window blanking set
to opaque gray or translucent smear;
blank all video above user defined tilt
angle; blank all video below user-defined
tilt angle
 - j. Auto Flip Rotates dome 180° at bottom of tilt
travel
 - k. Dome Drive Compatibility All dome drives are compatible with
all back box configurations
 - l. Power Consumption Nominal 23 VA (without heater running)
Nominal 73 VA (with heater running)
- 5. Back box and lower dome specifications
 - a. Pendant, Environmental
 - 1) Connection to Dome Drive Quick, positive mechanical and
electrical disconnect without the
use of any tools

- | | |
|------------------------------|--|
| 2) Installation | Quick-mount wall, corner, pole, parapet, or ceiling adapter |
| 3) Cable Entry | Through 1.5-inch NPT fitting |
| 4) Environmental Features | Factory-installed heaters, blowers, and sun shroud |
| 5) Operating Temperatures | Maximum temperature range of -60°F to 140°F (-51°C to 60°C) for two hours and a continuous operating range of -22°F to 122°F (-30°C to 50°C) |
| 6) Construction | Aluminum |
| 7) Trim Ring Connection | 2 screws |
| b. Pendant, Standard | |
| 1) Connection to Dome Drive | Quick, positive mechanical and electrical disconnect without the use of any tools |
| 2) Installation | Quick-mount wall, corner, pole, parapet, or ceiling adapter |
| 3) Cable Entry | Through 1.5-inch NPT fitting |
| 4) Environmental Features | Factory-installed heaters, blowers, and sun shroud |
| 5) Operating Temperatures | Maximum temperature range of 113°F (45°C) for two hours and a continuous operating range of 25°F to 95°F (-4°C to 35°C) |
| 6) Construction | Aluminum |
| 7) Trim Ring Connection | 2 screws |
| c. In-Ceiling, Environmental | |
| 1) Connection to Dome Drive | Quick, positive mechanical and electrical disconnect without the use of any tools |
| 2) Installation | Hard Ceiling applications |
| 3) Cable Entry | 0.75-inch conduit fitting |
| 4) Environmental Features | Factory-installed heaters and blowers |
| 5) Operating Temperatures | Maximum temperature range of -60°F to 140°F (-51°C to 60°C) for two |

- hours and a continuous operating range of -22°F to 122°F (-30°C to 50°C)
- 6) Construction Aluminum
- 7) Trim Ring Connection 2 screws
- d. In-Ceiling, Interior
 - 1) Connection to Dome Drive Quick, positive mechanical and electrical disconnect without the use of any tools
 - 2) Installation Hard ceiling applications
 - 3) Cable Entry 0.75-inch conduit fitting
 - 4) Operating Temperatures Maximum temperature range of 32°F to 122°F (0°C to 50°C)
 - 5) Construction Aluminum
 - 6) Trim Ring Connection 2 screws
- 6. Dome System Specifications
 - a. Diameter of Bubble, Maximum of 5.9 inches (15.0 cm)
 - b. Pendant, Environmental 10.6-inch (26.9 cm) overall length (including dome) by 8.6-inch (21.8 cm) diameter
 - c. Pendant, Standard Pendant 10.6-inch (26.9 cm) overall length (including dome) by 8.6-inch (21.8 cm) diameter
 - d. In-Ceiling, Environmental 4.4 inches (11.0 cm) above ceiling, lower dome 4.3 inches (10.9 cm) below ceiling, 8.6-inch (21.8 cm) diameter
 - e. In-Ceiling, Interior 5.2 inches (13.2 cm) above ceiling, lower dome 3.5 inches (8.8 cm) below ceiling, 8.2-inch (20.8 cm) diameter
- 7. Warranty
 - a. 36-months, parts and labor
- 8. Certifications and Ratings
 - a. FCC, Class A
 - b. UL/cUL Listed
 - c. C-Tick

- d. Meets NEMA Type 4X and IP66 standards when installed properly
- 9. Pelco Model Numbers: The discreet camera dome system shall be the Pelco Spectra® HD

2.9 OUTDOOR, HIGH DEFINITION PTZ HIGH-SPEED DOME IP SYSTEM

- A. The outdoor camera dome system shall be a discreet camera dome system consisting of a dome drive with a variable speed/high speed pan/tilt drive unit with continuous 360° rotation
- B. The outdoor camera dome system shall be a ⅓.8-inch high resolution color, monochrome, or color/black-white CMOS sensor camera; motorized zoom lens with optical and digital zoom and auto focus
- C. The outdoor camera dome system shall provide an enclosure consisting of a back box, lower dome, and a quick-install mounting.
- D. The outdoor network positioning camera shall support standard IT protocols.
- E. The outdoor camera dome system shall provide a 100Base-TX network interface.
- F. The outdoor network positioning camera shall use a standard Web browser interface for remote administration and configuration of camera parameters. The browser interface shall provide PTZ control including preset and pattern and on-screen display (OSD) for access to camera programming.
- G. The outdoor network positioning camera shall have a window blanking feature to conceal user-defined privacy areas that cannot be viewed by an operator. The outdoor camera dome system shall support up to 32 blanked windows. A blanked area shall appear on the screen as a solid gray window.
- H. The outdoor network positioning camera shall feature open architecture connectivity for third-party software recording solutions allowing integration into virtually any IP-based system. It is also compatible with Endura and Digital Sentry® video management systems. As with all Pelco IP camera solutions, Spectra® IV IP is Endura Enabled™ to record, manage, configure, and view multiple live streams.
- I. The network camera shall provide an additional processor for running Pelco Video analytics.
 - 1. Pelco Analytic Suites shall be configured and enabled using a standard Web browser.

2. Pelco Analytics for Spectra HD Series including:

- a. Abandoned Object: Detects objects placed in a defined zone and triggers an alarm if the object remains in the zone longer than the user-defined time allows. An airport terminal is a typical installation for this behavior. This behavior can also detect objects left behind at an ATM, signaling possible card skimming.
- b. Adaptive Motion: Detects and tracks objects that enter a scene and then triggers an alarm when the objects enter a user-defined zone. This behavior is primarily used in outdoor environments with light traffic to reduce the number of false alarms caused by environmental changes.
- c. Auto Tracker: Detects and tracks movement in the camera's field of view. When the Auto Tracker behavior is configured, the system automatically pans and tilts to follow the moving object until the object stops or disappears from the monitored area.
- d. Camera Sabotage: Detects contrast changes in the field of view. An alarm is triggered if the lens is obstructed with spray paint, a cloth, or a lens cap. Any unauthorized repositioning of the camera also triggers an alarm.
- e. Directional Motion: Generates an alarm in a high traffic area when a person or object moves in a specified direction. Typical installations for this behavior include an airport gate or tunnel where cameras can detect objects moving in the opposite direction of the normal flow of traffic or an individual entering through an exit door.
- f. Loitering Detection: Identifies when people or vehicles remain in a defined zone longer than the user-defined time allows. This behavior is effective in real-time notification of suspicious behavior around ATMs, stairwells, and school grounds.
- g. Object Counting: Counts the number of objects that enter a defined zone or cross a tripwire. This behavior might be used to count the number of people at a store entrance/exit or inside a store where the traffic is light. This behavior is based on tracking and does not count people in a crowded setting.
- h. Object Removal: Triggers an alarm if an object is removed from a defined zone. This behavior is ideal for customers who want to

detect the removal of high value objects, such as a painting from a wall or a statue from a pedestal.

- i. Stopped Vehicle: Detects vehicles stopped near a sensitive area longer than the user-defined time allows. This behavior is ideal for airport curbside drop-offs, parking enforcement, suspicious parking, traffic lane breakdowns, and vehicles waiting at gates.
 3. Pelco Analytic Suites shall be preloaded or configuration and alarm notification when used with an Endura® system or a third-party system that supports Pelco's Analytics API.
 4. Multiple user-configurable behaviors can be scheduled to work during a certain time or condition.
- J. The outdoor fixed dome system shall meet or exceed the following design and performance specifications.

1. Camera Specifications

- a. Sensor Type 1/2.8-inch Type Exmor CMOS
- b. Optical Zoom 20X
- c. Digital Zoom 12X
- d. Maximum Resolution 1920 x 1080
- e. Lens f/1.6 ~ f/3.5, (focal length, 4.7 ~ 94.0 mm optical)
- f. Horizontal Angle of View 55.4° (wide) ~ 2.9° (tele)
- g. Aspect Ratio 16:9
- h. Light Sensitivity Sensitivity in lux for 90% reflectance, f/1.6 (wide angle), 28 dB gain at 30 IRE (30% of signal level) with Sensitivity Boost OFF. 4X improvement to sensitivity with Sensitivity Boost ON.
 - 1) Color (33 ms) 0.65 lux
 - 2) Color (250 ms) 0.07 lux
 - 3) Mono (33 ms) 0.20 lux
 - 4) Mono (250 ms) 0.015 lux
- i. Day/Night Capabilities Yes
- j. IR Cut Filter Yes
- k. IR Trace Curves 850 nm and 950 nm
- l. Wide Dynamic Range 80dB
- m. Iris Control Auto iris with manual override
- n. Backlight Compensation Yes

- o. Automatic Gain Control Yes
- p. Active Noise Filtering Yes
- 2. Video Specifications
 - a. Video Encoding H.264 in High, Main, or Base profiles and MJPEG
 - b. Video Streams Up to 2 simultaneous streams, the second stream is variable based on the setup of the primary stream
 - c. Frame Rate Up to 30, 25, 15, 12.5, 10, 8.333, 7.5, 6, 5, 3, 2.5, 1 (depending upon coding, resolution, and stream configuration)
 - d. Available Resolutions
 - 1) 2.07 Megapixel 1920 x 1080; 16:9 aspect ratio; 30.0 ips max., 12.0 Mbps bit rate for MJPEG; 30.0 ips max., 3.50 Mbps bit rate for H.264
 - 2) 0.92 Megapixel 1280 x 720; 16:9 aspect ratio; 30.0 ips max., 12.0 Mbps bit rate for MJPEG; 30.0 ips max., 2.90 Mbps bit rate for H.264
 - 3) 0.36 Megapixel 800 x 448; 16:9 aspect ratio; 30.0 ips max., 5.75 Mbps bit rate for MJPEG; 30.0 ips max., 1.80 Mbps bit rate for H.264
 - 4) 0.23 Megapixel 640 x 352; 16:9 aspect ratio; 30.0 ips max., 3.60 Mbps bit rate for MJPEG; 30.0 ips max., 1.15 Mbps bit rate for H.264
 - 5) 0.13 Megapixel 480 x 272; 16:9 aspect ratio; 30.0 ips max., 2.05 Mbps bit rate for MJPEG; 30.0 ips max., 0.75 Mbps bit rate for H.264
 - 6) 0.06 Megapixel 320 x 176; 16:9 aspect ratio; 30.0 ips max., 0.90 Mbps bit rate for MJPEG; 30.0 ips max., 0.35 Mbps bit rate for H.264
 - 7) Supported Protocols TCP/IP, UDP/IP (Unicast, Multicast IGMP), UPnP, DNS, DHCP, RTP, RTSP, NTP, IPv4, SNMP v2c/v3, QoS, HTTP, HTTPS, LDAP (client), SSH, SSL, SMTP, FTP, and 802.1x (EAP)
 - e. Users
 - 1) Unicast Up to 20 simultaneous users

- 2) Multicast Unlimited H.264
- f. Security Access Password protected
- g. Software Interface Web browser view and setup
- h. Pelco System Integration Endura 2.0 (or later); Digital Sentry 7.3 (or later)
- i. Open API Pelco API or ONVIF v1.02
- j. Minimum PC Requirements
 - 1) Processor Intel® Core™ i3 Processor, 2.4 GHz
 - 2) Operating System Microsoft® Windows® 7 (32-bit and 64-bit) with DirectX 11, Windows® XP Service Pack 3 with DirectX 9.0c, or Mac OS® X 10.4 (or later)
 - 3) Web User Interface Requires QuickTime® 7.55 (or later)
 - 4) Memory 4 GB RAM
 - 5) Network Interface Card 100 Mbps
 - 6) Monitor Minimum of 1024 x 768 resolution, 16- or 32-bit pixel color resolution Web Browser Internet Explorer® 8.0 (or later) or Mozilla® Firefox® 3.5 (or later); Internet Explorer 8.0 (or later) is recommended for configuring analytics
 - 7) Media Player Pelco Media Player or QuickTime® 7.6.5 for Microsoft Windows XP, Windows Vista and Windows 7; or QuickTime 7.6.4 for Mac OS X 10.4 (or later)
- 3. Electrical Specifications
 - a. Port RJ-45 for 100Base-TX; Auto MDI/MDI-X; autonegotiate/manual setting
 - b. Cabling Type Cat5 cable or better for 100Base-TX
 - c. Input Voltage 18 to 32 VAC; 24 VAC nominal; 22 to 27 VDC; 24 VDC nominal

- d. Input Power
 - 1) 24 VAC 23 VA nominal (without heater and blower); 73 VA nominal (with heater and blower)
 - 2) 24 VDC 0.7 A nominal (without heater and blower); 3 A nominal (with heater and blower)
 - 3) PoE IEEE802.3af (without heater and blower)
- 4. Dome Drive Specifications
 - a. Pan Movement 360° continuous pan rotation
 - 1) Pan Speed Variable between 400 per second continuous pan to 0.1° per second
 - 2) Vertical Tilt Unobstructed tilt of +1° to -90°
 - 3) Manual Control Speed Pan speed of 0.1° to 80° per second and pan at 150° per second in turbo mode; tilt operation shall range from 0.1° to 40° per second
 - 4) Automatic Preset Speed Pan speed of 280° and a tilt speed of 160° per second
 - 5) Presets 255 positions with 16 preset tours
 - 6) Preset Accuracy $\pm 0.1^\circ$
 - 7) Proportional Pan/Tilt Speed Speed decreases in proportion to the increasing depth of zoom
 - 8) Motor Continuous duty and variable speed, operating at 18 to 32 VAC, 24 VAC nominal
 - 9) Window Blanking 32 blanked windows; window blanking setting to turn off at user-defined zoom ratio; window blanking set to opaque gray or translucent smear; blank all video above user defined tilt angle; blank all video below user-defined tilt angle
 - 10) Auto Flip Rotates dome 180° at bottom of tilt travel
 - a) Dome Drive Compatibility All dome drives are compatible with all back box configurations

b) Power Consumption Nominal 23 VA (without heater and
blower running)

c) Nominal 73 VA (with heater and blower running)

5. Back box and lower dome specifications

a. Pendant, Environmental

- | | |
|-----------------------------|--|
| 1) Connection to Dome Drive | Quick, positive mechanical and electrical disconnect without the use of any tools |
| 2) Installation | Quick-mount wall, corner, pole, parapet, or ceiling adapter |
| 3) Cable Entry | Through 1.5-inch NPT fitting |
| 4) Environmental Features | Factory-installed heaters, blowers, and sun shroud |
| 5) Operating Temperatures | Maximum temperature range of -51°C to 60°C (-60°F to 140°F) for two hours and a continuous operating range of -45°C to 50°C (-50°F to 122°F) |
| 6) Construction | Aluminum |
| 7) Trim Ring Connection | 2 screws |

b. Pendant, Standard

- | | |
|-----------------------------|---|
| 1) Connection to Dome Drive | Quick, positive mechanical and electrical disconnect without the use of any tools |
| 2) Installation | Quick-mount wall, corner, pole, parapet, or ceiling adapter |
| 3) Cable Entry | Through 1.5-inch NPT fitting |
| 4) Environmental Features | Factory-installed heaters, blowers, and sun shroud |
| 5) Operating Temperatures | Maximum temperature range of 45°C (113°F) for two hours and a continuous operating range of -4°C to 35°C (25°F to 95°F) |
| 6) Construction | Aluminum |
| 7) Trim Ring Connection | 2 screws |

c. In-Ceiling, Environmental

- | | |
|-----------------------------|--|
| 1) Connection to Dome Drive | Quick, positive mechanical and electrical disconnect without the use of any tools |
| 2) Installation | Hard Ceiling applications |
| 3) Cable Entry | 0.75-inch conduit fitting |
| 4) Environmental Features | Factory-installed heaters and blowers |
| 5) Operating Temperatures | Maximum temperature range of -51°C to 60°C (-60°F to 140°F) for two hours and a continuous operating range of -45°C to 50°C (-50°F to 122°F) |
| 6) Construction | Aluminum |
| 7) Trim Ring Connection | 2 screws |

d. In-Ceiling, Interior

- | | |
|-----------------------------|---|
| 1) Connection to Dome Drive | Quick, positive mechanical and electrical disconnect without the use of any tools |
| 2) Installation | Hard ceiling applications |
| 3) Cable Entry | 0.75-inch conduit fitting |
| 4) Operating Temperatures | Maximum temperature range of 0° to 50°C (32°F to 122°F) |
| 5) Construction | Aluminum |
| 6) Trim Ring Connection | 2 screws |

e. Dome System Specifications

- | | |
|------------------------------|---|
| 1) Diameter of Bubble, | Maximum of 15.00 cm (5.90 in) |
| 2) Pendant, Environmental | 26.90 cm (10.60 in) overall length (including dome) by 23.80 cm (9.38 in) diameter |
| 3) Pendant, Standard | Pendant 26.90 cm (10.60 in) overall length (including dome) by 21.80 cm (8.60 in) diameter |
| 4) In-Ceiling, Environmental | 11.00 cm (4.40 in) above ceiling, lower dome 10.90 cm (4.30 in) below ceiling, 21.80 cm (8.6 in) diameter |

- | | |
|-------------------------|--|
| 5) In-Ceiling, Interior | 13.20 cm (5.20 in) above ceiling,
lower dome 8.80 cm (3.50 in) below
ceiling, 20.80 cm (8.20 in)
diameter |
|-------------------------|--|

6. General Specifications

a. Construction

- | | |
|---------------|--------------------------|
| 1) Dome Drive | Aluminum, thermo plastic |
| 2) Lower Dome | Acrylic |
| 3) Back Box | Aluminum |

b. Light Attenuation

- | | |
|-----------|------------------|
| 1) Smoked | f/0.5 light loss |
| 2) Clear | Zero light loss |

c. Weight

- | | |
|-----------------------------|-------------------|
| 1) In-Ceiling | 2.10 kg (4.60 lb) |
| 2) Environmental In-Ceiling | 2.40 kg (5.40 lb) |
| 3) Standard Pendant | 3.50 kg (7.70 lb) |
| 4) Environmental Pendant | 3.60 kg (7.90 lb) |

7. Analytic Specifications

a. Required Systems for Pelco Analytics

- | | |
|--------------------|--|
| 1) Pelco Interface | WS5200 Advanced System Management
Software on an Endura 2.0 (or
later) |
| 2) Open API | Pelco API transmits behavior alarm
data to third party applications |

8. Warranty

a. 36-months, parts and labor

K. Certifications and Ratings

1. CE, Class A
2. FCC, Class A
3. UL/cUL Listed
4. C-Tick
5. NEMA Type 4X and IP66 standards
6. ONVIF 1.02
7. KCC
8. For Environmental models:
 - IEC 60068-2-1
 - IEC 60068-2-2

IEC 60068-2-6
IEC 60068-2-14
IEC 60068-2-27
IEC 60068-2-30
IEC 60068-2-78

L. Pelco Model Number

1. The discreet camera dome system shall be the Spectra® 1080P Series Network Dome Positioning System

2.10 CAMERA HOUSINGS AND MOUNTS

A. General:

1. This section pertains to all interior and exterior housings, domes, and applicable wall, ceiling, corner, pole, and rooftop mounts associated with the housing. Housings and mounts shall be specified in accordance to the type of cameras used.
2. All cameras and lenses shall be enclosed in a tamper resistant housing. Any additional mounting hardware required to install the camera housing at its specified location shall be provided along with the housing.
3. The camera and lens contained inside the housing shall be installed on a camera mount. All additional mounting hardware required to install the camera housing at its specified location shall be provided along with the housing.
4. Shall be manufactured in a manner that are capable of supporting a maximum of three (3) cameras with housings, and meet environmental requirements for the geographical area the camera support equipment is being installed on or within.
5. Environmentally Sealed
 - a. Shall be designed in manner that it provides a condensation free environment for correct camera operation.
 - b. Shall be operated in a 100 percent condensing humidity atmosphere.
 - c. Shall be constructed in a manner that:
 - 1) Has a fill valve to allow for the introduction of nitrogen into the housing to eliminate existing atmospheric air and pressurize the housing to create moisture free conditions.
 - 2) Has an overpressure valve to prevent damage to the housing in the event of over pressurization.

- 3) Is equipped with a humidity indicator that is visible to the eye to ensure correct atmospheric conditions at all times.
- 4) The leak rate of the housing is not to be greater than 13.8kPa or 2 pounds per square inch at sea level within a 90 day period.
- 5) It shall contain camera mounts or supports as needed to allow for correct positioning of the camera and lens.
- 6) The housing and sunshield are to be white in color.
6. All electrical and signal cables required for correct operations shall be supplied in a hardened carrier system from the controller to the camera.
7. The mounting bracket shall be adjustable to allow for the housing weight of the camera and the housing unit it is placed in.
8. Accessibility to the camera and mounts shall be taken into consideration for maintenance and service purposes.

B. Indoor Mounts

1. Ceiling Mounts:

- a. This enclosure and mount shall be installed in a finished or suspended ceiling.
- b. The enclosure and mount shall be fastened to the finished ceiling, and shall not depend on the ceiling tile grid for complete support.
- c. Suspended ceiling mounts shall be low profile, and shall be suitable for replacement of 610mm x 610mm (2 foot by 2 foot) ceiling tiles.

2. Ceiling Mount Adapter:

- a. The ceiling mount adapter shall consist of a circular ring adapter, threaded for a suitable length of 1-1/2" pipe designed to mount a pendant dome or monitor to a ceiling along with any accessories which may be required for a complete mount adapter.
- b. The ceiling mount adapter shall meet or exceed the following design and performance specifications:
 1. The ceiling mount adapter shall measure 4.50" in diameter and shall be designed to accept a 1-1/2" NPT threaded pipe for adapting the mounting of either a dome or monitor mount.

2. The ceiling mount adapter shall be mounted to a ceiling via four 5/16" diameter user supplied fasteners suitable for the mounting surface.
 3. The ceiling mount adapter shall constructed of steel and finished in a black polyester powder coat.
 4. The ceiling mount adapter shall be UL listed to Standard 2044.
 5. The ceiling mount adapter shall weigh 2 lbs.
 - c. The ceiling mount adapter shall be provided with a manufacturer's warranty covering repair or replacement of defective parts for a period of one year from the date of shipment.
 - d. The ceiling mount adapter shall be the Pelco MRCA or approved equal.
3. Wall Mounts:
- a. The enclosure shall be installed in manner that it matches the existing décor and placed at a height that it will be unobtrusive, unable to cause personal harm, and prevents tampering and vandalism.
 - b. The interior mount shall contain a manual pan/tilt head that will provide 360 degrees of horizontal and vertical positioning from a horizontal position, and has a locking bar or screw to maintain its fixed position once it has been adjusted.
- C. Interior Domes
1. The interior dome shall be a pendant mount, pole mount, ceiling mount, surface mount, or corner mounted equipment.
 2. The lower portion of the dome that provides camera viewing shall be clear, zero light loss.
 3. The housing shall be equipped with integral pan/tilt capabilities complete with wiring, wiring harness, connectors, receiver/driver, pan/tilt control system, pre-position cards, or any other hardware and equipment as needed to fully provide a fully functional pan/tilt dome.
 4. The pan/tilt mechanism shall be:
 - a. Constructed of heavy duty bearings and hardened steel gears.
 - b. Permanently lubricated to ensure smooth and consistent movement of all parts throughout the life of the product.
 - c. Equipped with motors that are thermally or impedance protected against overload damage.

- d. Pan movements shall be 360 degrees and tilt movement shall not be less than +/- 90 degrees.
 - e. Pan speed shall be a minimum of 10 degrees per second.
- D. Exterior Domes
- 1. The exterior dome shall meet all requirements outlined in the interior dome paragraph above.
 - 2. The housing shall be constructed to be dust and water tight, and fully operational in 100 percent condensing humidity.
- E. Exterior Wall Mounts
- 1. Shall have an adjustable head for mounting the camera.
 - 2. Shall be constructed of aluminum, stainless steel, or steel with a corrosion-resistant finish.
 - 3. The head shall be adjustable for not less than plus and minus 90 degrees of pan, and not less than plus and minus 45 degrees of tilt. If the bracket is to be used in conjunction with a pan/tilt, the bracket shall be supplied without the adjustable mounting head, and shall have a bolt-hole pattern to match the pan/tilt base.
 - 4. Shall be installed at a height that allows for maximum coverage of the area being monitored.
- F. Dome Mount
- 1. The dome mount shall consist of a medium duty mount designed specifically for mounting the Spectra® Series, DF5 Series, and DF8 Series pendant domes to a wall, pole, or roof top parapet along with any accessories that may be required for a complete dome mount.
 - 2. The dome mount shall meet or exceed the following design and performance specifications:
 - a. The mount shall be 14.63 inches (37.16 cm) long.
 - b. The mount shall be capable of supporting up to 75 lb (34 kg).
 - c. The mount shall be versatile in that it may be mounted directly to a wall or adapted to a parapet, corner, or pole when used with the proper optional adapter.
 - d. The mount shall not be supplied with a pipe for dome mounting.
 - e. The mount shall be constructed of cast aluminum and finished in gray or black polyester powder coat.
 - f. The mount shall be capable of cable access either through two cable feedthrough holes in the mounting plate or one 0.75-inch

(1.91 cm) NPT opening located on the bottom of the mount for a conduit connector.

g. The mount shall be mounted to a solid surface via four 3/8-inch fasteners suitable for the mounting surface.

h. The mount shall weigh 6.58 lb (2.98 kg).

3. The dome mount shall be provided with a manufacturer's warranty covering repair or replacement of defective parts for a period of one year from the date of shipment.

4. The dome mount shall be the Pelco IWM24-BK or IWM24-GY, and the optional adapters shall be the Pelco PP4348 or PP400 parapet mounts, the Pelco PA402 pole mount, the Pelco CM400 corner mount, or approved equal.

2.11 OUTDOOR POWER SUPPLY FOR PARKING LOT POLE MOUNTED CAMERAS ONLY

A. The power supply shall allow for powering of one outdoor unit from a single power source and shall allow for 24 VAC output. The power supply shall allow the capability to handle pan/tilt, heater, and blower operation in addition to the camera; shall allow for one fused output; and be capable of handling up to 100 VA of load. The power supply shall be provided integral to the dome mount, Pelco IWM24 series, and provided from the same manufacturer.

B. Electrical Specifications

1. Input Voltage 120 or 240 VAC, 50/60 Hz, switchable through an internal slide switch.
2. Output Power 24 VAC, 100 VA transformer
3. Required Input Current: One 1.6 A, 120V, fast acting.

2.12 24 VDC POWER SUPPLY

A. Refer to Contract Drawings for specification.

2.13 3000VA UNINTERRUPTIBLE POWER SUPPLY (UPS)

A. The UPS shall have integral surge protection and be suitable for installation as a floor mount. The UPS shall be capable of maintaining power to the system for no less than five minutes at full load on internal battery in the event of power failure.

B. Output power capacity shall be 3000VA, 2,200 watts, 0.75 power factor, with 98 percent line-mode efficiency, or better. Battery type shall be maintenance free, leak-proof, sealed lead-acid batteries with suspended electrolyte.

- C. The UPS shall feature automatic self-test, automatic voltage regulation, and replace batteries indicator. The UPS shall be equipped with an interface port for communications and management. Provide 8 NEMA 5-20R receptacle outputs. Input shall be one L5-30P.
- D. Furnish the UPS with a network management card. The network management card shall utilize SNMP. The network management card shall be Tripp Lite model number SNMPWEBCARD or approved equal.
- E. The UPS shall conform to FCC Part 15 Class A, UL 1449 and UL 1778.
- F. The UPS shall be Tripp Lite model number SMART3000RM2U or approved equal.
- G. Install and connect a battery pack with the capabilities of maintaining power to the system for no less than thirty minutes at full load in the event of a power failure. Battery type shall be maintenance-free, leak-proof, sealed lead-acid batteries with suspended electrolyte. The battery pack shall be Tripp Lite model number BP48V60RT3U or approved equal.
- H. Provide all equipment to install as a tower.

2.14 SINGLE WORKSTATION UNINTERRUPTIBLE POWER SUPPLY (UPS)

- A. Provide an AVR series 900VA Ultra-compact line-interactive 120 volt UPS with USB port as manufactured by Tripp Lite, Model AVR900U or approved equal for desktop PC, network workstations and monitors.
- B. Output:
 - 1. Output Volt Amp Capacity: 900VA
 - 2. Output Watt Capacity: 480 Watts.
 - 3. Nominal Output Voltage: 115V, 60Hz.
 - 4. Output Voltage Regulation, line mode: 120V, +8%, -21%
 - 5. Output Voltage Regulation, battery mode: 115V, +5%, -5%
 - 6. Built-in UPS output receptacles: 12 5-15R outlets.
 - 7. Surge suppression only outlets: 6 UPS outlets, 6 surge-only outlets
 - 8. Output AC waveform, AC mode: Sine wave
 - 9. Output AC waveform, Battery mode: PWM sine wave
- D. Input:
 - 1. Rated Input Current, at maximum load: 12A
 - 2. Nominal Input Voltage: 120V AC
 - 3. UPS input connection type: 5-15P with 6 foot cord
- E. Battery:
 - 1. Full Load Runtime: 2.9 minutes @ 480W

2. Half Load Runtime: 10.5 minutes @ 240W.
3. Internal Battery, hot-swappable with user replaceable batteries

F. General Specification:

1. Provide an automatic voltage regulator that maintains line power operation with an input voltage range of 129 to 147 volts.
2. Provide overvoltage correction for input voltages between 129 and 147, reduced by 12 percent. Provide undervoltage correction for input voltages between 83 and 104, boost by 14 percent.
3. Provide 2 LEDs that indicate power status and overload/check battery status. Provide an audible alarm that indicates power-failure and overload status.
4. Operating temperature range from +32 to +104 degrees Fahrenheit with a relative humidity range of 0 to 95 percent non-condensing.
5. Communications: provide USB port, free download software and USB communications cable. Provide a Watchdog application.
6. Line to Battery transfer shall be 4 milliseconds, AC to battery, and 1 millisecond from battery to AC.
7. UL listed 1778.
8. Warranty of 3 years.

2.15 NETWORK WORKSTATION

- A. The workstation shall be a high end personal computer with a USB keyboard, a mouse, and two DVI-I monitor outputs except where noted on the Contract Drawings to be one DVI-I monitor output and one HDMI monitor output.
- B. The workstation shall use a graphical user interface and keyboard/mouse that runs on 64-bit Microsoft Windows 7 Ultimate for monitoring live and recorded video, and virtual matrix functionality that shall allow operators to see and respond to any alarm from any device on the network as well as direct any camera to any monitor on the network.
- C. The workstation shall allow administrators to configure devices, set up users, adjust network settings, and create recording schedules. Permission to access these functions and all other system services shall be configured to a fine level of detail including the ability to restrict cameras from viewers, restrict PTZ operation, allow or restrict digital zoom, Zone of Interest operations, or the ability to configure maps. In addition, user permissions shall allow for designated users to receive and respond to alarm and system diagnostic

messages. Administrators shall have the ability to prioritize user access to PTZ cameras.

- D. The workstation shall have advanced search capabilities, event logging, and alarm interface displays. The workstation shall export video and still images in multiple formats, including Pelco Native, AVI, BMP, and JPG. The unit shall provide a front panel USB port and DVD/CD-RW drive to make it capable of exporting video clips and still images to external media. Authentication software shall be exported automatically for any Pelco native exports.
- E. The workstation shall allow users with authority to monitor content from standard resolution and megapixel resolution cameras and encoders throughout the network. The workstation shall display content encoded in MPEG-4 and H.264 baseline, main, and high profiles. The workstation shall support cameras from multiple manufacturers.
- F. The workstation shall be capable of decoding up to 16 simultaneous 4CIF resolution, 30 images per second (ips) video streams encoded in MPEG-4; or 12 simultaneous 4CIF resolution, 30ips video streams encoded in H.264 baseline profile; or 2 simultaneous 1080p video streams encoded in H.264 baseline profile.
- G. The workstation shall support CCTV-style (joystick) keyboard control of Pan/Tilt/Zoom (PTZ) cameras and camera call-up.
- H. The workstation shall detect the monitor's native resolution; provide users with single, 2 x 2, 3 x 3, 4 x 4, 1 + 5, 1 + 12, 2 + 8 displays for 4:3 aspect ratio monitors, and provide 3 x 2 and 4 x 3 displays for 16:9 aspect ratio monitors.
- I. The workstation shall retain the camera's aspect ratio and allow mixing standard resolution and megapixel resolution cameras on the same display.
- J. The workstation shall allow any combination of live or playback video on the same monitor at the same time. The workstation shall provide time-synchronized playback of up to 16 cameras simultaneously.
- K. The workstation shall provide digital zoom capability for any camera in live or playback mode.
- L. The workstation shall provide a Zone of Interest feature that can generate up to six independently controlled and zoomed images from a single image and allow operators to maintain a panoramic view of the

scene while closely monitoring selected areas. This shall be accomplished without requiring additional network throughput.

- M. The system shall be capable of customizing the display area to suit user preferences. All aspects of the graphical user interface shall be capable of being resized, torn-off and moved to other monitors, or simply hidden. The system shall allow up to 6 customizable workspaces to be created and loaded with camera groups to facilitate easy and efficient monitoring. The system shall allow for up to two detachable video display windows to accommodate up to a 32-camera display.
- N. The workstation shall automatically load a user's language preferences, camera groups, and screen configurations upon log on. The workstation shall support the English language and also support languages that do not use the Latin alphabet such as Chinese, Korean, Turkish, and Arabic.
- O. The workstation shall notify designated operators of all alarms on the system in an alarm tab. Video thumbnails shall be available for visual verification within the alarm monitoring workspace. The system shall allow alarms to be acknowledged or snoozed by the operator. The workstation application shall support the functionality to view procedures and instructions for given alarms triggered to appear during alarm events, while generating detailed written or verbal instructions to the operator as to the actions to be taken. An operator shall have the capability of entering his or her own feedback to the given alarm. All user alarms and user actions shall be kept in the system log for audit purposes.
- P. The workstation application shall provide the ability to control and program any camera equipped with PTZ. The workstation shall be capable of the following operations
 - 1. Manually control the PTZ
 - 2. Set the pan/tilt home positions for manual or alarm activation
 - 3. Automatically control the cameras through an alarm trigger
 - 4. Ability to set multiple preset positions
 - 5. Ability to set multiple tours
 - 6. Remotely set and clear the movement limits of the pan/tilt mechanism from the control room, through a telemetry unit at an outdoor camera site
 - 7. Adjust the zoom lens

8. Ability to control the camera menu and set up the camera through the IP video security system

Q. The workstation shall meet or exceed the following design and performance specifications.

1. System Specifications

- a. Processor Intel® Core 2 Quad Q9400
- b. Internal Memory 4 GB RAM
- c. Operating System Windows 7 Ultimate, 64-bit version
- d. User Interface Graphical User Interface, WS5200 version 2.x, advanced system management software
- e. Video System Graphics card with 512 MB video RAM (nonshared memory), 2560 x 1600 display resolution, and DirectX® 10; true color (32-bit), 2 dual-link DVI outputs

2. Power Specifications

- a. Power Input 100 to 240 VAC, 50/60 Hz, autoranging
- b. Power Supply Internal
- c. Power Consumption Operating Maximum
 - 1) 100 VAC 160 W, 1.60 A, 547 BTU/H
 - 2) 115 VAC 160 W, 1.39 A, 547 BTU/H
 - 3) 220 VAC 160 W, 0.72 A, 547 BTU/H
 - 4) Power Cord: region-specific, 3 prongs, 6 ft (1.8m)

3. Environmental Specifications

- a. Operating Temperature 50° to 95°F (10° to 35°C)
- b. Storage Temperature -40° to 149°F (-40° to 65°C)
- c. Operating Humidity 20% to 80%, noncondensing
- d. Max. Humidity Gradient 10% per hour
- e. Operating Altitude -50 to 10,000 ft (-15 to 3,048m)
- f. Operating Vibration 0.25 G at 3 Hz to 200 Hz at a sweep rate of 0.5 octave/minute

4. Physical Specifications

- a. Construction Steel Cabinet
 - 1) Finish
 - 2) Front panel Gray metallic with black end caps
 - 3) Chassis Black matte finish
 - 4) Dimensions 17.0" Dx17.1" Wx3.5" H
(43.20x43.40x8.90cm)

- 5) Mounting Desktop (feet) or rack (2 RU per unit)
- 6) Unit Weight 28.80 lbs. (13.06kg)
- 5. Video Specifications
 - a. Video Output 2 DVI outputs (2 DVI-to-VGA supplied)
 - b. Video Decoding MPEG-4 ASP; H.264 Baseline, Main, and High profile
 - c. Video Decoding
 - 1) Performance 16Xreal-time MPEG-4 streams at 704 x 480; 12X real-time H.264 Baseline profile streams at 704 x 480; 4X H.264 Baseline profile streams at 720p; 2X real-time H.264 Baseline profile streams at 1080p
 - d. Video Display Modes: 1 image, 4 images (2 x 2), 9 images (3 x 3) 16 images (4 x 4), 6 images (1 large + 5 small), 10 images (2 large + 8 small), 13 images (1 large + 12 small); High definition monitors can also display 6 images (3 x 2) and 12 images (4 x 3)
 - e. PTZ Control Available in KBD5000
- 6. Audio Specifications
 - a. Audio Decoding G.711 speech codec
 - b. Audio Bit Rate 64 kbps
 - c. Audio Input Level Electret microphone
 - d. Audio Output Level Up to 3 Vp-p, adjustable, min. load of 8 ohms
 - e. Audio Inputs Microphone and line-in
 - f. Audio Outputs Speaker or line out
 - g. Front Panel Specifications
- 7. Auxiliary Interfaces
 - a. Network Specifications
 - 1) Interface Gigabit Ethernet (GE) RJ-45 port, (1000Base-T)
 - 2) Security 2 modes: secure mode and unsecured mode
 - b. USB 2.0 7 USB 2.0 ports (1 front, 6 rear)
 - c. DVD±RW/CD-RW Drive
 - 1) CD read/write speed 24X
 - 2) CD rewrite speed 24X

- 3) DVD read/write speed 8X
- 4) DVD rewrite speed 8X/6X (dual layer)
- 8. Front Panel Specifications
 - a. Power Blue
 - b. Network Activity Green, red
 - c. Unit Status Green, Amber, Red
- 9. Certifications
 - a. CE, Class A
 - b. FCC, Class A
 - c. UL/cUL Listed
 - d. S-Mark for Argentina
 - e. CCC
 - f. C-Tick
- R. Warranty
 - 1. 36 months, parts and labor
- S. Supplied Accessories
 - 1. 1 region specific power cord
 - 2. 1 Pelco keyboard, 1 Pelco mouse
 - 3. 1 rack-mounting kit (for mounting in 2 RU rack)
 - 4. 1 resource disc, 1 recovery disc
 - 5. Windows 7 Ultimate Disc with License
- T. Pelco Model Number
 - 1. WS5070-Series, Workstation

2.16 ETHERNET MINI 2 PORT MEDIA CONVERTER

- A. Provide a standalone Ethernet 2 port media converter that is designed to transmit and receive 10/100 Mbps data over single mode optical fiber without any adjustments and environmentally hardened to operate in extreme temperatures. Provide with conformal coating applied to the printed circuit boards for installation in condensing conditions.
- B. System Description: Provide Ethernet media converters in an Ethernet transceiver system configuration utilizing 1310nm optics, as shown on the Contract Drawings, that transmits bi-directional 10Mbps and or 100Mbps data over two single mode optical fibers.
- C. Submittals
 - 1. Manufacturer's printed product data sheet.
 - 2. Detail Drawings: Electrical and optical connect drawings.
 - 3. Product mounting template.

4. Manufacturer's Installation and Operating Manual.
5. Manufacturer's printed Warranty.

D. Warranty

1. Provide manufacturer's lifetime Warranty.

E. Manufacturer's

1. Provide International Fiber Systems (IFS), Inc. 16 Commerce Road, Newtown, CT 06470 USA, Telephone 203-426-1180, model DE7230MC.
2. Or approved equal.

F. General Specifications

1. The Ethernet data transceiver shall be an IFS DE7230MC series module. The module shall support the transmission of 10 and or 100 Mbps over a single-mode fiber(s). The module shall support the Ethernet data interface and be IEEE 802.3 compliant. The unit shall provide Network Detection for MDI/MDI-X cabling by a selected dip switch, making plug and play easy. The unit shall be set to auto-negotiate data rates and can be used for half duplex or full duplex transmission. The module shall require no infield optical adjustments or in-line attenuators to ease installation. Provide with a continuously active contact closure relay to activate an external alarm. Provide power and fiber link status indicating LED's for monitoring proper system operation. Provide automatic re-settable solid-state current limiters and independent voltage regulators on each module to reduce the chance of a single point failure of the system. The module shall have an MTBF of > 100,000 hours and operate in an environment of -40 degrees Celsius to +74 degrees Celsius and relative humidity between 0% to 95%, non-condensing. The module shall be UL listed. The circuit board shall be UL 94 flame rated and meet all PCI standards. The housing shall be of metal construction. Provide silk-screened labels for all LED indicators and both electrical and mechanical connections.

G. Data Specifications

1. Data Interface: Ethernet IEEE802.3.
2. Data Rate: 10/100 Mbps.
3. Operation Mode: Full and or Half Duplex

H. Optical Specifications

1. Optical Fiber: 9/125 micron single mode.
2. Number of fibers required per device: 2.

3. Optical Wavelength: 1310nm.
4. Optical Power Budget: 15 dB.
5. Optical Attenuation: No manual adjustments required.

I. Status Indicators.

1. Power: On/Green - Off/Off.
2. Fiber Link: Fiber connection/Green - No Fiber Connection/Off.

J. Connectors

1. Optical: SC
2. Power: Terminal blocks with screw clamps. Provide plug-in transformer.
3. Contact Closure: Terminal Block with Screw Clamps.
4. Data: RJ-45.

K. Electrical Specifications

1. Power: Surface Mount: 12VDC @ 200mA.
2. Current Protection: Automatic re-settable solid-state current limiters.
3. Voltage Regulation: Solid-state, Independent on each board.
4. Circuit Board: UL 94 flame rated.

L. Mechanical Specifications

1. Surface Mount Dimensions: 4.0" x 3.0" x 1.0" (10.2 cm x 7.6 cm x 2.5 cm).
2. Finish: Module shall be constructed of a metal enclosure with a powder coat finish with all connections and indicators silk-screened directly on the unit.
3. Weight: Less than 2 pounds.

M. Environmental Specifications

1. MTBF: Greater than 100,000 Hours.
2. Operating Temp: -40 degrees Celsius to +74 degrees Celsius without the assistance of fan forced cooling.
3. Storage Temp: -40 degrees Celsius to +85 degrees Celsius
4. Relative Humidity: 0 percent to 95 percent (non-condensing) and provided with conformal coating applied to the printed circuit boards for installation in condensing installations.

2.17 WIRES AND CABLES

- A. Shall meet or exceed the manufactures recommendation for power and signal.

- B. Will be carried in an enclosed conduit system where indicated on the Contract Drawings, utilizing electromagnetic tubing (EMT) to include the equivalent in flexible metal, rigid galvanized steel (RGS) to include the equivalent of liquid tight, polyvinylchloride (PVC) schedule 40 or 80.
- C. All conduits will be sized and installed per the NEC. All security system signal and power cables that traverse or originate in a mechanical space, high security office space shall be contained in either EMT or RGS conduit.
- D. All conduit, pull boxes, and junction boxes shall be clearly marked with colored permanent tape or paint that will allow it to be distinguished from all other conduit and infrastructure.
- E. Conduit fills shall not exceed 50 percent unless otherwise documented.
- F. A pull string shall be pulled along and provided with signal and power cables to assist in future installations.
- G. At all locations where there is a wall penetration or core drilling is conducted to allow for conduit to be installed, fire stopping materials shall be applied to that area.
- H. High voltage and signal cables shall not share the same conduit and shall be kept separate up to the point of connection. High voltage for the security system shall be defined as any cable or sets of cables carrying 30 VDC/VAC or higher.
- I. For all equipment that is carrying digital data between the Physical Access Control System and Database Management or at a remote monitoring station, shall not be less than 20 AWG and stranded copper wire for each conductor. The cable or each individual conductor within the cable shall have a shield that provides 100% coverage. Cables with a single overall shield shall have a tinned copper shield drain wire.
- J. All cables and conductors, except fiber optic cables, that act as a control, communication, or signal lines shall include surge protection. Surge protection shall be furnished at the equipment end and additional triple electrode gas surge protectors rated for the application on each wire line circuit shall be installed within 1 m. (3 ft.) of the building cable entrance. The inputs and outputs shall be tested in both normal and common mode using the following wave forms:
 - 1. A 10 microsecond rise time by 1000 microsecond pulse width waveform with a peak voltage of 1500 watts and peak current of 60 amperes.

2. An 8 microsecond rise time by 20 microsecond pulse width wave form with a peak voltage of 1000 volts and peak current of 500 amperes.
- K. The surge suppression device shall not attenuate or reduce the video or sync signal under normal conditions. Fuses and relays shall not be used as a means of surge protection.

L. Coaxial Cables

1. All video signal cables for the VASS System, with exception to the PoE cameras, shall be a coaxial cable and have a characteristic impedance of 75 ohms plus or minus 3 ohms.
2. For runs between 0 feet and 1250 feet, RG-6/U is required. RG-6/U shall be shielded which provides a minimum of 95 percent coverage, with a stranded copper center conductor of a minimum 18 AWG, polyethylene insulation, and black non-conductive polyvinylchloride (PVC) jacket.
3. For runs of 1250 to 2750 feet, RG-11/U is required. RG-11/U shall be shielded which provides a minimum of 95 percent coverage, with a stranded copper center conductor of a minimum 14 AWG, polyethylene insulation, and black non-conductive polyvinylchloride (PVC) jacket.
4. All runs greater than 2750 feet will be substituted with a fiber optic cable. If using fiber optics as a signal carrier then the following equipment will be utilized:
 - a. Multimode fiber optic cable a minimum size of 62 microns
 - b. Video transmitter, installed at the camera that utilizes 12 VDC or 24 VAC for power.
 - c. Video receiver, installed at the building entrance.
5. RG-6/U Technical Characteristics:

AWG	18
Stranding	7x27
Conductor Diameter	.040 in.
Conductor Material	BC
Insulation Material	Gas-injected FHDPE
Insulation Diameter	.180 in.
Outer Shield Material	Trade Name Duofoil
Outer Shield Type	Tape/Braid
Outer Shield %Coverage	100 %
Outer Jacket Material	PVC

Overall Nominal Diameter	.274 in.
Nom. Characteristic Impedance	75 Ohms
Nom. Inductance	0.106 μ H/ft
Nom. Capacitance	Conductor to Shield 16.2 pF/ft
Nom. Velocity of Propagation	82 %
Nom. Delay	1.24 ns/ft
Nom. Conductor DC Resistance	6.4 Ohms/1000 ft
Nominal Outer Shield DC Resistance @ 20°C	2.8 Ohms/1000 ft
Max. Operating Voltage	UL 300 V RMS

6. RG-11/U Technical Characteristics:

AWG	15
Stranding	19x27
Conductor Diameter	.064 in.
Conductor Material	BC
Insulation Material	Gas-injected FHDPE
Insulation Diameter	.312 in.
Inner Shield Type	Braid
Inner Shield Material	BC - Bare Copper
Inner Shield %Coverage	95 %
Inner Jacket Material	PE - Polyethylene
Inner Jacket Diameter	.391 in.
Outer Shield Type	Braid
Outer Shield Material	BC - Bare Copper
Outer Shield %Coverage	95 %
Outer Jacket Material	Trade Name Belflex
Outer Jacket Material	PVC Blend
Overall Nominal Diameter	.520 in.
Operating Temperature Range	-35°C To +75°C
Non-UL Temperature Rating	75°C
Nom. Characteristic Impedance	75 Ohms
Nom. Inductance	0.097 μ H/ft

Nom. Capacitance	Conductor to Shield 17.3 pF/ft
Nom. Velocity of Propagation	78 %
Nom. Delay	1.30 ns/ft
Nom. Conductor DC Resistance	3.1 Ohms/1000 ft
Nom. Inner Shield DC Resistance	1.8 Ohms/1000 ft
Nom. Outer Shield DC Resistance	1.4 Ohms/1000 ft
Max. Operating Voltage Non-UL	300 V RMS

7. Signal Cables:

- a. Signal wiring for PoE cameras depends on the distance the camera is being installed from either a hub or the server.
- b. If the camera is up to 300 ft from a hub or the server, then use a shielded UTP category 6 (CAT-V) cable with standard RJ-45 connector at each end. The cable will comply with the Power over Ethernet, IEEE802.3af, Standard.
- c. If the camera is over 300 ft from a hub or server then utilize a multimode fiber optic cable with a minimum size of 62 microns.
- d. Provide a separate cable for power.
- e. CAT-6 Technical Characteristics:

Number of Pairs	4
Total Number of Conductors	8
AWG	23
Stranding	Solid
Conductor Material	BC - Bare Copper
Insulation Material	PO - Polyolefin
Overall Nominal Diameter	.230 in.
IEEE Specification	802.3 1000 Base-T
TIA/EIA Specification	854 1000 Base-Tx
Max. Capacitance Unbalance	5.9 nF/100 m
Nom. Velocity of Propagation	72 %
Max. Delay Skew	35 ns/100 m
Max. Conductor DC Resistance	9.38 Ohms/100
Max. DCR Unbalance@ 20°C	5 %

Flame Rating	Plenum NFPA 262, CMP, UL listed
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8. 8.3/125 Micron Single Mode, Optical Fiber Cable - Loose Tube Outside Plant Characteristics:

Fiber Type	8.3/125 Micron
Number of Fibers	12
Cladding Diameter	125.0 + or - 0.7 microns
Core to Cladding Concentricity	0.5% Maximum
Mode Field Diameter	1310 nm = 9.2 + or - 0.4 1550 nm = 10.4 + or - 0.5
Clad Non-Circularity	0.7% Maximum
Colored Fiber Nominal Diameter	249-259 microns
Fiber Curl radius of curvature	Greater than 4.0 meters
Cabled Fiber Attenuation	1310 nm = less than 0.4 dB 1550 nm = less than 0.3 dB
Point Discontinuity	1310 nm = 0.05 dB minimum 1550 nm = 0.05 dB minimum
Macrobend Attenuation Turns Mandrel OD <u>1 32+or-2mm</u> <u>100 50+or-2mm</u> <u>100 50+or-2mm</u> <u>100 60+or-2mm</u>	Less than 0.05 at 1550nm Less than 0.05 at 1310nm Less than 0.05 at 1550nm Less than 0.05 at 1625nm
Cable Cutoff Wavelength	Less than 1260 nm
Zero Dispersion Wavelength	Greater than 1302 but less than 1324 nm
Zero Dispersion Slope	Less than 0.092
Total Dispersion 1285-1330nm 1550nm 1625nm	Less than 3.8 ps/(nm*km) Less than 17.5 ps/(nm*km) Less than 21.6 ps/(nm*km)
Cabled Polarization Mode Dispersion	Less than 0.2 ps km
IEEE 802.3 GbE - 1300nm Laser Distance	Up to 5000 meters

Water Peak Attenuation: 1383 + or - 3 nm	Less than 0.4 dB/km
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- a. Outdoor stranded loose tube 8.3/125 micron, single mode optical fiber cable designed for backbone interbuilding outside plant applications. The cable shall be provided for use outdoors and provide excellent protection from the elements.
- b. The outside plant cable shall be listed and accepted by USDA RUS as compliant with 7CFR 1755.900, Specifications for Filled Fiber Optic Cable.
- c. Outside plant cable in conduit shall be rated for outdoor installation.
- d. All fibers in the cable shall be usable and meet required specifications.
- e. Each optical fiber shall be sufficiently free of surface imperfections and inclusions to meet the optical, mechanical, and environmental requirements of this specification.
- d. Each optical fiber shall consist of a Germania-doped silica core surrounded by a concentric glass cladding. The fiber shall be a matched clad design.
- f. Each optical fiber shall be proof tested by the fiber manufacturer at a minimum of 100 kpsi (0.7 GN/m^2).
- g. The fiber shall be coated with a dual layer acrylate protective coating. The coating shall be in physical contact with the cladding surface.
- h. The attenuation specification shall be a maximum value of each cabled fiber at $23 + \text{or} - 5$ degrees Celsius on the original shipping reel.
- i. The Single-mode fiber, SMF-28e, shall meet EIA/TIA-492CAAB, "Detail Specification for Class Iva Dispersion-Unshifted Single-Mode Optical Fibers with Low Water Peak," and ITU recommendation G.652 (Categories A, B, C & D), "Characteristics of a single-mode optical fiber cable.
- j. Provide two fiber drop cables of the same construction as the 12 fiber backbone cable. Drop cables shall be installed from splice closure to media converters in pole base junction box.

9. Optical Fiber Splice Closure:

- a. The splice closure housing shall be non-metallic. It shall be resistant to solvents, stress cracking, and creep. The housing materials shall also be compatible with chemicals and other materials to which they might be exposed in normal applications.
- b. The optical fiber closure shall be capable of accepting any optical fiber cable used in interoffice, outside plant, and building entrance facilities.
- c. The optical fiber closure shall be available in distinct sizes to accommodate a variety of cable entries as specified in the table below:

Table 2-1. Cable Capacity

Cable Capacity	Canister (Butt) Configuration		Branch (In-Line) Configuration	
	Express Entries/ Max. Cable Diameter (mm)	Drop Port Entries/ Max. Cable Diameter (mm)	Express Entries/ Max. Cable Diameter (mm)	Drop Port Entries/ Max. Cable Diameter (mm)
Large	2/32	6/25	4/32	12/25
Medium	2/25	4/18	4/25	8/18
Small	2/20	3/15	4/20	6/15

- d. As an option, the ability to double the cable capacity of an installed canister splice closure by use of a kit shall be available. Such a conversion shall not disturb existing cables or splices.
- e. The sealing mechanism shall not utilize heat shrinks nor require electrical power to attain a seal. The sealing mechanism used for the drop ports shall be of a mechanical type incorporating reusable compression fittings. Mastic sealing tape shall be used to install cables along the end cap seam. Encapsulation shall not be required to resist water penetration.
- f. The splice closure shall be re-enterable. The closure end cap shall be capable of accepting additional cables without removal of the sheath retention or strength member clamping hardware on

previously installed cables or disturbing existing splices. The optical fiber splice closure shall provide a clamping mechanism to prevent pistoning of the central member or strength members and to prevent cable sheath slip or pullout.

- g. The splice closure shall have appropriate hardware and installation procedures to facilitate the bonding and grounding of metal components in the closure and the armored cable sheath. The cable bonding hardware shall be able to accommodate a copper conductor equal to or larger than a #6 AWG.
- h. The closure shall accommodate splice trays suitable for single fiber, single fiber heat shrink, mechanical, or ribbon heat shrink splices.
- i. The small splice closure shall accommodate up to 48 single fiber splices.
- j. Spliced fibers shall not be subjected to a bend radius smaller than 30 mm (1.2 inches). Buffer tubes shall not be subjected to a bend radius smaller than 38 mm (1.5 inches).
- k. The installation of the splice closure shall not require specialized tools or equipment, other than those normally carried by installation crews.
- l. Performance Requirements as Follows:

NOTE: The test procedures for evaluating these requirements are detailed in EIA/TIA/IS-66, August 1991, section 4.0.

- 1) A bond clamp shall remain firmly attached to the cable armor sheath while under a tensile load of 9-kg (20 lbf). Following removal of the load, there shall be no evidence of clamp loosening or damage to the cable sheath, armor, or clamp that would reduce its current carrying capacity as required by the AC fault test.
- 2) The electrically conductive path used for continuity and grounding of the splice closure metallic components shall be capable of withstanding an AC current of 1000 Amperes for 20 seconds.
- 3) The cable clamping and sealing hardware used to terminate optical fiber cable shall not cause an attenuation change greater than ± 0.05 dB per fiber, when tested with a source operating at $1550 \text{ nm} \pm 20 \text{ nm}$.

- 4) An axial load of 100 lbf, individually applied to each cable, shall not cause mechanical damage to the cable or clamping hardware. The load to the optical fiber cable shall not cause an attenuation change greater than ± 0.05 dB per fiber, when tested with a source operating at 1550 ± 20 nm.
- 5) The diameter of the optical fiber splice closure shall not permanently deform more than 10%, nor temporarily deform more than 20%, when it is compressed by a uniformly distributed load of 300 lbf. Additionally, the compressive load shall cause no mechanical damage to the closure or its contents.
- 6) The closure shall not exhibit any mechanical damage after being subjected to mechanical impact of 85 lbf (115 Nm) at temperatures of $-18 \pm 2^{\circ}\text{C}$ ($0 \pm 3.6^{\circ}\text{F}$) and $40 \pm 2^{\circ}\text{C}$ ($104 \pm 3.6^{\circ}\text{F}$).
- 7) The closure shall be capable of being safely and properly assembled at temperatures of $0 \pm 2^{\circ}\text{C}$ ($32 \pm 3.6^{\circ}\text{F}$) and $40 \pm 2^{\circ}\text{C}$ ($104 \pm 3.6^{\circ}\text{F}$) using materials and procedures specified by the manufacturer.
- 8) The splice closure shall show no evidence of water penetration following exposure to a 20-foot waterhead for a period of 7 days.
- 9) A closure shall show no evidence of corrosion following exposure to salt-fog for a period of 90 days.
- 10) Samples of polymeric closure materials shall not support fungus growth when tested per ASTM G 21. A rating of 0 is required.

NOTE: The test procedures for evaluating the following requirements are detailed in GR-771-CORE, Issue 1, July 1994, section 6.

- 11) Subjecting the closure/cable interface to 10 cycles of torsional loading at ambient temperatures of $\pm 2^{\circ}\text{C}$ ($0 \pm 3.6^{\circ}\text{F}$) and $40 \pm 2^{\circ}\text{C}$ ($104 \pm 3.6^{\circ}\text{F}$) shall not cause any mechanical damage to the cable or clamping hardware. In addition, torsional loading of the optical fiber cable shall not exceed allowable attenuation changes.

12. Subjecting the closure/cable interface to 90° flexing for 8 cycles at ambient temperatures of $-18 \pm 2^{\circ}\text{C}$ ($0 \pm 3.6^{\circ}\text{F}$) and $40 \pm 2^{\circ}\text{C}$ ($104 \pm 3.6^{\circ}\text{F}$) shall not cause any mechanical damage to the cable or clamping hardware. In addition, flexing of the optical fiber cable shall not cause an attenuation change greater than ± 0.05 dB per fiber, when tested with a source operating at 1550 ± 20 nm.
13. The closure central member clamp shall prevent movement (e.g. bowing, pistoning, or breaking) of the cable central member (CM) when the CM exerts a force of 100 lbf on the clamp.
14. Sealing components (gaskets, grommets, O-rings) used in a closure, shall not permit the entry of water into the closure after thermal aging at $90 \pm 1^{\circ}\text{C}$ ($194 \pm 1.8^{\circ}\text{F}$) for 720 hours (30 days).
10. Connector Panels: Provide Wall-mountable Closet Housing model WCH-02P as manufactured by Corning Cable Systems with two CCH panels, or approved equal. The housing shall be fully enclosed and provided with a lock and key. Wall-mountable connector housings shall use an interchangeable connector panel. The connector panel is defined as a removable plate used to mount connector adapters and is mounted within a modular outer housing. The connector panel shall have the following characteristics:
- The connector panel shall be available in one mounting footprint for panels with twelve SC connector adapters in each panel and one mounting footprint for high density panels with six or twelve duplex connector adapters in each panel. The panel shall be attached with at least two push-pull latches to allow quick installation and removal.
 - The connector panel shall be available in a 12 fiber SC style with a 12 port configuration per panel.
 - The connector panel shall have removable colored icons.
 - Blank connector panels shall be available to fill unused housing space. Blank panels shall be finished with a wrinkled black powder coat for durability. The blank panel shall be attached with at least two push-pull latches to allow quick installation and removal.

- e. Panels shall be manufactured using cold rolled steel or equivalent for structural integrity.
 - f. Panels shall be finished with a wrinkled black powder coating to match other hardware and to provide a durable finish.
 - g. Provide quantity as required to terminate the specified number of strands. Provide blank plates for all unused spaces.
 - h. Furnish and install duplex couplings for all SC connectors.
11. Power Cables
- a. Will be sized accordingly and shall comply with the NEC. High voltage power cables will be a minimum of three conductors, 12 AWG, stranded, and coated with a non-conductive polyvinylchloride (PVC) jacket. Low voltage cables will be a minimum of 18 AWG, stranded and non-conductive polyvinylchloride (PVC) jacket.
 - b. Will be utilized for all components of the VASS System that require either a 110 VAC 60 Hz or 220 VAC 50 Hz input. Each feed will be connected to a dedicated circuit breaker at a power panel that is primarily for the security system.
 - c. All equipment connected to AC power shall be protected from surges. Equipment protection shall withstand surge test waveforms described in IEEE C62.41. Fuses shall not be used as a means of surge protection.
 - d. Shall be rated for either 110 or 220 VAC, 50 or 60 Hz, and shall comply with VA Master Spec 26 05 21 Low Voltage Electrical Power Conductors and Cables (600 Volts and Below).
 - e. Low Voltage Power Cables
 - 1) Shall be a minimum of 18 AWG, Stranded and have a polyvinylchloride outer jacket.
 - 2) Cable size shall be determined using a basic voltage over distance calculation and shall comply with the NEC's requirements for low voltage cables.

PART 3 - EXECUTION

3.1. GENERAL

- A. Installation: The Contractor shall install all system components including Owner furnished equipment, and appurtenances in accordance with the manufacturer's instructions, ANSI C2 and as shown, and shall furnish all necessary connectors, terminators, interconnections,

services, and adjustments required for a complete and operable data transmission system.

- B. Identification and Labeling: The Contractor shall supply permanent identification labels for each cable at each end that will appear on the as-built drawings. The labeling format shall be identified and a complete record shall be provided to the Owner with the final documentation. Each cable shall be identified by type or signal being carried and termination points. The labels shall be printed on letter size label sheets that are self-laminated vinyl that can be printed from a computer data base or spread sheet. The labels shall be E-Z code WES12112 or equivalent.
1. The Contractor shall provide all personnel, equipment, instrumentation, and supplies necessary to perform all testing.
- C. Transient Voltage Surge Suppressors (TVSS): The Contractor shall mount TVSS within 3 m (118 in) of equipment to be protected inside terminal cabinets or suitable NEMA 1 enclosures. Terminate off-premise conductors on input side of device. Connect the output side of the device to the equipment to be protected. Connect ground lug to a low impedance earth ground (less than 10 ohms) via Number 12 AWG insulated, stranded copper conductor.
- D. Contractor's Field Test: The Contractor shall verify the complete operation of the data transmission system during the Contractor's Field Testing. Field test shall include a bit error rate test. The Contractor shall perform the test by sending a minimum of 1,000,000 bits of data on each DTM circuit and measuring the bit error rate. The bit error rate shall not be greater than one (1) bit out of each 100,000 bits sent for each dial-up DTM circuit, and one (1) bit out of 1,000,000 bits sent for each leased or private DTM circuit. The Contractor shall submit a report containing results of the field test.
- E. Acceptance Test and Endurance Test: The wire line data transmission system shall be tested as a part of the completed IDS and EECS during the Acceptance test and Endurance Test as specified.
- F. Identification and Labeling: The Contractor shall supply identification tags or labels for each cable. Cable shall be labeled at both end points and at intermediate hand holes, manholes, and junction boxes. The labeling format shall be identified and a complete record shall be provided to the Owner with the final documentation.

Each cable shall be identified with type of signal being carried and termination points.

3.2 INSTALLATION

- A. System installation shall be in accordance with NECA 303, manufacturer and related documents and references, for each type of security subsystem designed, engineered and installed.
- B. Components shall be configured with appropriate "service points" to pinpoint system trouble in less than 30 minutes.
- C. The Contractor shall install all system components including Government furnished equipment, and appurtenances in accordance with the manufacturer's instructions, documentation listed in Sections 1.5 of this document, and shall furnish all necessary connectors, terminators, interconnections, services, and adjustments required for a complete and operable system.
- D. The VASS System will be designed, engineered, installed, and tested to ensure all components are fully compatible as a system and can be integrated with all associated security subsystems, whether the system is a standalone or a complete network.
- E. For integration purposes, the VASS System shall be integrated where appropriate with the following associated security subsystems:
 - 1. PACS:
 - a. Provide 24 hour coverage of all entry points to the perimeter and agency buildings, as well as all emergency exits utilizing a fixed color camera.
 - b. Record cameras on a 24 hours basis.
 - c. Be programmed go into an alarm state when an emergency exit is opened, and notify the Physical Access Control System and Database Management of an alarm event.
- F. Integration with these security subsystems shall be achieved by computer programming or the direct hardwiring of the systems.
- G. For programming purposes refer to the manufacturers requirements for correct system operations. Ensure computers being utilized for system integration meet or exceed the minimum system requirements outlined on the systems software packages.
- H. A complete VASS System shall be comprised of, but not limited to, the following components:
 - 1. Cameras

2. Lenses
 3. Video Display Equipment
 4. Camera Housings and Mounts
 5. Controlling Equipment
 6. Recording Devices
 7. Wiring and Cables
- I. The Contractor shall visit the site and verify that site conditions are in agreement/compliance with the design package. The Contractor shall report all changes to the site or conditions that will affect performance of the system to the Contracting Officer in the form of a report. The Contractor shall not take any corrective action without written permission received from the Contracting Officer.
- J. Existing Equipment
1. The Contractor shall connect to and utilize existing video equipment, video and control signal transmission lines, and devices as outlined in the design package. Video equipment and signal lines that are usable in their original configuration without modification and without affecting construction phasing, may be reused with Contracting Officer approval.
 2. The Contractor shall perform a field survey, including testing and inspection of all existing video equipment and signal lines intended to be incorporated into the VASS System, and furnish a report to the Contracting Officer as part of the site survey report. For those items considered nonfunctioning, provide (with the report) specification sheets, or written functional requirements to support the findings and the estimated cost to correct the deficiency. As part of the report, the Contractor shall include a schedule for connection to all existing equipment.
 3. The Contractor shall make written requests and obtain approval prior to disconnecting any signal lines and equipment, and creating equipment downtime. Such work shall proceed only after receiving Contracting Officer approval of these requests. If any device fails after the Contractor has commenced work on that device, signal or control line, the Contractor shall diagnose the failure and perform any necessary corrections to the equipment.

4. The Contractor shall be held responsible for repair costs due to Contractor negligence, abuse, or incorrect installation of equipment.
 5. The Contracting Officer shall be provided a full list of all equipment that is to be removed or replaced by the Contractor, to include description and serial/manufacturer numbers where possible. The Contractor shall dispose of all equipment that has been removed or replaced based upon approval of the Contracting Officer after reviewing the equipment removal list. In all areas where equipment is removed or replaced the Contractor shall repair those areas to match the current existing conditions.
- K. Enclosure Penetrations: All enclosure penetrations shall be from the bottom of the enclosure unless the system design requires penetrations from other directions. Penetrations of interior enclosures involving transitions of conduit from interior to exterior, and all penetrations on exterior enclosures shall be sealed with rubber silicone sealant to preclude the entry of water and will comply with VA Master Specification 07 84 00, Firestopping. The conduit riser shall terminate in a hot-dipped galvanized metal cable terminator. The terminator shall be filled with an approved sealant as recommended by the cable manufacturer and in such a manner that the cable is not damaged.
- L. Cold Galvanizing: All field welds and brazing on factory galvanized boxes, enclosures, and conduits shall be coated with a cold galvanized paint containing at least 95 percent zinc by weight.
- M. Interconnection of Console Video Equipment: The Contractor shall connect signal paths between video equipment as specified by the OEM. Cables shall be as short as practicable for each signal path without causing strain at the connectors. Rack mounted equipment on slide mounts shall have cables of sufficient length to allow full extension of the slide rails from the rack.
- N. Cameras:
1. Install the cameras with the focal length lens as indicated for each zone.
 2. Connect power and signal lines to the camera.
 3. Aim camera to give field of view as needed to cover the alarm zone.

4. Aim fixed mounted cameras installed outdoors facing the rising or setting sun sufficiently below the horizon to preclude the camera looking directly at the sun.
5. Focus the lens to give a sharp picture (to include checking for day and night focus and image quality) over the entire field of view
6. Synchronize all cameras so the picture does not roll on the monitor when cameras are selected.
7. PTZ cameras shall have all preset positions and privacy areas defined and programmed.
8. Obtain approval from VA Security Personnel for the final field of view of each camera.

O. Monitors:

1. Install the monitors as shown and specified in design and construction documents.
2. Connect all signal inputs and outputs as shown and specified.
3. Terminate video input signals as required.
4. Connect the monitor to AC power.

P. Video Encoder

1. Install the Video Encoder/Decoder per design and construction documents, and as specified by the OEM.
2. Connect analog camera inputs to video encoder.
3. Connect video encoder to VASS network.
4. Connect unit to AC power.
5. Configure the video encoder per manufacturer's recommendation and project requirements.

Q. Video Server:

1. Install the video server per design and construction documents, and as specified by the OEM.
2. Connect video server to AC power (UPS).
3. Connect to VASS network.
4. Install operating system and Video Management Software.
5. Provide Video Management Software programming per VA guidance and the requirements provided by the Owner. Programming shall include:
 - a. Camera names
 - b. Screen views

- c. Camera recording schedules (continuous and event) driven recording. Events include alarms from other systems (sensors), manual input, and video motion detection.
 - d. Video detection zones for each camera requiring video motion detection
 - e. Alarm interface
 - f. Alarm outputs
 - g. GUI maps, views, icons and actions
 - h. PTZ controls (presets, time schedules for privacy zones etc.)
 - i. Reports
- R. Video Workstation:
- 1. Install the video workstation per design and construction documents, and as specified by the OEM.
 - 2. Connect video workstation to AC power (UPS).
 - 3. Connect to VASS network.
 - 4. Install operating system and application software.
 - 5. Provide application software programming per VA guidance and the requirements provided by the Owner. Programming shall include:
 - a. Screen views
 - b. Graphical User Interface (GUI) maps, views, icons and actions
 - c. Alarm outputs
 - d. Reports
- S. Network Recording Equipment
- 1. Install the NVR or video storage unit as shown in the design and construction documents, and as specified by the OEM.
 - 2. Connect recording device to AC power (UPS).
 - 3. Connect recording device to network switch as shown and specified.
 - 4. Configure network connections
 - 5. Provide recording unit programming per VA guidance and the requirements provided by the Owner. Programming shall include:
 - a. Camera names
 - b. Screen views
 - c. Camera recording schedules (continuous and event) driven recording. Events include alarms from other systems (sensors), manual input, and video motion detection.
 - d. Video detection zones for each camera requiring video motion detection

- e. Alarm interface
 - f. Alarm outputs
 - g. GUI maps, views, icons and actions
 - h. PTZ controls (presets, time schedules for privacy zones etc.)
 - i. Reports
- T. Video Signal Equipment:
- 1. Install the video signal equipment as shown in the design and construction documents, and as specified by the OEM.
 - 2. Connect video or signal inputs and outputs as shown and specified.
 - 3. Terminate video inputs as required.
 - 4. Connect alarm signal inputs and outputs as required.
 - 5. Connect control signal inputs and outputs as required
 - 6. Connect electrically powered equipment to AC power.
- U. Camera Housings, Mounts, and Poles:
- 1. Install the camera housings and mounts as specified by the manufacturer and as shown, provide mounting hardware sized appropriately to secure each camera, housing and mount with maximum wind and ice loading encountered at the site.
 - 2. Provide a foundation for each camera pole as specified and shown.
 - 3. Provide a ground rod or loop for each camera pole and connect the camera pole to the ground rod as specified in Division 26 of the VA Master Specification and the VA Electrical Manual 730.
 - 4. Provide electrical and signal transmission cabling to the mount location via a hardened carrier system from the Physical Access Control System and Database Management to the device.
 - 5. Connect signal lines and AC power to the housing interfaces.
 - 6. Connect pole wiring harness to camera.
- V. Ethernet Media Converter:
- 1. Inspect modules before installation.
 - 2. Modules shall be free of any cosmetic defects or damage.
 - 3. All optical connectors shall be covered with dust caps and remain on the module until installing cable connectors to module.
 - 4. The unit shall be mounted on a properly prepared surface adequate for the size and weight of module. The placement of the unit shall allow provision for cable installation and maintenance as indicated on the drawings.

5. The optical link shall be tested with an Optical Time Domain Reflectometer (OTDR) to ensure the link budget plus an added 3 dB of optical safety margin does not exceed the optical power budget.
6. All optical connectors on cable shall be cleaned in compliance to optical connector manufactures specifications and covered with dust caps until connection to the fiber optic module.
7. Locate fiber optic modules as indicated on the Contract Drawings and install module in compliance with the manufacturer's installation and operations manual.
8. Verify that the data leads and optical fibers are properly connected. Make sure that power is applied to all fiber optic modules, controllers, and receiver drivers or other equipment used in the system.

3.3 SYSTEM START-UP

- A. The Contractor shall not apply power to the VASS System until the following items have been completed:
 1. VASS System equipment items and have been set up in accordance with manufacturer's instructions.
 2. A visual inspection of the VASS System has been conducted to ensure that defective equipment items have not been installed and that there are no loose connections.
 3. System wiring has been tested and verified as correctly connected as indicated.
 4. All system grounding and transient protection systems have been verified as installed and connected as indicated.
 5. Power supplies to be connected to the VASS System have been verified as the correct voltage, phasing, and frequency as indicated.
- B. The Commissioning Agent will observe startup and contractor testing of selected equipment. Coordinate the startup and contractor testing schedules with the Resident Engineer and Commissioning Agent. Provide a minimum of 7 days prior notice.
- C. Satisfaction of the above requirements shall not relieve the Contractor of responsibility for incorrect installation, defective equipment items, or collateral damage as a result of Contractor work efforts.

3.4 SUPPLEMENTAL CONTRACTOR QUALITY CONTROL

- A. The Contractor shall provide the services of technical representatives who are familiar with all components and installation procedures of the installed VASS System; and are approved by the Contracting Officer.
- B. The Contractor will be present on the job site during the preparatory and initial phases of quality control to provide technical assistance.
- C. The Contractor shall also be available on an as needed basis to provide assistance with follow-up phases of quality control.
- D. The Contractor shall participate in the testing and validation of the system and shall provide certification that the system installed is fully operational as all construction document requirements have been fulfilled.

3.5 COMMISSIONING

- A. Provide commissioning documentation in accordance with the requirements of Section 28 08 00 - COMMISSIONING OF ELECTRONIC SAFETY AND SECURITY SYSTEMS for all inspection, start up, and contractor testing required above and required by the System Readiness Checklist provided by the Commissioning Agent.
- B. Components provided under this section of the specification will be tested as part of a larger system. Refer to Section 28 08 00 - "COMMISSIONING OF ELECTRONIC SAFETY AND SECURITY SYSTEMS" and related sections for contractor responsibilities for system commissioning.

3.6 DEMONSTRATION AND TRAINING

- A. All testing and training shall be compliant with the VA General Requirements, Section 01 00 00, "GENERAL REQUIREMENTS".
- B. Provide services of manufacturer's technical representative for 8 hours overlapping two shifts of the VA Security Personnel to instruct VA personnel in operation and maintenance of units.
- C. Submit training plans and instructor qualifications in accordance with the requirements of Section 28 08 00 - "COMMISSIONING OF ELECTRONIC SAFETY AND SECURITY SYSTEMS".
- D. Provide video and audio recordings of the training and provide the recordings on a DVD to the VA Security Personnel.

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SECTION 31 20 11
EARTHWORK (SHORT FORM)

PART 1 - GENERAL

1.1:DESCRIPTION:

This section specifies the requirements for furnishing all equipment, materials, labor and techniques for earthwork including excavation, fill, backfill and site restoration utilizing fertilizer, seed and/or sod.

1.2 DEFINITIONS:

- A. Unsuitable Materials:
 - 1. Fills: Topsoil, frozen materials; construction materials and materials subject to decomposition; clods of clay and stones larger than 75 mm (3 inches); organic materials, including silts, which are unstable; and inorganic materials, including silts, too wet to be stable.
 - 2. Existing Subgrade (except footings): Same materials as above paragraph, that are not capable of direct support of slabs, pavement, and similar items, with the possible exception of improvement by compaction, proofrolling, or similar methods of improvement.
- B. Earthwork: Earthwork operations required within the new construction area. It also includes earthwork required for auxiliary structures and buildings and sewer and other trenchwork throughout the job site.
- C. Degree of Compaction: Degree of compaction is expressed as a percentage of maximum density obtained by the test procedure presented in ASTM D1557 Method A.
- D. The term fill means fill or backfill as appropriate.

1.3 RELATED WORK:

- A. Materials testing and inspection during construction: Section 01 45 29, TESTING LABORATORY SERVICES.
- B. Safety Requirements: Section 00 72 00, GENERAL CONDITIONS, Article, ACCIDENT PREVENTION.
- C. Protection of existing utilities, fire protection services, existing equipment, roads, and pavements: Section 01 00 00, GENERAL REQUIREMENTS.
- D. Subsurface Investigation: Section 01 00 00, GENERAL REQUIREMENTS, Article, PHYSICAL DATA.

1.4 CLASSIFICATION OF EXCAVATION:

- A. Unclassified Excavation: Removal and disposal of pavements and other man-made obstructions visible on the surface; utilities, and other items

including underground structures indicated to be demolished and removed; together with any type of materials regardless of character of material and obstructions encountered.

B. Rock Excavation:

1. Solid ledge rock (igneous, metamorphic, and sedimentary rock).
2. Bedded or conglomerate deposits so cemented as to present characteristics of solid rock which cannot be excavated without blasting; or the use of a modern power excavator (shovel, backhoe, or similar power excavators) of no less than 0.75 m³ (1 cubic yard) capacity, properly used, having adequate power and in good running condition.
3. Boulders or other detached stones each having a volume of 0.4 m³ (1/2 cubic yard) or more.

1.5 MEASUREMENT AND PAYMENT FOR ROCK EXCAVATION:

- A. Measurement: Cross section and measure the uncovered and separated materials, and compute quantities by the Registered Professional Land Surveyor or Registered Civil Engineer, specified in Section 01 00 00, GENERAL REQUIREMENTS. Do not measure quantities beyond the following limits:
1. 300 mm (12 inches) outside of the perimeter of formed footings.
 2. 600 mm (24 inches) outside the face of concrete work for which forms are required, except for footings.
 3. 150 mm (6 inches) below the bottom of pipe and not more than the pipe diameter plus 600 mm (24 inches) in width for pipe trenches.
 4. The outside dimensions of concrete work for which no forms are required (trenches, conduits, and similar items not requiring forms).
- B. Payment: No separate payment shall be made for rock excavation quantities shown. The contract price and time will be adjusted for overruns or underruns in accordance with Articles, DIFFERING SITE CONDITIONS, CHANGES and CHANGES-SUPPLEMENT of the GENERAL CONDITIONS as applicable.

1.6 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Contractor shall submit procedure and location for disposal of unused satisfactory material. Proposed source of borrow material. Notification of encountering rock in the project. Advance notice on the opening of excavation or borrow areas. Advance notice on shoulder construction for rigid pavements.

C. Qualifications of the commercial testing laboratory or Contractor's Testing facility shall be submitted.

1.7 APPLICABLE PUBLICATIONS:

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
- B. American Nursery and Landscape Association (ANLA):
2004.....American Standard for Nursery Stock
- C. American Association of State Highway and Transportation Officials (AASHTO):
T99-10.....Moisture-Density Relations of Soils Using a 2.5 kg (5.5 lb) Rammer and a 305 mm (12 inch) Drop
T180-10.....Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg [10 lb] Rammer and a 457 mm (18 inch) Drop
- D. American Society for Testing and Materials (ASTM):
C33-03.....Concrete Aggregate
D698-e1.....Laboratory Compaction Characteristics of Soil Using Standard Effort
D1140-00.....Amount of Material in Soils Finer than the No. 200 (75-micrometer) Sieve
D1556-00.....Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
D1557-09.....Laboratory Compaction Characteristics of Soil Using Modified Effort
D2167-94 (2001).....Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method
D2487-06.....Standard Classification of Soil for Engineering Purposes (Unified Soil Classification System)
D6938-10.....Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
- E. Standard Specifications of West Virginia Department of Transportation.

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Fills: Materials approved from on site and off site sources having a minimum dry density of 1760 kg/m³ (110 pcf), a maximum Plasticity Index of 6, and a maximum Liquid Limit of 30.
- B. Granular Fill:
 - 1. Under concrete slab, granular fill shall consist of clean, poorly graded crushed rock, crushed gravel, or uncrushed gravel placed beneath a building slab without a vapor barrier to cut off the capillary flow of pore water to the area immediately below. Coarse aggregate Size 57.
 - 2. Bedding for ductbank, crushed stone or gravel graded from 13 mm (1/2 inch) to 4.75 mm (No. 4).
- C. Fertilizer: (5-10-5) delivered to site in unopened containers that clearly display the manufacturer's label, indicating the analysis of the contents.
- D. Seed: Grass mixture comparable to existing turf delivered to site in unopened containers that clearly display the manufacturer's label, indicating the analysis of the contents.
- E. Requirements For Offsite Soils: Offsite soils brought in for use as backfill shall be tested for TPH, BTEX and full TCLP including ignitability, corrosivity and reactivity. Backfill shall contain less than 100 parts per million (ppm) of total hydrocarbons (TPH) and less than 10 ppm of the sum of Benzene, Toluene, Ethyl Benzene, and Xylene (BTEX) and shall not fail the TCLP test. TPH concentrations shall be determined by using EPA 600/4-79/020 Method 418.1. BTEX concentrations shall be determined by using EPA SW-846.3-3a Method 5030/8020. TCLP shall be performed in accordance with EPA SW-846.3-3a Method 1311. Provide Borrow Site Testing for TPH, BTEX and TCLP from a composite sample of material from the borrow site, with at least one test from each borrow site. Material shall not be brought on site until tests have been approved by the Resident Engineer.
- F. Buried Warning and Identification Tape: Metallic core, acid- and alkali-resistant polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3 inch minimum width, color coded as specific below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW"

or similar wording. Color and printing shall be permanent, Unaffected by moisture or soil. Warning tape color codes:

Red: Electric

PART 3 - EXECUTION

3.1 SITE PREPARATION:

- A. Clearing: Clearing within the limits of earthwork operations as described or designated by the Resident Engineer. Work includes removal of trees, shrubs, fences, foundations, incidental structures, paving, debris, trash and any other obstructions. Remove materials from the Medical Center Property.
- B. Grubbing: Remove stumps and roots 75 mm (3 inches) and larger diameter.
- C. Trees and Shrubs: Trees and shrubs, not shown for removal, may be removed from the areas within 4500 mm (15 feet) of new construction and 2250 mm (7'-6") of utility lines if such removal is approved in advance by the Resident Engineer. Remove materials from the Medical Center.
- D. Stripping Topsoil: Unless otherwise indicated on the drawings, the limits of earthwork operations shall extend anywhere the existing grade is filled or cut or where construction operations have compacted or otherwise disturbed the existing grade or turf. Strip topsoil as defined herein, or as indicated in the geotechnical report, from within the limits of earthwork operations as specified above unless specifically indicated or specified elsewhere in the specifications or shown on the drawings. Topsoil shall be fertile, friable, natural topsoil of loamy character and characteristic of the locality. Topsoil shall be capable of growing healthy horticultural crops of grasses. Stockpile topsoil and protect as directed by the Resident Engineer. Eliminate foreign material, such as weeds, roots, stones, subsoil, frozen clods, and similar foreign materials, larger than 0.014 m³ (1/2 cubic foot) in volume, from soil as it is stockpiled. Retain topsoil on the station. Remove foreign materials larger than 50 mm (2 inches) in any dimension from topsoil used in final grading. Topsoil work, such as stripping, stockpiling, and similar topsoil work, shall not, under any circumstances, be carried out when the soil is wet so that the tilth of the soil will be destroyed.
- 1. Concrete Slabs and Paving: Score deeply or saw cut to insure a neat, straight cut, sections of existing concrete slabs and paving to be removed where excavation or trenching occurs. Extend pavement section to be removed a minimum of 300 mm (12 inches) on each side of widest part of trench excavation and insure final score lines are

approximately parallel unless otherwise indicated. Remove material from the Medical Center.

- E. Disposal: All materials removed from the property shall be disposed of at a legally approved site, for the specific materials, and all removals shall be in accordance with all applicable Federal, State and local regulations. No burning of materials is permitted onsite.

3.2 EXCAVATION:

- A. Shoring, Sheet piling and Bracing: Shore, brace, or slope to its angle of repose banks of excavations to protect workmen, banks, adjacent paving, structures, and utilities, in compliance with OSHA requirements.
1. Extend shoring and bracing to the bottom of the excavation. Shore excavations that are carried below the elevations of adjacent existing foundations.
- B. Excavation Drainage: Operate pumping equipment, and/or provide other materials, means and equipment as required, to keep excavations free of water and subgrades dry, firm, and undisturbed until approval of permanent work has been received from Resident Engineer. Approval by the Resident Engineer is also required before placement of the permanent work on all subgrades. When subgrade for foundations has been disturbed by water, remove the disturbed material to firm undisturbed material after the water is brought under control. Replace disturbed subgrade in trenches by mechanically tamped sand or gravel. When removed disturbed material is located where it is not possible to install and properly compact disturbed subgrade material with mechanically compacted sand or gravel, the Resident Engineer should be contacted to consider the use of flowable fill. Groundwater flowing toward or into excavations shall be controlled to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. French drains, sumps, ditches or trenches will not be permitted within 0.9 m (3 feet) of the foundation of any structure, except with specific written approval, and after specific contractual provisions for restoration of the foundation area have been made. Control measures shall be taken by the time the excavation reaches the water level in order to maintain the integrity of the in situ material. While the excavation is open, the water level shall be maintained continuously, at least 2 feet below the working level. Operate dewatering system continuously until construction work below existing water levels is complete. Submit performance records weekly. Measure and record performance of dewatering system at same

time each day by use of observation wells or piezometers installed in conjunction with the dewatering system.

C. Blasting: Blasting shall not be permitted.

D. Trench Earthwork:

1. Utility trenches (except sanitary and storm sewer):

- a. Excavate to a width as necessary for sheeting and bracing and proper performance of the work.
- b. Grade bottom of trenches with bell-holes, scooped-out to provide a uniform bearing.
- c. Support piping on suitable undisturbed earth unless a mechanical support is shown. Unstable material removed from the bottom of the trench or excavation shall be replaced with select granular material placed in layers not exceeding 150 mm (6 inches) loose thickness.
- d. The length of open trench in advance of pipe laying shall not be greater than is authorized by the Resident Engineer.
- e. Provide buried utility lines with utility identification tape. Bury tape 300 mm (12 inches) below finished grade; under pavements and slabs, bury tape 150 mm (6 inches) below top of subgrade
- f. Bedding shall be of the type and thickness shown.// Initial backfill material shall be placed and compacted with approved tampers to a height of at least one foot above the utility pipe or conduit. The backfill shall be brought up evenly on both sides of the pipe for the full length of the pipe. Care shall be taken to ensure thorough compaction of the fill under the haunches of the pipe.

3.3 FILLING AND BACKFILLING:

- A. General: Do not fill or backfill until all debris, unsatisfactory soil materials, obstructions, and deleterious materials have been removed from the excavation. Proof-roll exposed subgrades with a fully loaded dump truck. Use excavated materials or borrow for fill and backfill, as applicable. Do not use unsuitable excavated materials. Do not backfill until foundation walls have been completed above grade and adequately braced, waterproofing or dampproofing applied, and pipes coming in contact with backfill have been installed, and inspected and approved by Resident Engineer.

3.4 DISPOSAL OF UNSUITABLE AND EXCESS EXCAVATED MATERIAL:

- A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off // Medical Center property.

B. Segregate all excavated contaminated soil designated by the Resident Engineer from all other excavated soils, and stockpile on site on two 0.15 mm (6 mil) polyethylene sheets with a polyethylene cover. A designated area shall be selected for this purpose. Dispose of excavated contaminated material in accordance with State and Local requirements.

3.5 CLEAN-UP:

Upon completion of earthwork operations, clean areas within contract limits, remove tools, and equipment. Provide site clear, clean, free of debris, and suitable for subsequent construction operations. Remove debris, rubbish, and excess material from the Medical Center.

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