



2018 TECHNOLOGY STANDARDS

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Purpose

The 2018 Technology Standards provide information for the support of the Department of Watershed Management's business applications and technology infrastructure. This document assists planning and decision-making related to technology procurement and provides a foundation for sustainable information technology investments and support based on strategic initiatives and standardization. Key drivers towards standardization of the technology infrastructure are:

- Increase business agility by taking advantage of new and emerging technologies which provide a benefit to DWM business units, staff, and COA constituency
- Improve business and AIM alignment
- To simplify hardware and software selection and procurement
- Reduce licensing and support costs

Software Standards

The software standards listed below. Support for alternative applications and operating systems will be provided on an approved, best-effort basis.

Operating Systems

- Server Operating Systems
 - Microsoft Windows Server 2012 R2
 - Microsoft Windows Server 2016
 - Red Hat Linux Enterprise Linux 7
- Desktop Operating Systems
 - Microsoft Windows 10
 - Apple macOS

Office Productivity Suite

- Microsoft Office365

Email & Calendar

- Microsoft Outlook
- Outlook Web App ([UCI Office 365](#))

Security

- Forescout (PC & Mac)
- Windows Defender Security Center
- VPN – Palo Alto

Web Browsers

- Microsoft Internet Explorer
- Mozilla Firefox
- Google Chrome
- Safari (Mac)

Database

- Oracle 12g
- Microsoft SQL Server 2016

GIS

- ArcGIS

Business Support

- Adobe Acrobat Reader DC

- Adobe Acrobat Pro DC (**Additional licensing cost**)
- Microsoft Skype for Business for IM and online meetings
- TechSmith SnagIt (**Additional licensing cost**)

Hardware Standards

Computer Hardware

- Server
 - Cisco UCS server M4 w/ RAID 5 support
 - VMWare ESXi Server
 - 2 Processor Cores
 - 16GB Ram
 - 240GB Hard Drive
- Desktop Operating Systems
 - Microsoft Windows 10
 - Apple macOS

Desktop Hardware

- Dell High-end Desktop
- Dell Low-end Desktop
 - Dell Optiplex 7060 SFF
 - Intel® Core™ i5 (6 Cores/9MB/6T/4.1GHz/65W)
 - 8GB (1x8GB) 266MHz DDR4 UDIMM Non-ECC Memory
 - M.2 512GB SATA Class 20 Solid State Drive
 - NVIDIA GeForce GT 730, 2 GB
 - 8x DVD+/-RW Optical Drive
 - Media Card reader
 - Dell KB216 wired Multi-Media Keyboard (English)
 - Dell Optical MS116 Wired Mouse, Black
 - Dell 24 Monitor

Laptop Hardware

- Dell High-end Laptop
 - Dell Latitude 7490
 - Intel Core i5-8250U (Quad Core, 6M Cache, 1.6GHz, 15W)
 - 8GB, (1x8GB) 2400MHz DDR4 memory
 - M.2 512G SATA SSD
 - Dell USB Slim DVD+/-RW Drive
 - 14" FHD WVA (1920x1080) Anti-Glare Non-Touch, Camera & Microphone, WWAN/WLAN
 - Internal US English Qwerty Backlit Keyboard
 - Qualcomm QCA61x4A 802.11ac Dual Band Wireless Driver+Bluetooth 4.1
 - Qualcomm QCA61x4A 802.11ac Dual Band Wireless Adapter+Bluetooth 4.1
 - Qualcomm Snapdragon X7 LTE-A Verizon
 - Primary 3-cell 42W/HR Battery
 - 65W AC Adapter, 3-pin
 - Dual Pointing, 82 Key, smartcard, Contactless Smartcard, Fingerprint Reader, Displayport over Type C
 - E5 Power Cord

- Dell Business Dock-WD15 with 130W adapter with DiB mDP to DP cable 2.7 ft.
- Dell 24 Monitor
- Dell Professional Briefcase 15
- Dell KB216 Dell Wired Keyboard
- Dell Optical Mouse MS116
- Dell Low-end Laptop

Ruggedized Devices

- Tough Book

Mobile Devices (Tablet)

- Apple iPad 9.7
- Mozilla Firefox
- Google Chrome
- Safari (Mac)

Mobile Phone

- Apple iPhone 7 iOS 12
- Samsung Galaxy

Printers

- Xerox

Network Infrastructure

Switches

- Cisco

Router

- Cisco

Telephony

Cisco Call Manager Phone/Gateway Models – 7821, 7841, 7911, 7941, 7942, 7961, 7962, 8945, 881, 8841

Cisco Unity Connection

Cisco Voice Gateway 2911, 3845, 4431, 3945

Cabling

CHANNEL PERFORMANCE

Scope

This section defines the complete end-to-end channel requirements for the combined channel solution. This section specifies the minimum requirements that cables, connecting hardware, and assembled patch cords must meet when combined into a full cabling system.

Normative Reference

Reference Documents

The latest eAIMion of referenced standards (from the latest available draft in the case of proposed standards) shall be the controlling document. In the event of conflict between any referenced standards, the eAIMion with the most stringent requirements shall be controlling.

- ANSI/ICEA S-90-661
- CSA
- UL 444
- ANSI/TIA/EIA-568-B
- ANSI/TIA/EIA-569-B
- ANSI/TIA/EIA-606-A
- ANSI/TIA/EIA-607-A
- ISO/IEC 11801
- CENELEC EN50173: 1995
- NEC, NFPA70-Latest Version
- NEMA WC-63/66

In addition to the requirements shown above, UTP cables shall meet the requirements of:

ANSI/TIA/EIA-568-B
ISO/IEC 11801

All connecting hardware and patch cords shall meet, as a minimum, all the requirements including the electrical and mechanical performance requirements of:

- CSA
- UL 1863
- ANSI/TIA/EIA-568-B.2.1
- ISO/IEC 11801
- ISO/IEC 60603-7
- CENELEC EN50173: 1995
- NEC, NFPA70

Applicable Testing Standards

Testing of individual components and channel shall be conducted in accordance with the following standards: ASTM D 4566-94, Standard Test Methods for Electrical Performance Properties of Insulation and Jackets for Telecommunications Wire and Cable, 1994 ANSI/TIA/EIA-568-B, Commercial Building Telecommunications Standard, and ISO/IEC-11801.

		Geometry	
Cladding Diameter (μm)			125.0 ± 0.7
Core-to-Cladding Concentricity (μm)			< 0.5
Cladding Non-Circularity			$< 0.7\%$
Mode Field Diameter (μm)			
	1310 nm		9.2 ± 0.4
	1550 nm		10.4 ± 0.8
Coating Diameter (μm)			245 ± 5
Fiber Curl radius of curvature (m)			> 4.0 m
		Optical	
Cabled Fiber Attenuation (dB/km)			≤ 1.0
			≤ 0.75
Point discontinuity (dB)	1310 nm		≤ 0.05
	1550 nm		≤ 0.05
Macrobend Attenuation (dB)			
Turns	Mandrel OD		
1	32 ± 2 mm		≤ 0.05 at 1550 nm
100	50 ± 2 mm		≤ 0.05 at 1310 nm
100	50 ± 2 mm		≤ 0.05 at 1550 nm
100	60 ± 2 mm		< 0.05 at 1625 nm

Cable Cutoff Wavelength (λ_{ccf}) (nm)	< 1260
Zero Dispersion Wavelength (λ_0) (nm)	$1302 \leq \lambda_0 \leq 1322$
Zero Dispersion Slope (S_0) (ps/(nm ² •km))	≤ 0.089
Total Dispersion (ps/(nm•km))	1285-1330 nm ≤ 3.5

1550 nm	≤ 18
Cabled Polarization Mode Dispersion (ps/km)	≤ 0.5
IEEE 802.3 GbE - 1300 nm Laser Distance (m)	up to 5000
IEEE 802.3 10 GbE - Distance (m)	up to 10,000 (at 1310 nm) up to 40,000 (at 1550 nm)
Cabled Water Peak Attenuation: 1383 \pm 3 nm (dB/km)	≤ 1.0

Laser-optimized™ 50/125 μ m Multimode Fiber

The fiber shall meet the requirements of EIA/TIA-492AAAC, "Detail Specification for 850-nm Laser-Optimized, 50- μ m Core Diameter/125- μ m Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers."

Geometry	
CORE Diameter (μ m)	50.0 \pm 2.5
Core Non-Circularity	$\leq 5\%$
Cladding Diameter (μ m)	125.0 \pm 2.0
Cladding Non-Circularity	$\leq 1.0\%$
Core-to-Cladding Concentricity (μ m)	≤ 1.5
Coating Diameter (μ m)	245 \pm 5
Optical	
Cabled Fiber Attenuation (dB/km)	
850 nm	≤ 3.0
1300 nm	≤ 1.5
Point discontinuity (dB)	
850 nm	≤ 0.02
1300 nm	≤ 0.02
Macrobend Attenuation (dB)	
Turns Mandrel OD	
100 75 \pm 2 mm	< 0.5 at 850 nm
100 75 \pm 2 mm	< 0.5 at 1300 nm
OFL Bandwidth (MHz•km)	
850 nm	> 1500
1300 nm	> 500
Cabled Effective Modal Bandwidth ¹ (MHz•km)	> 2000
850 nm	
Numerical Aperture	0.200 \pm 0.015
IEEE 802.3 GbE Distance ² (m)	
1000BASE-SX Window (850 nm)	up to 1000
1000BASE-LX Window (1300 nm)	up to 600
IEEE 802.3 10 GbE Distance ² (m)	up to 300
10GBASE-S Window (850 nm)	

As predicted by minEMBc, per TIA/EIA 455-220 and IEC 60793-1-49, for high performance laser-based systems (up to 10 Gb/s), Values as derived from the IEEE GbE models.

**SPECIFICATION FOR TIGHT BUFFER
OPTICAL FIBER CABLES FOR INDOOR DISTRIBUTION APPLICATIONS**

- The cable must meet the requirements of the National Electrical Code[®] (NEC)[®] Section 770.
- Plenum Applications - Applicable Flame Test: NFPA 262. Cables shall be listed OFNP (OFCP).
- Finished cables shall conform to the applicable performance of the Insulated Cable Engineers Association, Inc. (ICEA) *Standard for Fiber Optic Premises Distribution Cable* (ICEA S-83-596).
- The coated fiber shall have a low friction slip layer placed between the acrylate coating of the optical fiber and the thermoplastic buffer. The diameter of the thermoplastic buffer coating shall be $900 \pm 50 \mu\text{m}$.
- The fibers shall be stranded around a dielectric strength yarn. For cables containing 12-24 fibers, the fibers shall be arranged in two layers.
- Cables with 24 to 54 Fibers: Unitized Riser and Plenum Constructions, the buffered fibers shall be grouped in 6-fiber subunits.
- The fibers shall be stranded around a dielectric strength yarn in the subunit.

Outer Cable Jacket:

- The jacket shall be continuous with the owners name or project name and phone number printed on fiber jacket (*example: AIM 404-330-6110*) free from pinholes, splits, blisters, or other imperfections. The jacket shall have a consistent, uniform thickness - jackets extruded under high pressure are not acceptable. The jacket shall be smooth, as is consistent with the best commercial practice. The jacket shall provide the cable with a tough, flexible, protective coating, and be able to withstand the stresses expected in normal installation and service.
- The cable jacket color shall be orange for cables containing multimode fiber except for cables containing 50/125 μm Laser Optimized Fiber, which shall have an aqua colored jacket. The cable jacket color shall be yellow for cables containing single-mode fiber.
- The indoor distribution cable specified herein shall be available with an optional interlocking armor made of aluminum. The interlocking armor for riser cables may be left uncoated or may have a PVC jacket. The interlocking armor for plenum cables shall have a PVC jacket except when used in plenum airspace, and then a Plenum jacket will be used. The color of the armor jacket (if specified for riser cables), shall match the jacket color of the optical fiber cable located inside of the armor. The armor for these cables shall be comparable to liquid tight flexible metal conduit if jacketed, or flexible metal conduit if not. The interlocking armor and jacket option will be specified on the purchase order. Cables with interlocking armor shall be available in fiber counts up to 72 fibers.
- The individual fibers shall be color coded for identification. The optical fiber color coding shall be in accordance with EIA/TIA-598, "Optical Fiber Cable Color Coding." The coloring material shall be stable over the temperature range of the cable, shall not be susceptible to migration, and

shall not affect the transmission characteristics of the optical fibers. Color-coded buffered fibers shall not adhere to one another.

- When buffered fibers are grouped into individual subunits, each subunit jacket shall be numbered for identification, with the exception of filler subunits where used. The number shall be repeated at regular intervals. The subunit jacket color shall be orange for subunits containing multimode fibers, except for subunits containing 50/125 μm Laser Optimized Fiber, which shall have an aqua colored subunit jacket, yellow for subunits containing single-mode fibers, and white for filler subunits.

Cables with a PVC jacket over interlocking armor shall be marked with the manufacturer's name or ETL file number, date of manufacture, fiber count, fiber type, flame rating, listing symbol, and sequential length markings every two feet (e.g., "CORNING OPTICAL CABLE - 01/00 - 12 SM – TBII - OFCP (ETL) OFC FT6 (CSA) 00001 FEET"). The marking shall be in contrasting color to the cable jacket. The cable jacket color shall match the color of the core optical fiber cable.

Cable Specifications

- Plenum Applications. The storage temperature range for the cable on the original shipping reel shall be $-40\text{ }^{\circ}\text{C}$ to $+70\text{ }^{\circ}\text{C}$. The installation temperature range for plenum cables shall be $0\text{ }^{\circ}\text{C}$ to $+60\text{ }^{\circ}\text{C}$. The operational temperature range for plenum cables shall be $0\text{ }^{\circ}\text{C}$ to $+70\text{ }^{\circ}\text{C}$. Testing shall be conducted in accordance with FOTP-3.
- When tested in accordance with FOTP-41, "Compressive Loading Resistance of Fiber Optic Cables," the cable shall withstand a minimum compressive load of 100 N/cm (57 lbf/in) applied uniformly over the length of the compression plate. While under compressive load, the fiber shall not experience an attenuation change greater than 0.40 dB at 1550 nm (single-mode) or greater than 0.60 dB at 1300 nm (multimode).
- When tested in accordance with FOTP-104, "Fiber Optic Cable Cyclic Flexing Test," the cable shall withstand 25 mechanical flexing cycles at a rate of 30 ± 1 cycle per minute. The fiber shall not experience an attenuation change greater than 0.40 dB at 1550 nm (single-mode) or greater than 0.60 dB at 1300 nm (multimode). The jacket shall not crack, split, or tear.
- When tested in accordance with FOTP-37, "Fiber Optic Cable Bend Test, Low and High Temperature," the cable shall withstand four full turns around a mandrel at low temperatures of $-10\text{ }^{\circ}\text{C}$ for riser cables and $0\text{ }^{\circ}\text{C}$ for plenum cables. The cable shall also withstand four full turns at a high temperature of $+60\text{ }^{\circ}\text{C}$ for both riser and plenum cables. The mandrel diameter shall be the greater of 20 times the cable OD or 150 mm. The fibers shall not experience an attenuation change greater than 0.40 dB at 1550 nm (single-mode) or greater than 0.60 dB at 1300 nm (multimode).
- When tested in accordance with FOTP-25, "Repeated Impact Testing of Fiber Optic Cables and Cable Assemblies," the cable shall withstand a minimum of 2 impact cycles at 3 locations spaced a minimum distance of 150 mm. The impact energy shall be 2.94 nm. The fibers shall not experience an attenuation change greater than 0.40 dB at 1550 nm (single-mode) or greater than 0.60 dB at 1300 nm (multimode). The jacket shall not crack, split or tear.

- When tested in accordance with FOTP-3, "Procedure to Measure Temperature Cycling Effects on Optical Fiber, Optical Cable, and Other Passive Fiber Optic Components," the change in attenuation after the second cycle at the extreme operational temperatures shall not exceed 0.40 dB/km at 1550 nm (single-mode) or 0.60 dB/km at 1300 nm (multimode). The change in attenuation is measured with respect to the baseline values measured at room temperature before temperature cycling.
- When tested in accordance with FOTP-85, "Fiber Optic Cable Twist Test," a length of cable no greater than 2 meters shall withstand 10 cycles of mechanical twisting and bending. The fibers shall not experience an attenuation change greater than 0.40 dB at 1550 nm (single-mode) or 0.60 dB at 1300 nm (multimode).
- When tested in accordance with FOTP-33, "Fiber Optic Cable Tensile Loading and Bending Test," and FOTP-38, "Measurement of Fiber Strain in Cables Under Tensile Load," a length of cable shall be tested to the rated tensile load. For riser cables $\leq 12f$ the rated tensile load is 660 N (148 lbf) and for riser cables $> 12f$ the rated tensile load is 1320 N (297 lbf). For plenum cables $\leq 12f$ the rated tensile load is 440 N (99 lbf) and for plenum cables $> 12f$ the rated tensile load is 660 N (148 lbf). While under the rated tensile load, the fiber shall not experience a measured fiber strain greater than 60% of the fiber proof test level. After being held at the residual load (30% of the rated tensile load) the fiber shall not experience a measured fiber strain greater than 20% of the fiber proof test level nor an attenuation change greater than 0.40 dB at 1550 nm (single-mode) or greater than 0.60 dB at 1300 nm (multimode). After the tensile load is removed, the fibers shall not experience an attenuation change greater than 0.40 dB at 1550 nm (single-mode) or greater than 0.60 dB at 1300 nm (multimode).
- The cable shall be packaged in cartons and/or wound on spools. Each package shall contain only one continuous length of cable. The packaging shall be constructed so as to prevent damage to the cable during shipping and handling.
- When the length of an order requires a wooden reel, the cable shall be covered with a three-layer laminated protective material. The outer end of the cable shall be securely fastened to the reel head to prevent the cable from becoming loose in transit. The inner end of the cable shall project into a slot in the side of the reel or into housing on the inner slot of the drum, in such a manner and with sufficient length to make it available for testing.
- Test tails shall be at least two meters long. The inner end shall be fastened so as to prevent the cable from becoming loose during shipping and installation.
- Reel Marking and Labeling. Every cable shall come with the following information:

Reel Label:

- Part number;
- Reel number;
- Length (ft/m);
- Marking (ft/m) top and bottom;
- Date of manufacture; and
- Listing information.

Bar Code Label:

- Package ID;
- Reel number;
- Quantity;
- Customer ID;
- Package count;
- Factory order number;
- Release part number;
- Length (ft);
- “Ship to:” address; and
- “Attention to:.”

Stenciling:

- Manufacturer’s name and address;
- Direction of rotation;
- Reel size; and
- “DO NOT LAY REEL ON SIDE.”

Hardware**Equipment Rack**

- The equipment rack shall conform to Electronics Industry Association (EIA) EIA-310 standards. The rack shall be 213 cm tall with a 465 mm standard panel mounting flange width, and it shall contain forty-four usable rack spaces. One EIA rack space or panel height (denoted as 1U) is defined as being 44.45 mm in height with mounting holes on each upright of the rack. Equipment mounting holes shall be tapped either with 10-32 UNF-2B, 12-24 UNC-2B, or M5x.8-6H threads.
- The equipment rack shall be manufactured from aluminum for lighter weight and ease of assembly during installation. The rack shall be black in color with rack units marked on each side of rack. Installation fasteners shall be included and shall be black in color. The rack shall be supplied unassembled, with all components packed in a single carton.
- The rack shall come equipped with a top jumper trough with radius guides for distributing jumpers between equipment bays. Additional jumper troughs shall be available in 1U and 2U versions for transitioning jumpers between racks.
- Blank rack panels shall be available to fill unused rack space. Blank panels shall be finished with a wrinkled black powder coat for durability and color consistency. Attaching fasteners shall be black in color to match the panel and shall be supplied with the blank panels.

Rack Jumper Management Panels

- The rack mount hardware shall incorporate in-rack and inter-bay jumper management techniques. One or both methods may be used as required. In-rack jumper management panels shall be available to provide horizontal jumper routing management to the termination housings and electronic equipment. Additionally, in-rack slack storage panels are required for installations where inter-bay storage methods are not feasible. Inter-bay storage is

recommended for large slack storage requirements, vertical cable, jumper routing, and significant patching to adjacent racks.

- In-rack jumper management panels shall be available in 1U, 2U, and 3U sizes, and they shall have removable front covers to conceal and protect the jumpers when installation is complete. The front of the jumper management panel cover shall be flush with the front door of the termination housing.
- In-rack jumper management panels shall be designed to maintain a 38mm minimum bend radius, and they shall be finished with a wrinkled black powder coat for durability. Black installation fasteners shall be included.
- The unit shall be mounted with a 12 cm frontal projection, with the option to flush mount.
- Units shall be manufactured using 16-gauge aluminum or equivalent for structural integrity, and they shall be finished with a wrinkled black powder coat for durability. Black installation fasteners shall be included.
- The unit shall meet the design requirements of ANSI/TIA/EIA-568 and the plastics flammability requirements of UL 94 V-0.
- The inter-bay jumper routing and slack storage unit shall have vertically adjustable cable retaining channels. These adjustable routing channels shall be removable and shall contain a swing out door for ease in jumper installation. The sides of the channels shall have rounded edges to provide fiber minimum bend radius control. Additional channels shall be available. The unit shall contain several re-locatable cylindrical hubs to assist in the management of excess patch cord length. The rear side of the vertical routing area shall provide cable-retaining channels that secure data and power cables next to the rack. Pass-through grommets shall be provided for routing cables from the front to the back of the inter-bay management unit.
- The inter-bay storage unit shall be designed to integrate with EIA standard 213 cm tall equipment racks. The inter-bay unit shall have a footprint of 15.2 cm wide by 213 cm tall, and it shall have an optional removable front cover that is flush with the front doors of the connector housings when installed. The panel shall be finished with a wrinkled black powder coat for durability. All fasteners shall be black to match the housings.

Connector Modules

Rack mountable connector housings shall accept an interchangeable connector module. A connector module is defined as a modular, removable case containing optical fiber connector adapters and provisions for strain-relief, slack storage, and the furcation of fiber optic cables.

The connector module shall consist of a panel incorporated into a protective case with a removable cover for access to the interior connectors and fibers.

Modules shall contain a fiber-retaining spool for managing fiber slack.

The connector module shall utilize a single mounting footprint and shall be available with three, four, six, eight, or twelve SC connector adapters in each module. The module shall be attached with two push-pull latches to allow quick installation and removal.

The connector module shall be available with industry standard single fiber and small form factor multi-fiber adapters, including the SC duplex, ST compatible, MT-RJ, and LC.

Rack Mountable Connector Housings

- Rack mountable connector housings shall be available for cross-connecting or inter-connecting purposes. The units shall provide for direct connectorization and pigtail splicing.
- Housings shall be mountable in an EIA-310 compatible 465 or 592 mm rack. Housings shall be available in several sizes, including 1U, 2U, 3U and 4U. One EIA rack space or panel height (denoted as 1U) is defined as being 44.45 mm in height.
- The unit shall be modular with separate splicing, connector, jumper management, and combination connector /splicing housings available.
- The unit shall be mounted with a 12 cm frontal projection, with the option to flush mount.
- The unit shall not exceed a depth requirement of 30.5 cm.
- The unit shall meet the design requirements of ANSI/TIA/EIA-568 and the plastics flammability requirements of UL 94 V-0.
- Housings shall be manufactured using 16-gauge aluminum or equivalent for structural integrity, and it shall be finished with a wrinkled black powder coat for durability. Black installation fasteners shall be included.
- The unit shall have patch cord routing guides that allow a transition and segregation point for jumpers exiting the sides of the housing. The 3U and 4U units shall have an open top panel that allows jumper routing through the top of the housing. This shall interface with a separate jumper management panel to ease administration and access in higher density applications. An optional cover shall be available to close off this open top, if jumper routing out the top of the housing is not desired.
- The unit shall include a clamshell-type cable clamping mechanism to provide cable strain relief. The cable clamp shall accept one cable from 9.5 to 28.6 mm in diameter. The cable clamp mechanism shall also handle multiple smaller fiber count cables, when used with the multiple cable insert. The total cable capacity per clamp shall be five cables (≤ 10.2 mm OD) when used with the multiple cable insert. Housing cable clamp capacity shall be two clamps for the 1U and 2U housings and four clamps for the 3U and 4U housings. Additional cable clamps shall be available as an accessory kit.

Rack Mountable Combination Connector/Splice Housings

- Rack mountable combination connector and splice housings shall be available. These units provide for pigtail splicing to the connector patch panel within a single housing.
- Housings shall be mountable in an EIA-310 compatible 465 or 592 mm rack. Housings shall be available in a 3U size. One EIA rack space or panel height (denoted as 1U) is defined as being 44.45 mm in height.
- The unit shall be modular with a splicing compartment and a termination compartment in a single housing.
- The unit shall be mounted with a 12 cm frontal projection, with the option to flush mount.
- The unit shall not exceed a depth requirement of 30.5 cm.
- The unit shall meet the design requirements of ANSI/TIA/EIA-568 and the plastics flammability requirements of UL 94 V-0.
- Housings shall be manufactured using 16-gauge aluminum or equivalent for structural integrity, and they shall be finished with a wrinkled black powder coat for durability. Black assembly hardware and equipment attaching machine screws shall be included..
- The unit shall have patch cord routing guides that allow a transition and segregation point for jumpers exiting the sides of the housing. The unit shall have an open top panel that allows jumper routing through the top of the housing. This shall interface with a separate jumper management panel to ease administration and access in higher density applications. An optional cover shall be available to close off this open top, if jumper routing out the top of the housing is not desired.
- Splice capacity shall be four 5.1 mm tall splice trays or two 10.2 mm tall splice trays.
- The 3U housings shall have a tinted polycarbonate front door and jumpers shall route out the sides and/or top of the patch field.
- Front and rear doors of the 3U housings shall be hinged and removable for ease of cable installation. Front and rear doors shall utilize a slam slide latch to provide quick ready access and closing. The front and rear doors shall be lockable when used with an optional key lock kit.
- The housings shall have a labeling scheme that complies with ANSI/TIA/EIA-606.
- Cable supplier shall be capable of manufacturing all passive components.
- Fiber optic cable manufacturer must be 100% vertically integrated with the fiber manufacturer.
- The cable manufacturer must be able to provide at least a 25-year warranty on all fiber optic components.
- Cable manufacturer must be able to provide all fiber types required from the same fiber manufacturer.

- The cable manufacturer must be able to provide cable, connectors, hardware, splice equipment, test equipment and engineering services under the same manufacturer's name.
- Cable manufacturing and passive components facility shall possess TIA 9000/ISO 9001 certification.

If this document and any of the documents listed above are in conflict, then the more stringent requirement shall apply. All documents listed are believed to be the most current releases of the documents; however, the contractor is responsible for determining and adhering to the most recent release when developing the proposal for installation. All contractors must remain informed of new technologies and media advances.

CAD drawings must be submitted within 30 days of testing acceptance for installed fiber cabling.

7. INSTALLATION REQUIREMENTS

In order for unshielded twisted-pair cabling infrastructure to deliver high-speed performance, it is manufactured to very tight specifications. Consequently, to maintain the unshielded twisted-pair cabling system performance proper installation practices must be followed. Listed below are requirements that must be followed:

7.1 OUTLET INSTALLATION

All outlets shall be installed in the following manner:

Category 6 (data) modular jacks shall be non-keyed, 4pair and shall meet or exceed all proposed TIA/EIA Category 6 modular jacks shall incorporate Compliant Pin design technology and require no special tools for termination. Jack design should ensure that cable jacket shall be contained inside jack termination.

Modular Furniture Outlets

Use appropriate Snap-In furniture faceplate determined by modular furniture brand. Modular furniture faceplates shall accept up to 4 modular jacks. The faceplate(s) shall be mounted in the appropriate knockout(s) in the furniture channel. When channel depth is a concern a Faceplate Extender or a sloped two position modular furniture faceplate must be used.

Office Outlets

Use 4-port Executive Style faceplates. Each port shall be color coded or provided with an icon to indicate its function. When additional ports are not utilized blanks shall be installed. Faceplates shall accommodate two labels and provide a clear polycarbonate cover for each.

Surface Mounted Boxes

When required surface mounted boxes with low profile design that have provisions for bend radius control shall be utilized. Surface mounted boxes shall be capable of

mounting to a single or double gang box and accepting between 4 and 12 modular jacks, fiber optic connectors or coax connectors.

- Cables shall be coiled in the in-wall or surface mount boxes, if adequate space is present to house the cable coil without exceeding the manufacturer's bend radius. In hollow wall installations where box-eliminators are used, excess wire can be stored in the wall. No more than 24 in. of slack shall be stored in an in-wall box, modular furniture raceway, or insulated walls. Excess slack may be properly coiled and stored in the ceiling above each drop location when there is not enough space present in the outlet box to store slack cable;
- Cables shall be dressed and terminated in accordance with the recommendations made in the **TIA/EIA-568-B** document, manufacturer's recommendations and/or best industry practices;
- Pair untwist at the termination shall not exceed one-Quarter of an inch for all connecting hardware;
- Bend radius of the cable in the termination area shall not be less than 4 times the outside diameter of the cable;
- The cable jacket shall be maintained as close as possible to the termination point and in all cases contained underneath termination hardware caps.
- Data jacks shall occupy the top position(s) on the faceplates. Data jacks in horizontally oriented faceplates shall occupy the left-most position(s).

7.2 HORIZONTAL CABLE DISTRIBUTION

New horizontal distribution cable for data circuits shall be Category 6, 4-pair unshielded twisted pair, CMP rated cable as required. Individual conductors should be 23 AWG solid copper coated with a flame retardant FEP jacket then twisted into four pairs separated by a divider. Cable shall be packaged in an easy pay-out reel in a box packaging with descending length markings having an overall outside diameter of 0.235 inches. Ultimate breaking strength should be greater than 90 lbs and a NVP of 72%. Horizontal distribution cable for voice circuits shall be Category 6, 4-pair unshielded twisted pair, CMP rated cable as required. *Custom er's specification on supersedes document specified specifications for each individual project, but meets TIA/EIA cabling standards.*

7.2.1 HORIZONTAL CABLE DISTRIBUTION INSTALLATION

- Cable shall be installed in accordance with the manufacturer's recommendations and best industry practices.
- Cable raceways shall not be filled greater than the NEC maximum fill.
- Cables shall be installed in continuous lengths from origin to destination (**no splices**), unless specifically addressed in the document. Maximum cable lengths will not be exceeded per industry standards.

- Where cable transition points are allowed, they shall be in accessible locations and housed in an enclosure intended and suitable for the purpose.
- The cable's minimum bend radius and maximum pulling tension shall not be exceeded.
- If a J-hook system is used to support cable bundles all horizontal cables shall be supported at a maximum of five-foot intervals. J-hooks shall be pre-riveted non-metallic material approved for use in air handling spaces while providing complete horizontal and vertical 1 inch bend radius. At no point shall cable(s) rest on acoustic ceiling grids or panels.
- Horizontal distribution cables shall be bundled in groups of not greater than 50 cables. Cable bundle quantities in excess of 50 cables may cause deformation of the bottom cables within the bundle.
- Cable shall be installed above fire-sprinkler systems and shall not be attached to the system or any ancillary equipment or hardware. The cabling system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.
- Cables shall not be attached to ceiling grid or lighting support wires. Where light supports for drop cable legs are required, the contractor shall install clips to support the cabling.
- Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the contractor prior to final acceptance at no cost to the owner.
- Cables shall be identified by a self-adhesive label in accordance with, ANSI/TIA/EIA-606A "Administration Standard for Telecommunications Infrastructure of Commercial Buildings." The cable label shall be mechanically generated with a thermal printer and then applied to the cable behind the faceplate on a section of cable that can be accessed by removing the cover plate and within 12 inches of the point of termination.
- Unshielded twisted pair cable shall be installed so that there are no bends less than four times the cables outside diameter (4 X cable O.D.) at any point in the run.
- Pulling tension on 4-pair UTP cables shall not exceed 25-pounds for a single cable or cable bundle.
- Maximum cable lengths shall not be exceeded.
- All penetrations through fire rated building structures (walls and floors) shall have a metal stuffing pipe that extends 12" beyond each side of the building

structure and sealed with an appropriate fire-stop system. This requirement applies to through penetrations (complete penetrations) and membrane penetrations (through one side of a hollow fire structure). Any penetrating items (i.e. riser slots and sleeves, cables, conduit, cable tray and raceways, etc.) shall be fire-stopped.

7.3 HORIZONTAL CROSS-CONNECT INSTALLATION

Each cable Copper termination and management hardware shall be installed in the following manner:

- Cables shall be dressed and terminated in accordance with the recommendations made in the TIA/EIA-568-B document, manufacturer's recommendations and/or best industry practices.
- Pair untwist at the termination shall not exceed one-half an inch for all connecting hardware.
- Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.
- Cables shall be neatly bundled and dressed to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.
- The cable jacket shall be maintained as close as possible to the termination and contained under voice and data jack termination caps.
- Cables shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties and within 12 inches of the point of termination.

Fiber optic termination hardware shall be installed in the following manner:

- Fiber slack shall be neatly coiled within the fiber termination panel.
- Each cable shall be individually attached to the respective termination panel by mechanical means. The cable's strength member(s) shall be securely attached to the cable strain relief bracket in the panel.
- Each fiber cable shall be stripped upon entering the termination panel and the individual fibers shall be routed in the termination panel.
- Each cable shall be clearly labeled with the Owner's name, phone number, entrance, and termination points on the cable jacket and at both termination panels.

- Dust caps shall be installed on the connectors and couplings at all times unless physically connected.

7.4 BACKBONE CABLE INSTALLATION

All backbone cables shall be installed in the following manner:

- Backbone cables shall be installed separately from horizontal distribution cables
- Where cables are housed in conduits, the backbone and horizontal cables shall be installed in separate conduits or in separate innerducts within conduits.
- Metal conduit installed without innerduct will be required to have MaxCell duct installed inside conduit, customer to determine cell count for MaxCell duct.
- All backbone fiber not installed in metal conduit must be an Armored jacketed fiber optic cable with appropriate coating, lateral fiber cables not installed in metal conduit will utilize innerduct.
- Where cables are installed in an air return plenum, plenum cable shall be installed.
- Where backbone cables and distribution cables are installed in a cable tray or wire-way, backbone cables shall be installed first and bundled separately from the horizontal distribution cables.

7.5 Termination Hardware Installation

Copper termination and management hardware shall be installed in the following manner:

- Cables shall be dressed and terminated in accordance with the recommendations made in the TIA/EIA-568-B document, manufacturer's recommendations and/or best industry practices.
- Pair untwist at the termination shall not exceed one-Quarter of an inch for all connecting hardware.
- Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.
- Cables shall be neatly bundled and dressed to their respective panels or blocks. Each panel or block shall be fed by an individual bundle -separated and dressed back to the point of cable entrance into the rack or frame.
- The cable jacket shall be contained inside the jacket cap.
- Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables

labeled within the bundle, where the label is obscured from view shall not be acceptable.

Fiber optic termination hardware shall be installed in the following manner:

- All fiber will be terminated using manufacture recommended fusion spliced pigtails with SC connectors or anaerobic SC Field Polish connectors.
- Fiber slack shall be neatly coiled within the area of fiber termination panel. A 50 ft. service loop will be secured in ceiling or where specified by the customer. The customer (AIM) can change service loop specifications as needed.
- Each cable shall be individually attached to the respective termination panel by mechanical means. The cable's strength member(s) shall be securely attached to the cable strain relief bracket in the panel.
- Each fiber cable shall be stripped upon entering the termination panel and the individual fibers routed in the termination panel.
- Each cable shall be clearly labeled at the entrance to the termination panel. Cables labeled within the bundle shall not be acceptable.
- Dust caps shall be installed on the connectors and couplings at all times unless physically connected.

7.6 RACK and CABLE TRAY INSTALLATION

- The telecommunication closets shall house racks, cable termination fields, and the required cable routing hardware. Racks shall be placed in a manner that will allow a minimum of 4 feet of clearance from the rear mounting surfaces and on one side. If one mounting rail of the rack is placed against a wall, the mounting rail shall be mounted so that it will allow room for vertical management between the rail and the wall. Where there is more than one rack, the racks shall be ganged with vertical management hardware to provide interbay management. Ganged rack frames will be placed in a manner that will allow a minimum of 4 feet of clearance from the front and rear mounting surfaces and on one side of the ganged assembly.
- A minimum of 4 in. diameter conduit sleeves shall be used in all closets where necessary. Conduits for data backbone shall be located adjacent to the racks. The contractor shall provide conduit for all backbone fiber runs, unless armored jacketed fiber cable is installed. The contractor shall provide required ladder and wall mount management rings to properly support and dress cables from conduits to racks and frames.
- Racks shall be securely attached to the concrete floor using 3/8" hardware.

- All racks shall be grounded to the telecommunications ground bus bar or building ground in accordance with the TIA/EIA-607-A Telecommunications Bonding and Grounding Standard.
- Rack mount screws (#12-24) not used for installing fiber panels and other hardware shall be bagged and left with the rack, upon completion of the installation.
- Waterfall from the ladder rack shall be used at each vertical manager as required.
- Cable trays shall be Solid Bottom Type in common use areas determined by AIM and/or Fast Track Wire Basket type in confined areas (such as small office areas, independent buildings) as determined by AIM . Cable tray will be minimum 12 inch wide x 4 inch side walls. Installed to manufacture's specifications using trapeze supports, center support brackets are not to be used to support cable tray sections. Center supports can only be used at junctions and the cable tray must have a trapeze support at the end of each section of cable tray 1 ft from end of the cable tray that is connected to the junction.
- Ladder rack systems and cable trays must be installed per the manufacturer's installation specifications, NEC, or TIA/EIA standards - the most stringent standard shall apply. All ladder rack and cable tray systems installed must have grounding straps/continuous ground at each continuation joint. The cable tray/ladder rack must be grounded to the bus bar/building ground per NEC and TIA/EIA standards.

7.7 CCTV

- **Cable Type:**
 - **RG-06:**
 - Cable Core: Center Conductor material made of bare cooper
 - Cable Insulator: The dielectric should be polyethylene or FEP
 - Cable Shield: 95% Copper Braided Shield
 - Cable Sheath: Plenum rated for indoor/ Polyethylene sheath for outdoor
 - Cable Length: Distances of up to 1,500 feet.
 - Cable Ends and Termination: BNC connectors

- **UTP Category 6:**

Refer to Section 7.2

Installation Considerations:

A few tips for installing coaxial cable are as follows:

- First and foremost, follow all NEC requirements when installing coaxial cables.
- Distribute the pulling tension evenly over the cable and do not exceed the

minimum bend radius. Exceeding the maximum pulling tension or the minimum bend radius of a cable can cause permanent damage both mechanically and electrically to the cable.

- When pulling cable through conduit, clean and de-burr the conduit completely and use proper lubricants in long runs.
- All cabling; coaxial and category 6 UTP must be in a conduit or enclosed cable tray with no splice points or intermediate termination points between the camera and I.D.F.
- All conduit needs to be labeled every 50 ft. using D.I.T. labeling standards.
- When installing CAT 6 cabling for CCTV, use same practices as for Voice and Data Cabling according to ANSI / EIA/TIA 568B

8. LABELING AND DOCUMENTATION

All labels shall be TIA/EIA-606-A compliant labeling products. All cables, faceplates, patch panels, 110 blocks, boxes, and patch cords shall be labeled as to TIA/EIA-606-A standards. All conduits and innerduct shall be labeled as well.

Cross-connect fields shall be labeled according to ANSI/TIA/EIA 606-A.

The contractor shall supply final “as-built” drawings to AIM prior to cutover. These drawings shall show the details of each WAO, TC, MC location and cable routing. All drawings are to be saved electronically in AutoCAD™ format or another format specified by the City.

Test documentation shall be provided in a three-ring binder(s) and in CD-ROM format within three weeks of the completion of the project. The binder(s) shall be clearly marked on the outside front cover and spine with the words “Test Results,” the project name, and the date of completion (month and year). The test equipment by name, manufacturer, model number, and last calibration date will also be provided at the end of the document. The test document shall detail the test method used and the specific settings of the equipment during the test.

All test documents are to be saved in an electronic format utilizing Microsoft™ Excel™, Microsoft™ WORD™, Microsoft™ Access™, GIS or AutoCAD™ (.dwg). The contractor shall supply two (2) copies of the test documents and the drawings to AIM upon completion of the project.

9. GROUNDING

Grounding shall meet the requirements of the NEC and additional grounding bonding shall conform to ANSI/TIA/EIA-607. All ground cable shall be green in color. If the electrical contractor does not provide ground bars and plates, it is the responsibility of the cabling contractor to meet the requirements of this document.

10. TESTING AND CERTIFICATION:

EIA/TIA approved hand held testers and test leads shall meet the standards of the latest revision of TIA/EIA 568-B.

Testing

Testing of cabling shall be performed prior to system cutover. All of the UTP horizontal and

riser pairs shall be tested for opens, shorts, polarity reversals, transposition, and the presence of AC voltage. UTP voice, data, and building control device horizontal wiring pairs shall be tested to TIA/EIA 568-B standards from the information outlet to the TC and from the TC to the information outlet. In addition, all assigned circuits shall be tested from the information outlet/building control device to the MDF.

High speed unshielded twisted pair (UTP) data cable shall be performance verified using an automated test set. This test set shall be capable of testing for the continuity and length parameters defined above, and it shall provide results for the following tests:

- Near End Cross-Talk (NEXT);
- Power Sum Near End Cross-Talk (PSNEXT);
- Attenuation;
- Ambient Noise;
- Attenuation to Cross-Talk Ratio (ACR);
- Line Mapping;
- Cable Length;
- Return Loss;
- Equal Level Far-End CrossTalk (ELFEXT);
- Power Sum Equal Level Far-End CrossTalk (PSELFEXT);
- Propagation Delay; and Delay Skew.

Test results shall be automatically evaluated by the equipment, using the most up-to-date criteria from the TIA/EIA Standard, and the results shall show either a pass or fail using the Integrity Headroom Guarantee Test. Test results shall be printed directly from the test unit or from a download file using an application from the test equipment manufacturer. The printed

test results shall include all tests performed, the expected test result, and the actual test result achieved.

All fiber must be terminated and tested (OTDR and Power Loss). The installer shall provide a printed record of the fiber optic test. No spliced or broken fibers will be accepted. A calculated fiber loss budget must be consistent with the characteristics of the fiber and with allowances for splices and terminations. This allowance will be within the EIA/TIA defined guidelines for fiber optic cable testing. The actual fiber losses for a given link will compare favorably (less than) to the calculated loss budget.

Field testers for multimode optical fiber shall meet the requirements as specified in ANSI/EIA/TIA-526-14A Method B, One Jumper Reference. Single mode shall meet the requirements as specified in ANSI/EIA/TIA-526-7, method A.1, One Jumper Reference.

EIA/TIA Standards All backbone and horizontal cabling, which is terminated by the contractor, shall be tested to applicable EIA/TIA Standards.

The insertion loss for each mated fiber-optic connector pair shall be ≤ 0.75 dB. Reflectance for single-mode single fiber UPC cable assemblies shall be ≤ -55 dB. Mated connector pair loss testing shall be based on one unidirectional OTDR inspection in accordance with the OTDR operating manual for systems greater than 100 meters.

In addition to connector insertion loss for each mated pair, the contractor shall perform end-to-end insertion loss testing for each multimode fiber at 850 nm and 1300 nm from one direction for each terminated fiber span in accordance with EIA/TIA-526-14A (OFSTP 14) and single-mode fibers at 1310 nm and 1550 nm from one direction for each terminated fiber span in accordance with TIA/EIA-526-7 (OFSTP 7). For spans greater than 90 meters, each tested span must test to a value less than or equal to the value determined by calculating a link loss budget. For horizontal spans less than or equal to 90 meters, each tested span must be ≤ 2.0 dB.

Each terminated multimode fiber span shall be inspected for continuity and anomalies with an OTDR at 1300 nm from one direction in accordance with the OTDR operating manual for systems greater than 100 meters. Each terminated single-mode fiber span shall be inspected for continuity and anomalies with an OTDR at 1550 nm from one direction in accordance with OTDR operating manual for systems greater than meters.

FINAL DOCUMENTATION

Provide final documentation consisting of:

End-to-End Insertion Loss Data; Individual Splice Loss Data; "As Installed" Diagram; OTDR Traces; Connector Insertion Loss Data; and The contractor shall provide the Purchaser with one hard copy and one electronic copy of final test results.

11. WORKMANSHIP

Components of the premise distribution system shall be installed in a neat, orderly manner consistent with the best telephone and data installation practices. Wiring color codes shall be strictly observed and termination shall be uniform throughout. TIA/EIA 568-B wiring codes as shown on the drawings shall standardize all twisted pair wiring.

12. INSPECTION

On-going inspections shall be performed during construction by the AIM Project Manager and Installation Project Representative. All work shall be performed in a high quality, craftsman-like manner and the overall appearance shall be clean, neat, and orderly.

15. WARRANTY

Upon successful completion of the installation and subsequent testing by the installer, AIMAIM shall be provided with a warranty certificate registering the installation by specified suppliers.

16. FINAL ACCEPTANCE

Upon completion of the project, the Owner's Technical Representative will perform a final inspection of the installed cabling system with the contractor's project foreman. The final inspection will be performed to validate that all horizontal and backbone cables were installed as defined in the drawing package and that the installation meets the aesthetic expectations of AIM.

Upon receipt of the test documentation, AIM reserves the right to perform spot testing of a representative sample of the cabling system to validate test results provided and the test document. AIM testing will use the same method employed by the contractor, and minor variations will be allowed to account for differences in test equipment. If significant discrepancies are found, the contractor will be notified and required to resolve the discrepancies.

Completion of final inspections, receipt of the test, "as-built" documentation, and successful performance of the system for a fourteen (14) calendar day period will constitute acceptance of the system.

CABLING AESTHETIC SPECIFICATION

- CAT 6 Cable - Blue (DATA)**
 - CAT 6 Cable - WHITE (VOICE)**
 - CAT 6 PANDUIT JACKS - BLUE (DATA)**
 - CAT 6 PANDUIT JACKS - WHITE (VOICE)**
 - FACE PLATES – IVORY**
 - CAT 6 SLIM PATCH CORDS – BLUE**
 - COAX CABLE - WHITE OR BLACK**
 - SURFACE MOUNT FACEPLATE - IVORY**
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Electronic Security Systems

DIVISION 28

ELECTRONIC SECURITY SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section provides The Department of Watershed Management (also referred to in this document as “DWM”) guide specifications for Electronic Security Systems, for use in the development of security system specifications for the DWM projects. Electronic Security Systems/Subsystems in this guide specification include: Active Vehicle Barrier Systems; Closed- Circuit Television Systems; Security Management System, including Access Control and Intrusion Detection Systems; small Uninterruptible Power Systems used for security systems; Security Voice Intercom Systems; Emergency Communication Systems; Modular Security Enclosure Systems; Data and Signal Transmission equipment used for security system applications; modular security enclosure systems and associated materials and equipment.
 - B. This Guide Specification is intended to be used as a guide and adapted/modified as appropriate by security system designers for each project.
 - 1. Depending on the nature and scope of each project, it may be appropriate to use several Specification Sections, instead of one.
 - 2. Not all equipment identified in this Section will be applicable and suitable for all projects.
 - 3. Technology and security products available are expected to change rapidly, and it is the responsibility of each individual project security designer to ensure the accuracy and appropriateness of the specifications as it applies to that particular project.
 - C. Provide complete and fully functional, fully operational security systems as indicated on project plans and specifications, including all associated software; programming; and ancillary materials, devices and equipment required for complete installation and operation – regardless of whether or not such associated elements are individually specified.
 - D. Electronic Security Systems and subsystems shall be integrated together to function effectively as an overall system.
 - E. Electronic Security Systems shall permit various levels of system operation, management and administration.
 - 1. Systems shall be able to be partitioned by location, system type, and other restrictions as designated by the DWM, to support various levels of operation, maintenance and administration by multiple levels of authorization at restricted control levels.
 - 2. The DWM shall have various levels of restricted, as well as unrestricted capabilities for system operation, oversight and management.
 - 3. Authorized the DWM staff shall be able to determine access levels and system privileges
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of each access level, and shall be able to change partitioning, access level and system privileges.

4. If authorized by the DWM system administration staff, authorized users at contractor operated facilities (such as security operations contractor supervisors) shall be able to determine access levels and system privileges of subordinate user accounts, but only within that contractor's authorized domain of responsibility and authorization.
 - a. System shall permit authorized the DWM system administration staff to create, modify, and remove such partitions and permissions without affecting system operations.

F. Active Vehicle Barrier Systems include:

1. High Security
 - a. Sliding gates
 - b. Video Intercoms
 - c. Card Access Pedestals
 - d. Control unit
2. Parking equipment
 - a. Control gates
 - b. Vehicle loop detectors
 - c. Warning signs

G. Closed Circuit Television (CCTV) Systems include:

1. CCTV cameras
2. IR Infrared Illuminator Arrays
3. Video storage and retrieval equipment.
4. Video signal and control transmission/network equipment.
5. UPS
6. Keypads.
7. Smart Card Readers.
8. Combination Smart Card and Proximity Card Readers.

H. Voice Intercommunication Systems include:

1. Networked intercom systems, equipment and interfaces to related systems.
2. Standalone intercom systems and equipment. I.

Emergency Communication Systems include:

1. Remote emergency communication stations.
2. Control and switching equipment.
3. Communication interface equipment. J.

Data & Signal Transmission Media

1. Copper Cabling
2. Fiber Optic Cabling
3. Coaxial Cabling
4. Wireless Network Appliances

1.02 RELATED SECTIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section. B.

Other Related Sections include the following:

1. Division 8 Section 087100 "Door Hardware" for commercial/architectural door locks, door monitoring hardware, exit devices, wire transfer hinges, etc.
2. Division 2 Section 02850 "Parking Control Equipment" for interface with automatic barrier gates, vehicle detectors, traffic controllers, and entry / exit equipment.

1.03 REFERENCE STANDARDS

- A. ASTM International

1. ASTM F792-01e2: Standard Practice for Evaluation and Imaging Performance of Security X-Ray Systems.
2. ASTM F967-95: Standard Practice for Security Engineering Symbols.
3. ASTM F1468-95: Standard Practice for Evaluation of Metallic Weapons Detectors for Controlled Access Search and Screening.
4. ASTM F2069-00: Standard Practice for Evaluation of Explosives Vapor Detectors. B.

Electronic Industries Alliance / Telecommunications Industry Association (EIA/TIA):

1. EIA/TIA-232: Interface between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Exchange.
2. EIA/TIA-485: Electrical Characteristics of Generators and Receivers for Use in Balanced Digital Multi-point Systems.
3. EIA/TIA-568: Commercial Building Telecommunications Wiring Standard.
4. EIA/TIA-568-A: Commercial building Telecommunications Cabling Standard.
5. EIA/TIA-569: Commercial Building Standard for Telecommunications Pathways and Spaces.
6. EIA/TIA-606: Administration Standard for the Telecommunication Infrastructure.
7. EIA/TIA-607: Commercial Building Grounding and Bonding Requirements for Telecommunications.
8. EIA/TIA TSB-67: Link Performance Transmission Specification for Field Testing of Unshielded Twisted Pair Cabling.

- C. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
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1. IEEE 802.1F: IEEE Standards for Local and Metropolitan Area Networks: Common Definitions and Procedures for IEEE 802 Management Information.
2. IEEE 802.3: CSMA/CD Access Method and Physical Layer Specifications.
3. IEEE 802.6: Metropolitan Area Network Access Method and Physical Layer Specifications.
4. IEEE 802.7: IEEE Recommended Practice for Broadband Local Area Networks.
5. IEEE 802.10: Interoperable Local Area Network (LAN) Security, currently contains Secure Data Exchange (SDE).

D. National Fire Protection Association (NFPA):

1. NFPA 70: National Electric Code.
2. NFPA 72: National Fire Alarm Code.
3. NFPA 75: Standard for the Protection of Electronic Computer/Data Processing Equipment.
4. NFPA 101: Life Safety Code.
5. NFPA 110: Standard for Emergency and Standby Power Systems.
6. NFPA 601: Standard for Security Services in Fire Loss Prevention.
7. NFPA 780: Standard for the Installation of Lightning Protection Systems.
8. NFPA 1221: Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems. E.

National Institute of Justice (NIJ)

1. NIJ Standard – 0601.02: Walk-Through Metal Detectors for Use in Concealed Weapon and Contraband Detection.

F. National Institute of Standards and Technology (NIST) / Federal Information Processing Standards (FIPS) Publication:

1. FIPS PUB 197: Advanced Encryption Standard.
2. FIPS PUB 201: Personal Identity Verification of Federal Employees and Contractors.
3. NIST Special Publication 800-73: Interfaces for Personal Identity Verification.
4. NIST Special Publication 800-78: Cryptographic Algorithms and Key Sizes for PIV. G.

Security Industry Association (SIA)

1. SIA AC-01: Access Control: Weigand Card Reader Interface Standard.
2. SIA AC-03: Access Control: Badging Techniques.
3. SIA DC-04: Digital Communications: SIA 2000 Protocol for Alarm System Communications.
4. ANSI/SIA PIR-01-2000: Passive Infrared Motion Detector: False Alarm Immunity Features Standard.

H. Underwriter's Laboratories (UL):

1. UL 294: Standard for Access Control System Units.
 2. UL 305: Standard for Panic Hardware.
 3. UL 444: Communications Cables.
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4. UL 497: Standard for Protectors for Paired-Conductor Communications Circuits.
5. UL 497A: Standard for Protectors for Data Communications and Fire Alarm Circuits.
6. UL 497B: Standard for Protectors for Data Communications and Fire-Alarm Circuits.
7. UL 497C: Standard for Protectors for Coaxial Communications Circuits.
8. UL 603: Standard for Power Supplies for Use with Burglar-Alarm Systems.
9. UL 609: Standard for Local Burglar Alarm Units and Systems.
10. UL 634: Standard for Connectors and Switches for Use with Burglar-Alarm Systems.
11. UL 636: Standard for Holdup Alarm Units and Systems.
12. UL 639: Standard for Intrusion-Detection Units.
13. UL 681: Standard for Installation and Classification of Burglar and Holdup Alarm Systems.
14. UL 827: Standard for Central-Station Alarm Services.
15. UL 913: Standard for Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations.
16. UL 983: Standard for Surveillance Camera Units.
17. UL 1034: Standard for Burglary-Resistant Electric Locking Mechanisms.
18. UL 1037: Standard for Antitheft Alarms and Devices.
19. UL 1076: Standard for Proprietary Burglar Alarm Units and Systems.
20. UL 1203: Standard for Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations.
21. UL 1310: Standard for Class 2 Power Units.
22. UL 1480: Standard for Speakers for Fire Alarm, Emergency, and Commercial and Professional Use.
23. UL 1610: Standard for Central-Station Burglar-Alarm Units.
24. UL 1635: Standard for Digital Alarm Communicator System Units.
25. UL 1638: Standard for Visual Signaling Appliances – Private-Mode Emergency and General Utility Signaling.
26. UL 1778: Standard for Uninterruptible Power Supply Equipment.
27. UL 1981: Standard for Central-Station Automation Systems.
28. UL 1989: Standard for Standby Batteries.
29. UL 3044: Standard for Surveillance Closed Circuit Television Equipment.

1.04 DEFINITIONS

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|----|---------------|---|
| A. | ANSI: | American National Standards Institute |
| B. | APTA: | American Public Transportation Association |
| C. | As indicated: | As shown on the Drawings, and in accordance with the Specifications |
| D. | As required: | As necessary to provide a complete and satisfactory Work in full conformance with the Drawings and Specifications |
| E. | ASTM | American Society for Testing and Materials A non-profit Standards Development Organization Current name is ASTM International |
| F. | CPTED: | Crime Prevention through Environmental Design |
| G. | ECS: | Emergency Communication System |
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H.	EIA:	Electronic Industries Alliance
I.	EMI:	Electromagnetic Interference
J.	EPA:	Environmental Protection Agency
K.	FIPS:	Federal Information Processing Standard
L.	FTA:	Federal Transportation Administration
M.	Location:	A Location on the network having a PC-to-Controller communications link, with additional Controllers at the Location connected to the PC-to-Controller link with RS-485 communications loop. Where this term is presented with an initial capital letter, this definition applies
N.	NECA:	National Electrical Contractors Association
O.	NEMA:	National Electrical Manufactures Association
P.	NFPA:	National Fire Protection Association, Inc
Q.	NTCIP:	National Transportation Communications for ITS Protocol
R.	NTSC:	National Television Standards Committee
S.	PDF:	(Portable Document Format) The file format used by the Acrobat document exchange system software from Adobe
T.	PSI:	Pounds Square Inch
U.	PTT:	Push to Talk
V.	Provide:	Furnish, install, connect, test and make ready for use
W.	Relocate : Existing:	Remove existing item from present location Reinstall, re-connect, and test existing item and make ready for use at new location as shown on the Drawings and/or as indicated in the Specifications
X.	Remove Existing:	Remove existing item and dispose or return item to RTC as indicated on Drawings and Specifications
Y.	RTC:	Regional Transportation Commission of Southern Nevada
Z.	SEIWG:	Security Equipment Integration Working Group
AA.	SIA:	Security Industry Association
BB.	RS-485:	An EIA/TIA standard for multipoint communications

- CC. TIA: Telecommunications Industry Association A trade association of information and communications technology companies. TIA represents the communications sector of the Electronic Industries Alliance (EIA)
- DD. TSA: Transportation Security Administration
- EE. TSWG: Technical Support Working Group
- FF. TWIC: Transportation Worker Identification Credential A uniform identification credential for transportation workers requiring unescorted access to secure areas at transportation facilities including mass transit
- GG. UL: Underwriter's Laboratories
- HH. ULC: Underwriter's Laboratories Canada

1.05 SYSTEM DESCRIPTION

A. Closed Circuit Television System (CCTV):

1. Security CCTV System shall include all labor, software, programming and materials as required for a completely functional and operational CCTV system that is integrated into the overall the DWM CCTV system and all related systems, such as Security Management System, Intercom System, etc.
2. Functional Requirements shall include:
 - a. Automatic video selection/call-up from other related/interfaced systems, including the following: Security Management System; Intercom System; etc.
 - b. Automatic video scene selection / camera positioning for Pan/Tilt/Zoom cameras.
 - c. Control of Pan/Tilt/Zoom (PTZ) camera positioning from authorized Security Management System workstations, authorized networked administration workstations, authorized other workstations connected to the CCTV or Security Management System networks over the DWM LAN, as well as from CCTV subsystem control keyboards.
 - 1) Authorizations as determined by the DWM.
 - d. Multiple levels of authorizations using password protected accounts.
 - e. Video storage on networked drives and DVD storage equipment.
 - f. Video scenes "tagged" with associated events, such as alarm conditions, and stored for later retrieval, analysis, and evidentiary uses.
 - g. All controllable CCTV equipment shall be compatible with control equipment at the facility.
 - h. All equipment located in areas accessible to the public shall be tamper protected and vandal-resistant.
 - i. Control, monitoring, and storage equipment located in equipment rooms and

monitoring stations shall be provided with UPS power or battery backed power sufficient to provide power to all connected equipment for at least 4 hours, or as otherwise determined by the DWM.

B. Power Systems – Uninterruptible Power Supply (UPS):

1. Uninterruptible Power Supply systems and equipment consists of power conversion equipment, batteries, transfer switches, bypass switches, control systems, status monitoring systems, software, programming and wiring necessary to provide continuous, regulated, and “clean” power that is free from waveform irregularities to UPS powered equipment during disruption of normal power sources.
2. UPS equipment powering security system equipment shall provide status and alarm outputs connected to SMS to enable UPS equipment status and alarms to be monitored at SMS workstations designated by the DWM.

C. Voice Intercommunication Systems, Standalone:

1. Standalone voice intercom systems shall consist of remote intercom stations, amplifiers, audio switching equipment, central station equipment, microphones, speakers, enclosures, power supplies, wiring, master station console equipment, software and programming, as required to provide a complete and operational intercom system, as required.
2. Equipment located outside, in environmentally uncontrolled rooms, or where exposed to liquids or sprays, shall be weatherproof.

D. Modular Security Enclosures:

1. Consoles and equipment racks shall be provided for security systems as required for complete, professional and sound installation.
2. All doors, panels, frames, hinges, hardware, fasteners, etc., required for complete installation shall be provided.
3. Consoles and equipment racks shall be suitably finished for areas in which they are located. Color and finish selection shall be selected from manufacturer’s standard finish by the DWM or authorized representative.
4. Consoles and equipment racks shall be suitably constructed, ventilated and filtered to protect equipment.
5. Consoles and equipment racks shall be lockable and tamper protected, as appropriate for the installation, and as specified for individual projects.
6. Internal wiring shall be in accordance with NEC and UL requirements.

E. Data Transmission:

1. Data transmission systems and components for general network transmission over the DWM IT network LAN/WAN infrastructure shall be as required by the DWM IT staff and as recommended by manufacturer of affected systems.
 2. Data transmission systems and components for system elements that do not use the DWM IT network LAN/WAN infrastructure shall be as recommended by manufacturer of affected systems, as indicated on contract documents, and as required for system operation.
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F. Signal Transmission:

1. Signal transmission systems and components for devices such as CCTV, audio systems, etc., shall be as recommended by manufacturer of the affected system, as indicated on the contract documents, and as required for system operation.

1.06 SUBMITTALS

A. Product Data: For each type of product indicated. Include operating characteristics, furnished specialties, and accessories. Reference each product to a location on Drawings.

1. Manufacturer's technical data for all material and equipment at the system and sub system level to be provided.
2. System description including analysis and calculations used in sizing equipment. The description shall show how the equipment will operate as a system to meet the performance requirements. The following information shall be supplied as a minimum:
 - a. Server(s) processor(s), disk space and memory size.
 - b. Description of site equipment and its configuration.
 - c. Network bandwidth, latency and reliability requirements.
 - d. Backup/archive system size and configuration.
 - e. Start up operations.
 - f. System expansion capability and method of implementation.
 - g. System power requirements and UPS sizing.
 - h. Device / component environmental requirements (cooling and or heating parameters).
 - i. A description of the operating system and application software.

B. Shop Drawings: Provide complete shop drawings which include the following:

1. Indicate all system device locations on architectural floor plans. No other system(s) shall be included on these plans.
 2. Include a complete one-line, block diagram.
 3. Include a narrative description of the system sequence of operation.
 4. Diagrams for cable management system.
 5. System labeling schedules, including electronic copy of labeling schedules that are part of the cable and asset identification system of the software specified in Parts 2 and 3 of this Specification.
 6. Wiring Diagrams. Show typical wiring schematics including the following:
 - a. Include full schematic wiring information on these drawings for all devices. Wiring information shall include cable type, conductor routings, quantities, and connection details at device.
 - b. Workstation outlets, jacks, and jack assemblies.
 - c. Patch cords.
 - d. Patch panels.
 7. Cable Administration Drawings: As specified in Part 3 "Identification" Article.
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8. Battery and charger calculations for Central Station, workstations, and Controllers.
 9. Provide a complete spreadsheet list of all equipment installed at each location. Each site list shall include the Manufactures make and model number, serial number, description of location installed and asset tag number. The Owner shall provide the Contractor with the asset tags that will be placed on each piece of equipment. The contractor shall coordinate the spreadsheet data collection format and requirements with the Owner.
- C. Field quality-control test reports.
- D. Operation and Maintenance Data: For security system to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Sections "Closeout Procedures", and "Operating and Maintenance Data", include the following:
1. Microsoft Windows software documentation.
 2. PC installation and operating documentation, manuals, and software for the PC and all installed peripherals. Software shall include system restore, emergency boot diskettes, and drivers for all installed hardware. Provide separately for each PC.
 3. Hard copies of manufacturer's specification sheets, operating specifications, design guides, user's guides for software and hardware, and PDF files on CD-ROM of the hard-copy submittal.
 4. System installation and setup guides, with data forms to plan and record options and setup decisions.

1.07 QUALITY ASSURANCE

- A. Installer Qualifications:
1. System installer (Project Manager, Project Engineer, On-site Supervising Technician):
 - a. Factory trained and certified by manufacturer of systems to be installed. b. Regularly engaged in installation of products specified.
 - c. Installer of products specified for a period of no less than five years with satisfactory performance.
 2. Cable installer must have on staff a registered communication distribution designer certified by Building Industry Consulting Service International.
- B. Integrator (System Vendor) Qualifications:
1. Integrator shall have successfully completed minimum of five (5) similar projects during 5- year period prior to bid date.
 2. Provide name and the DWM contact information for at least five (5) qualifying projects used to meet qualification requirements, with bid proposals.
 3. Unsatisfactory reference from referenced the DWM constitutes grounds for elimination from selection consideration, as determined by the DWM.
 4. Integrator shall maintain full performance service facility with fully qualified service staff within 50 miles of Atlanta.
 5. The integrator must possess a current Panasonic IP Pro Certification and be in good
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standings with the manufacturer. C.

Manufacturer Qualifications:

1. Regularly engaged in the manufacture of products specified.
 2. Manufacturer of products specified for a period of no less than five years with satisfactory performance in similar applications.
 3. Manufacturer shall have at least three (3) qualified and certified vendor facilities in the Atlanta metropolitan area – defined as within 50 miles of Atlanta, so that adequate service support can be provided from certified second-source vendors in the event that first vendor provides unsatisfactory service.
- D. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a Nationally Recognized Testing Laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
- E. Source Limitations: Obtain Central Station, workstations, Controllers, Identifier readers, and all software through one source from a single manufacturer.
- F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- G. Comply with NFPA 70, "National Electrical Code."
- H. Comply with SIA DC-01, SIA DC-03, and SIA DC-07.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Monitor Station, Workstations, and Controllers:
1. Store in temperature- and humidity-controlled environment in original manufacturer's sealed containers. Maintain ambient temperature between 50 and 85 deg F, and not more than 80 percent relative humidity, non-condensing.
 2. Open each container; verify contents against packing list, and file copy of packing list, complete with container identification for inclusion in operation and maintenance data.
 3. Mark packing list with designations that have been assigned to materials and equipment for recording in the system labeling schedules that are generated by cable and asset management system specified in Part 2.
 4. Save original manufacturer's containers and packing materials and deliver as directed under provisions covering extra materials.

1.09 PROJECT CONDITIONS

- A. Environmental Conditions: System shall be capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:
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1. **Control Station:** Rated for continuous operation in ambient conditions of 60 to 85 deg F and a relative humidity of 20 to 80 percent, non-condensing.
2. **Interior, Controlled Environment:** System components, except central-station control unit, installed in air-conditioned interior environments shall be rated for continuous operation in ambient conditions of 50 to 122 deg F dry bulb and 20 to 90 percent relative humidity, non-condensing. NEMA 250, Type 1 enclosure.
3. **Interior, Uncontrolled Environment:** System components installed in non-air-conditioned interior environments shall be rated for continuous operation in ambient conditions of 20 to 140 deg F dry bulb and 20 to 90 percent relative humidity, non-condensing. NEMA 250, Type 3R, Type 4, or Type 12 enclosures, as indicated.
4. **Exterior Environment:** System components installed in locations exposed to weather shall be rated for continuous operation in ambient conditions of 0 to 140 deg F dry bulb and 20 to 100 percent relative humidity, condensing. Rate for continuous operation where exposed to rain as specified in NEMA 250, winds up to 95 mph. NEMA 250, Type 4 or Type 4X enclosures, as indicated.
5. **Hazardous (Classified) Environment:** System components located in areas where fire or explosion hazards may exist because of flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers shall be rated, listed, and installed according to NFPA 70.
6. **Corrosive Environment:** For system components subjected to corrosive fumes and/or vapors, provide NEMA 250, Type 4X enclosures.

1.10 EXTRA MATERIALS

- A. Furnish extra materials as indicated per individual project requirements that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
- B. Furnish extra materials in protective wrapping and packaging for proper storage.
 1. Spare parts shall be new, in unused condition.
 2. Inspect extra materials prior to delivery to the DWM. Replace any damaged or improper material.
 3. Extra materials shall be in original manufacturer's packaging, where practical.
 4. Label extra materials for systems applicable.
 5. Furnish inventory list of extra materials furnished, with cross-reference to applicable systems. Inventory list shall be in printed copy and Microsoft Excel spreadsheet file.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 1. **Acceptable Manufacturers:** Subject to compliance with requirements, manufacturers
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offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.02 CLOSED CIRCUIT TELEVISION SYSTEM

A. Definitions

1. API: Application Programming Interface
 2. CCD: Charged Coupled Device
 3. CCTV: Closed-Circuit Television
 4. CD-ROM: Compact Disc Read Only Memory
 5. CMOS: Complementary Metal – Oxide Semiconductor
 6. Dark Fiber: Fiber optic infrastructure that is owned and operated by RTC – not leased from or owned by a separate service provider.
 7. DIP: Dual n Line Package
 8. GUI: Graphic User Interface
 9. IP: Internet Protocol
 10. IR: Infrared
 11. ITS: Intelligent Transportation System
 12. LCD: Liquid Crystal Display
 13. MAN: Metropolitan Area Network
 14. MB: Mega Byte
 15. MDF: Medium Density Fiberboard
 16. MFP: Multi-Function Peripheral
 17. NAS: Network Attached Storage
 18. PTZ: Pan/Tilt/Zoom
 19. RAID: Redundant Array of Inexpensive Drives
 20. RAM: Random Access Memory
 21. RDRAM: Rambus Dynamic Random Access Memory
 22. RF: Radio frequency
 23. ROM: Read-only memory. ROM data are maintained through losses of power
 24. RS-232: An EIA/TIA standard for asynchronous serial data communications between terminal devices. This standard defines a 25-pin connector and certain signal characteristics for interfacing computer equipment
 25. RS-485: An EIA/TIA standard for multipoint communications
 26. SCSI: Small Computer System Interface
 27. SDK: Software Development Kit
 28. SEIWG: Security Equipment Integration Working Group
 29. TCP/IP: Transport control protocol/Internet protocol incorporated into Microsoft Windows
 30. TSP: Time Series Processor
 31. TWAIN: (Technology without An Interesting Name.) A programming interface that lets a graphics application, such as an image editing program or desktop publishing program, activate a scanner, frame grabber, or other image-capturing device
 32. USB: Universal Serial Bus
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- 33. UHF: Ultra High Frequency
- 34. VHF: Very High Frequency
- 35. VESA: Video Electronic Standard Association
- 36. WAN: Wide Area Network
- 37. WAV: The digital audio format used in Microsoft Windows

B. Cameras

1. HD Vandal-resistant, fixed dome.

- a. Designed and manufactured for high-abuse locations, with a weather tight, impact resistant polycarbonate dome, and heavy-duty, vandal-resistant body.
 - 1) Suitable for interior and exterior environment, rated for continuous operation in ambient temperatures of minus 14 F to plus 122 F and up to 90 percent relative humidity, non-condensing.
 - 2) Resolution: Minimum 1.3 megapixels
 - 3) Lens: Integral, varifocal
 - 4) The camera shall compliant to IEC impact test standard (IEC 60068-2-75 test Eh) 20J/ (IEC 62262) IK10.
 - 5) With automatic backlight compensation.
 - 6) Sensitivity: Camera shall provide usable images in low-light conditions, The camera shall have a minimum illumination of 0.3 lux color.
 - 7) Incorporate a focus assist mechanism to provide optimal focus adjustment. The focus assist mechanism shall be operable through the integrated web browser pages.
 - 8) Power: 12 Volt AC, 4 Watts, class 2 PoE
 - 9) Acceptable Cameras: Panasonic WV-SF346

2. HD Vandal-resistant, fixed dome.

- a. Designed and manufactured for high-abuse locations, with a weather tight, impact resistant polycarbonate dome, and heavy-duty, vandal-resistant body.
 - 1) Suitable for interior and exterior environment, rated for continuous operation in ambient temperatures of minus 40 F to plus 122 F and up to 90 percent relative humidity, non-condensing.
 - 2) Resolution: Minimum 3.0 megapixels
 - 3) Lens: Integral, varifocal
 - 4) The camera shall compliant to IEC impact test standard (IEC 60068-2-75 test Eh) 20J/ (IEC 62262) IK10.
 - 5) SD memory card slot and recording capability.
 - 6) With automatic backlight compensation.
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- 7) Sensitivity: Camera shall provide usable images in low-light conditions, The camera shall have a minimum illumination of 0.6 lux color.
 - 8) Incorporate a focus assist mechanism to provide optimal focus adjustment. The focus assist mechanism shall be operable through the integrated web browser pages.
 - 9) Power: 12 Volt AC, 8 Watts, class 2 PoE
 - 10) Acceptable Cameras: Panasonic WV-SW559
3. HD Vandal-resistant, wide angle fixed dome.
- a. Designed and manufactured for high-abuse locations, with a weather tight, impact resistant polycarbonate dome, and heavy-duty, vandal-resistant body.
 - 1) Suitable for interior and exterior environment, rated for continuous operation in ambient temperatures of 14 F to 122 F and up to 90 percent relative humidity, non-condensing.
 - 2) Resolution: Minimum 1.3 megapixels
 - 3) Lens: Integral, Fixed 1.95mm
 - 4) The camera shall compliant to IEC impact test standard (IEC 60068-2-75 test Eh) 20J/ (IEC 62262) IK10.
 - 5) SD memory card slot and recording capability.
 - 6) With automatic backlight compensation.
 - 7) Sensitivity: Camera shall provide usable images in low-light conditions, The camera shall have a minimum illumination of 0.8 lux color.
 - 8) Incorporate a focus assist mechanism to provide optimal focus adjustment. The focus assist mechanism shall be operable through the integrated web browser pages.
 - 9) Power: 12 Volt AC, 8 Watts, class 2 PoE
 - 10) Acceptable Cameras: Panasonic WV-SW155
4. HD Vandal-resistant, Pan-Tilt fixed dome with two-way Audio.
- a. Designed and manufactured for high-abuse locations, with a weather tight, impact resistant polycarbonate dome, and heavy-duty, vandal-resistant body.
 - 1) Suitable for interior and exterior environment, rated for continuous operation in ambient temperatures of minus 4 F to plus 122 F and up to 90 percent relative humidity, non-condensing.
 - 2) Resolution: Minimum 1.3 megapixels
 - 3) Lens: Integral, Fixed 1.95mm
 - 4) The camera shall compliant to IEC impact test standard (IEC 60068-2-75 test Eh) 20J/ (IEC 62262) IK10.
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- 5) SD memory card slot and recording capability.
- 6) With automatic backlight compensation.
- 7) Sensitivity: Camera shall provide usable images in low-light conditions, The camera shall have a minimum illumination of 0.6 lux color.
- 8) Incorporate a focus assist mechanism to provide optimal focus adjustment. The focus assist mechanism shall be operable through the integrated web browser pages.
- 9) Power: 12 Volt AC, 8 Watts, class 2 PoE
- 10) Acceptable Cameras: Panasonic WV-SW175

5. HD Vandal-resistant, fixed camera with IR-LED.

- a. Designed and manufactured for high-abuse locations, with a weather tight, impact resistant polycarbonate dome, and heavy-duty, vandal-resistant body.
 - 1) Suitable for interior and exterior environment, rated for continuous operation in ambient temperatures of minus 4 F to plus 122 F and up to 90 percent relative humidity, non-condensing.
 - 2) Resolution: Minimum 1.3 megapixels
 - 3) Lens: Integral, varifocal
 - 4) The camera shall compliant to IEC impact test standard (IEC 60068-2-75 test Eh) 20J/ (IEC 62262) IK10.
 - 5) SD memory card slot and recording capability.
 - 6) With automatic backlight compensation.
 - 7) Sensitivity: Camera shall provide usable images in low-light conditions, The camera shall have a minimum illumination of 0.6 lux color.
 - 8) Incorporate a focus assist mechanism to provide optimal focus adjustment. The focus assist mechanism shall be operable through the integrated web browser pages.
 - 9) Power: 12 Volt AC, 8 Watts, class 2 PoE
 - 10) Acceptable Cameras: Panasonic WV-SW316L

6. HD Vandal-resistant, fixed camera with 360-degree view.

- a. Designed and manufactured for high-abuse locations, with a weather tight, impact resistant polycarbonate dome, and heavy-duty, vandal-resistant body.
 - 1) Suitable for interior and exterior environment, rated for continuous operation in ambient temperatures of minus 40 F to plus 122 F and up to 90 percent relative humidity, non-condensing.
 - 2) Resolution: Minimum 3.1 megapixels
 - 3) Lens: Integral, fixed
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- 4) The camera shall compliant to IEC impact test standard (IEC 60068-2-75 test Eh) 20J/ (IEC 62262) IK10.
 - 5) SD memory card slot and recording capability.
 - 6) With automatic backlight compensation.
 - 7) Sensitivity: Camera shall provide usable images in low-light conditions, The camera shall have a minimum illumination of 0.6 lux color.
 - 8) Incorporate a focus assist mechanism to provide optimal focus adjustment. The focus assist mechanism shall be operable through the integrated web browser pages.
 - 9) Power: 12 Volt AC, 8 Watts, class 2 PoE
 - 10) Acceptable Cameras: Panasonic WV-SW458
7. HD, fixed camera with auto iris 5-50mm lens.
- a. Designed and manufactured for high-abuse locations, with a weather tight, impact resistant polycarbonate dome, and heavy-duty, vandal-resistant body.
 - 1) Suitable for interior and exterior use in appropriate environmental housing, rated for continuous operation in ambient temperatures of 14 F to 122 F and up to 90 percent relative humidity, non-condensing.
 - 2) Resolution: Minimum 3.0 megapixels
 - 3) Lens: Auto Iris 5-50mm Megapixel Lens
 - 4) The camera shall compliant to IEC impact test standard (IEC 60068-2-75 test Eh) 20J/ (IEC 62262) IK10.
 - 5) SD memory card slot and recording capability.
 - 6) With automatic backlight compensation.
 - 7) Sensitivity: Camera shall provide usable images in low-light conditions, The camera shall have a minimum illumination of 0.6 lux color.
 - 8) Incorporate a focus assist mechanism to provide optimal focus adjustment. The focus assist mechanism shall be operable through the integrated web browser pages.
 - 9) Power: 12 Volt AC, 8 Watts, class 2 PoE
 - 10) Acceptable Cameras: Panasonic WV-SP509
 - 11) Acceptable Lenses: Panasonic PLAMP0550
 - 12) Acceptable Housings: Panasonic POH1500HB (unless otherwise shown on the drawings to be installed in a harsher environment).
8. Pan/Tilt/Zoom color dome camera.
- a. High-speed pan/tilt/zoom camera designed for high-abuse day/night exterior locations, with a recessed, pendant, pole or wall mounting (as indicated), impact-
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resistant polycarbonate dome, with integral receiver/driver. Camera shall automatically switch from color (day) mode to higher-sensitivity monochrome (night) mode when light level decreases below adjustable threshold level, and day/night mode shall also be manually selectable from system controller keyboards. Camera unit shall meet the following minimum requirements:

- 1) Suitable for interior or exterior environment, as indicated, rated for continuous operation in ambient temperatures of minus 40 F to plus 122 F and up to 100 percent relative humidity, condensing.
- 2) Resolution: 1.3 megapixels
- 3) With automatic backlight compensation.
- 4) Sensitivity: Camera shall provide usable images in low-light conditions, delivering a usable image at a scene illumination of 0.5 lux.
- 5) Receiver/Driver: Integral with unit.
- 6) Lens: Integrated, 4.7 mm – 84.6 mm (18x) zoom]
- 7) Focus Control: Automatic with Manual Override.
- 8) Iris Control: Automatic with Manual Override.
- 9) Pan: 360-degrees auto flip.
- 10) Pre-position Scene Settings: 256
- 11) Tilt: -15 to -185
- 12) Mounting: As indicated, provide all necessary mounts, adapters and hardware.
- 13) Enclosure, exterior: Weather resistant NEMA 4X.
- 14) Power Requirements: 24 Volts AC, 43 Watts.
- 15) Acceptable Camera: Panasonic WV-SW395

C. Camera Mounts and Brackets

- a. All camera mounts and brackets are to beige powder coated finish. b.

Acceptable Panasonic Mounting Brackets are:

- 1) PACA2B – Outdoor Corner Mount
- 2) PAPM#B – Outdoor Pole Mount Adapter
- 3) PPMF12D – Pendant Mount Bracket
- 4) PWM30GB – Parapet Mount
- 5) PWM20GB – Wall Mount
- 6) WV-Q120 – Adapter Box
- 7) PWM800 – Outdoor Pole/Wall Mount
- 8) POH1500HB – Outdoor Housing with Heater/Blower

D. Infrared LED IR Illuminator

- a) General Characteristics:

- 1) The infrared illuminator shall be a solid-state LED type.
 - 2) The infrared illuminator shall provide illumination from 20 m (65 ft) to 220 m (750 ft).
 - 3) The infrared illuminator shall be designed to IP67 for operation in harsh weather conditions.
 - 4) The infrared illuminator shall have been tested for outdoor usage.
 - 5) The infrared illuminator shall be powered by a universal, low voltage Class II
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power supply.

b) Performance

- 1) The infrared illuminator shall use high-efficiency surface mount LEDs comprised of 18 LEDs.
- 2) The infrared illuminator shall require a maximum of 45 Watts.
- 3) The infrared illuminator shall operate in semi-covert mode at 850 nm or covert mode at 940 nm, ± 20 nm (bandwidth FWHM 40 nm).
- 4) The infrared illuminator shall eliminate hot-spots, foreground overexposure and background underexposure.
- 5) The infrared illuminator shall produce even illumination with uniformity of less than 55% variation across field of illumination.
- 6) The infrared illuminator shall have diffused illumination using 3D Diffuser technology.
- 7) The infrared illuminator shall have a constant light output when operated at an ambient temperature of -50°C to $+50^{\circ}\text{C}$ (-58°F to $+122^{\circ}\text{F}$) over service life of the illuminator.
- 8) The infrared illuminator shall have a built-in, sensitivity adjustable photocell for automatic on / off operation.
- 9) The infrared illuminator shall be switchable by an external device via a built-in telemetry input.

c) Acceptable Products: Bosch UFLED95-9BD E.

IP Video Management System

- a) Contractor shall provide PSIM (CNL) camera licenses for all cameras and a one-year camera upgrade plan for camera license. All cameras shall be integrated into the City of Atlanta's Video Information Center. The Contractor shall budget \$100 per camera for each camera installed at each location. The camera licenses fees shall be given to the Owner at the substantial completion phase of the project. Coordinate all with the Owner.

F. CCTV Camera Poles

- a) Straight Camera Pole: The camera mounting pole shall be a non-hinged straight aluminum pole with mounting base. All fittings shall be stainless steel. The pole shall have an internal wiring harness that routes video, and power between the pole base and the camera mount. The wiring harness shall be compatible with the camera to be mounted on the pole. Surge protection shall be provided at the pole between the wiring harness, and the incoming electronic signal lines and power line.
- b) Acceptable products: Hapco SSS14B4-4-GC G.

Media Converter

- a) Ethernet to Fiber media converter: The media converter is an industrial Ethernet to fiber media converter designed for operation in harsh environments. It shall operate in -10-60 degrees and be DIN rail mountable.
- b) Acceptable products: IFS – MC-4TX

H. Video Recorder

System Capabilities

Provide an NVR Recorder as shown on the drawings.

1. Small Site NVR Video Recorder (1-15 cameras)
 - a) The NVR shall be capable of connecting to up to 16 network cameras without extra license fees and their images can be recorded simultaneously.
 - b) The NVR shall have built-in decoder and HDMI output.
 - c) The NVR shall be equipped with up to 2 HDDs (2TB each).
 - d) The NVR shall have quick intuitive search by calendar and timeline without PC.
 - e) The shall have simple mouse operation by GUI without the use of PC.
 - f) The NVR shall be the equipment with an embedded real-time operating system and shall not be based on a Microsoft Windows OS. The OS must reside completely in the hardware and not be installed on the hard disk drives. Installed disk drives must be dedicated to recording videos.
 - g) The NVR shall support H.264, MPEG-4 and JPEG multi format.
 - h) The NVR shall have a built-in network interface (10BASE-T / 100BASE-TX / 1000BASE-T) for camera recording and client access.
 - i) NRV shall have sufficient hard drives to record and store 30 days at 5 fps continuous and 15 fps on motion detection.
 - j) Acceptable products: WJ-NV200
 2. Medium Site NVR Video Recorder (16-40 cameras)
 - a) The NVR shall be capable of connecting to up to 64 network cameras without extra license fees and their images can be recorded simultaneously.
 - b) The NVR shall be equipped with up to 5 HDDs (3TB each). c) RAID 5/6 Capabilities
 - d) The NVR shall be the equipment with an embedded real-time operating system and shall not be based on a Microsoft Windows OS. The OS must reside completely in the hardware and not be installed on the hard disk drives. Installed disk drives must be dedicated to recording videos.
 - e) The NVR shall support H.264, MPEG-4 and JPEG multi format.
 - f) The NVR shall have a built-in network interface (10BASE-T / 100BASE-TX / 1000BASE-T) for camera recording and client access.
 - g) NRV shall have sufficient hard drives to record and store 30 days at 5 fps continuous and 15 fps on motion detection.
 - h) Acceptable products: WJ-NV400
 3. Large Site NVR Video Recorder (40 plus cameras)
 - a) The NVR shall be capable of connecting to up to 64 network cameras without extra license fees and their images can be recorded simultaneously.
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- b) The NVR shall be equipped with up to 9 HDDs (3TB each).
- c) RAID 5 Capabilities
- d) The NVR shall be the equipment with an embedded real-time operating system and shall not be based on a Microsoft Windows OS. The OS must reside completely in the hardware and not be installed on the hard disk drives. Installed disk drives must be dedicated to recording videos.
- e) The NVR shall support H.264, MPEG-4 and JPEG multi format.
- f) The NVR shall have a built-in network interface (10BASE-T / 100BASE-TX / 1000BASE-T) for camera recording and client access.
- g) NRV shall have sufficient hard drives to record and store 30 days at 5 fps continuous and 15 fps on motion detection.
- h) Acceptable products: WJ-NV400

I. Video Encoders:

- a) The video encoder shall convert analog video signals (NTSC) to digital data (MJPEG, H.264 and MPEG4).
 - b) The encoder shall distribute MJPEG/H.264/MPEG4 through the network with minimal image degradation.
 - c) The video and synchronization signals shall be transmitted up to 3000' over coaxial cable to the encoder.
 - d) The encoder shall support a Tri-Streaming Codec with MJPEG and H.264 or MPEG-4 Video Compression.
 - e) The encoder shall generate and transmit images to meet the following specifications for all 4 channels.
 JPEG: D1(720 x 480), VGA (640 x 480), QVGA (320 x 240) H.264:
 D1(720 x 480), VGA (640 x 480), QVGA (320 x 240) MPEG-4:
 D1(720 x 480), VGA (640 x 480), QVGA (320 x 240)
 - f) The encoder shall be able to support 30 fps per channel.
 - g) The encoder shall connect up to (4) analog cameras and control their functions such as PTZ, Focus, IRIS and Preset position (up to 256) remotely.
 - h) The camera shall feature Face Detection.
 - i) The encoder channels shall feature individual alphanumeric titles of 20 characters.
 - j) The encoder shall have Audio (1) input and (1) output jacks and transmit and receive the audio streams through the same Ethernet connection as the video. The audio shall be encoded by G.726 or equivalent ADPCM standard.
 By directional audio shall be supported (1 channel).
 - k) The encoder shall support 10BASE-TX/100BASE-T.
 - l) The encoder shall be able to support unicast and multi-cast transmissions.
 - m) The Max bit rate per client for H.264 and MPEG4 shall be selectable from 64/128/256/512/768/1024/1536/2048/4096 kbps and combined with Total bit rate control (64/128/256/512/1024/2048/4096/8192 kbps or Unlimited).
-

- n) Supported protocols: TCP/IP, UDP/IP, HTTP, FTP, SMTP, DHCP, DNS, DDNS, NTP, RTP and SNMP.
- o) The encoder shall support (4) terminal alarm inputs, (4) Video loss alarms, Panasonic protocol alarms shall trigger actions including SDHC memory recording, FTP image transfer, E-mail notification, Alarm indication, (4) terminal alarm outputs and Panasonic protocol output.
- p) The encoder shall support the scheduled transfer of image data via FTP to an FTP server.
- q) The encoder shall have a built-in web server so that access to the IP video stream can be obtained using Internet Explorer Version 6.0 or better. The web browser shall permit the user to make adjustments and settings to the camera.
- r) The encoder shall be able to control PTZ cameras and automatically sequence through the preset positions in logical programming order (sequence mode) or actual position (sort mode).
- s) The encoder shall protect all menu settings on web pages with user-id and password.
- t) The encoder shall provide the ability to display quad (4 cameras) and 16 camera images in a single browser screen.
- u) The encoder shall permit a physical, external time adjustment input or time adjustment via external, user-supplied NTP server.
- v) The power source shall be 12VDC @ 500mA or PoE IEEE 802.3af (6W) compliant power device. All units must be UL listed.
- w) Acceptable Encoders: Panasonic WJ-GXE500

J. Video Decoders:

- a) The decoder shall display 1x 4VGA (1280x960) image with 2x VGA images or 6x VGA images in a split screen.
 - b) The decoder shall display each of VGA images at 30ips (NTSC) or 25ips (PAL).
 - c) Up to 256 i-Pro cameras including cameras connected to the i-Pro Network Video Encoders shall be registered in the decoder.
 - d) The decoder shall decode MPEG4/JPEG image data from Panasonic i-Pro Network Cameras and Video Encoders.
 - e) The decoder shall support tour sequence and group sequence.
 - f) The decoder shall support camera site alarm signal. The decoder shall display Alarm indication and activate Alarm terminal output.
 - g) The decoder shall support selectable multi-screen border colors (White/Gray/Black/OFF).
 - h) The decoder shall be equipped with a High Definition HDMI interface supporting 1920x1080 display size and a NTSC video composite video signal output (BNC).
 - i) The decoder shall be equipped with High speed network interface (1000BASE-T/100BASE-TX) and Maintenance port (10BASE-T).
 - j) The decoder shall support Multicast/Unicast for efficient network usage.
 - k) The decoder shall support Single channel audio decoding G.726.
-

- l) The decoder shall be setup by the browser GUI.
- m) The decoder shall have Superior reliability with an embedded OS.
- n) Acceptable Decoders: Panasonic WJ-GXD400

K. Extra materials quantities for each site project shall be as follows:

- 1. Two (2) fixed IP Cameras
- 2. Two (2) ISCSI Storage Array Hard Drives (3 TB)
- 3. One (1) PTZ IP Camera
- 4. One (1) Infrared IR Illuminator
- 5. Two (2) Fiber Optic Media Converter

2.03 SECURITY MANAGEMENT SYSTEM

A. Subject to conformance with specified requirements, provide products and systems based on the following Manufacturers and Basic Equipment products. The following list of equipment is neither comprehensive nor complete and is intended to be used by designer to establish overall system requirements and expected performance standards.

B. Definitions

- 1. AES: Advanced Encryption Standard
 - 2. AWG: American Wire Gauge
 - 3. BAS: Building Automation System
 - 4. Central Station: A PC with software designated as the main controlling PC of the security access system. Where this term is presented with initial capital letters, this definition applies
 - 5. Controller: An intelligent peripheral control unit that uses a computer for controlling its operation. Where this term is presented with an initial capital letter, this definition applies
 - 6. CPU: Central Processing Unit
 - 7. Credential: Data assigned to an entity and used to identify that entity
 - 8. CRT: Cathode Ray Tube
 - 9. DPI: Dots per Inch
 - 10. DPS: Door Position Switch
 - 11. DRM: Dual Reader Module
 - 12. DSP: Digital Signaling Processor
 - 13. DTS: Digital Termination Service: A microwave-based, line-of-sight communications provided directly to the end user
 - 14. ICM: Intelligent Controller Module
 - 15. I/O: Input/Output
 - 16. IOM: Input/Output Module
 - 17. LAN: Local area network
 - 18. LED: Light-emitting diode
 - 19. PC: Personal computer. This acronym applies to the Central Station, workstations, and file servers
 - 20. PCI Bus: Peripheral Component Interconnect; a peripheral bus providing a high-speed data path between the CPU and peripheral devices (such as monitor, disk drive, or network)
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- 21. PIN: Personal Identification Number
- 22. REX: Request to Exit
- 23. RGB: Red Green Blue
- 24. RIM: Reader Interface Module
- 25. SMS: Security Management System
- 26. SNMP: Simple Network Management Protocol
- 27. UPS: Uninterruptible Power System. Also known as Uninterruptible Power Supply
- 28. Weigand: Patented magnetic principle that uses specially treated wires embedded in the credential card
- 29. Weigand Format: Industry standard 26-bit binary card data format. The 26-bit format is considered to be an Open Format, and it is widely used

C. Manufacturers and Basic Equipment:

- 1. S2 Systems
 - a. S2 Net Box
 - b. S2 MicroNode

D. Network Controller Blade:

- 1. Each Network Controller shall support up to thirty-two (32) network nodes each composed of a Node and up to seven application blades (Access, Input, Output, Temperature).
- 2. Each Controller shall include an on-board Node or not.
- 3. The network controller shall be supplied with 12V DC at a minimum of 3 amps. Internal battery backup shall supply sufficient power to provide for an orderly shutdown of the system in case of loss of external power. External battery backup shall be used to provide un-interrupted operation in the event of external power loss.
- 4. Communications between the node and network controller shall be encrypted (SSL 128-bit) and authenticated (SHA-1).

E. Network Node:

- 1. Each Node shall support up to seven (7) application blades (Access, Input, Output, Temperature), depending upon the enclosure type.
- 2. A Node shall be included on a Controller/Node Blade or it may be a Node-only blade.
- 3. The Node shall be supplied with 12V DC at a minimum of 3 amps. The Node blade shall supply all application blades in the node with power.
- 4. The Node shall support onboard data storage of up to 20,000 credentials for access control decisions and up to 27,000 records of logged system events.
- 5. Communications between the node and network controller shall be encrypted (SSL 128-bit) and authenticated (SHA-1).

F. Access Control Blade

- 1. Each Access Control Blade shall support up to two (2) readers, four (4) supervised inputs, and four (4) relay outputs.
 - 2. Reader connectors shall be 7-pin. Reader LED color control and reader beeper control are supported for many reader brands.
-

3. Readers require twisted, shielded 22 AWG Belden #9536 (6 conductor) or equivalent wiring and may be no more than 500 feet (152 meters) from the Access blade.
4. Supervised input connectors are 2-pin. The system shall support a wide variety of input supervision types including normally-open circuit and normally-closed circuits, and zero, one or two resistor configurations.
5. Inputs require twisted, shielded 22 AWG Belden #9462 or equivalent wiring and may be no more than 2000 feet (610 meters) from the blade.
6. Relay output connectors are 3-pin. Both normally-open circuit and normally-closed circuit output devices shall be supported. The relay outputs shall support any output devices that operate on the following maximum electrical ratings: 30 Volts DC or AC, 2.5 Amps inductive or 5.0 Amps non-inductive.
7. Outputs shall require twisted, shielded 22 AWG wiring and may be no more than 2000 feet (610 meters) from the blade.
8. The access control blade shall receive power via the ribbon cable bus directly from the Node Blade. The access blade shall supply up to 400 milliamps of power to one reader or 200 milliamps of power to each of two readers. Readers requiring more power than this shall be equipped with separate external power supplies.

G. Alarm Input Blade

1. Each Alarm Input Blade shall support up to eight alarm inputs.
2. Supervised input connectors are 2-pin. The system shall support a wide variety of input supervision types including normally-open circuit and normally-closed circuits, and zero, one or two resistor configurations.
3. Inputs shall require twisted, shielded 22 AWG wiring and may be no more than 2000 feet (610 meters) from the blade.
4. The alarm input blade shall receive power via the ribbon cable bus directly from the Node. H.

Relay Output Blade

1. Each Relay Output Blade shall support up to eight (8) relay outputs.
2. Relay output connectors shall be 3-pin. Both normally-open circuit and normally-closed circuit output devices are supported. The relay outputs shall support any output devices that operate on the following maximum electrical ratings: 30 Volts DC or AC, 2.5 Amps inductive or 5.0 Amps non-inductive.
3. Outputs require twisted, shielded 22 AWG wiring and may be no more than 2000 feet (610 meters) from the blade.
4. The relay output blade shall receive power via the ribbon cable bus directly from the Node.

I. Temperature Monitoring Blade

1. Each Temperature Monitoring Blade shall support up to eight (8) analog temperature inputs.
 2. Temperature leads require Category 3 cable for distances of up to 500 feet (152 meters). For distances of up to 1000 feet (305 meters), temperature leads shall be Category 5 cable.
 3. The temperature monitoring blade shall receive power via the ribbon cable bus directly from the Node.
-

J. System Enclosures

1. Each system enclosure shall contain one (1) Controller/Node Blade and from two (2) to seven (7) application blades. System enclosures can be wall mounted or rack mounted units as shown below.
2. The standard wall mount cabinet shall support a maximum seven (7) application blades.
3. The enclosure shall have a locking mechanism and a cabinet door tamper switch.
4. The system shall be powered by either 100-240V AC at 50-60 Hz, or by 12V DC at a minimum of 3 amps. Power must come from a separate circuit with an isolated earth ground and connected to the internal power supply.
5. The internal battery backup, if supplied, shall provide sufficient power for an orderly shut- down of the system in case of loss of external power.

K. System Overview

1. Design Elements

- a. Scalability: The system shall be scalable to support the growth of security system needs. Additional nodes can be added to a network controller up to a maximum of 32 nodes. Each of the nodes can carry an additional seven application blades. It shall not be necessary to reconfigure existing system resources when adding additional nodes, application blades and devices.
- b. Integration of Subsystems: All subsystems within the system, access control, video monitoring, digital video recording, alarm management, temperature monitoring, and management of personnel security data shall be integrated into one application interface for management, monitoring, and administration. In addition, the personnel security database shall integrate by means of an API to existing personnel databases for purposes of auto-populating.
- c. Browser-based User Experience: The system shall be capable of being monitored, administered, and configured through a browser on any computer connected to the network. The web server on-board the network controller shall provide a rich graphic application for the management of the system.
- d. User Licensing: Software licensing shall be based upon the number of readers and cameras for one network controller board only. Software license upgrades shall be available if system reader and camera capacity must be raised. The user license shall be valid in perpetuity and shall include one year of software updates from the date of shipment from the factory.

2. System Capacities

- a. The system shall have up to the following capacities for each network controller:

□ Network nodes:	32
□ Access control readers:	448 maximum, 140 certified
□ Access cards:	60,000+
□ Card formats:	32
□ Alarm input points:	500
□ Control point outputs:	500
□ Temperature monitor points:	500
□ IP, DVR, and NVR cameras:	limited only by license
□ Intercom stations:	16
□ Online event history log:	50,000 records
-

☐ Ethernet switch ports:	2
☐ Time specifications:	512
☐ Time spec groups:	64
☐ Time specs per group:	8
☐ Threat Levels:	8
☐ Threat Level Groups:	32
☐ Holidays:	30
☐ Access levels per person:	16
☐ Cards per person:	100

b. The System shall have up to the following single network node capacities although all maximums cannot be achieved at the same time:

☐ Application blades:	7
☐ Access control readers:	14
☐ Access levels:	512
☐ Portals:	14
☐ Portal groups:	64
☐ Reader groups:	64
☐ Input groups:	64
☐ Output groups:	64
☐ Elevators:	14
☐ Floor groups:	32
☐ Alarm input points:	56
☐ Control point relay outputs:	56
☐ Temperature monitor points:	56
☐ Credential storage:	20,000
☐ Event log records:	27,000

3. Internationalization/Localization

a. Supported Languages: The system shall provide user interface, online help, and printed documentation in English, Spanish, French and Italian. The system administrator shall be able to switch between languages through the application graphic user interface. It shall be possible to translate the user interface, online help, and documentation into other languages.

b. Date formats: The system shall support the use of globally appropriate date formats. The specific date formats available shall be:

- ☐ mm/dd/yyyy
- ☐ dd/mm/yyyy
- ☐ yyyy/mm/dd

1) The system administrator shall be able to switch between date formats through the application graphic user interface.

c. Character Set Support

- 1) English shall support the UTF-8 character set.
- 2) Spanish and Italian shall support the ISO 8859-1 character set.

4. Online Documentation: The system shall have an online Help system to provide explanations and procedures for all monitoring, administrative, and system configuration and maintenance functions. The Help system shall have linked table of contents, index, and frequently asked questions pages. The Help shall be printable.
5. Access Control: The system shall be able to make access control decisions, define a variety of access levels, time specifications and threat levels, write system activity into a log file, maintain a personnel enrollment database, receive signals from input devices such as door state monitors, card readers and motion detectors, energize devices such as door locks and annunciators via output relays, and provide on-screen monitoring features.
6. Threat Levels: The system shall include configurable and settable threat levels. A threat level or a change in threat level shall be capable of effecting a change in the behavior of the security system. The areas of security system behavior that threat levels can change are portal unlock behavior, alarm event actions, and the function of access levels. A system administrator shall be able to configure threat levels, define behavioral changes based on the system threat level and set the current threat level. Threat levels shall also be changeable automatically in response to alarm events.
7. Alarm and Event Monitoring: The system shall be capable of monitoring, prioritizing, and acknowledging alarms. It shall be possible to associate specific actions with each alarm event. These actions may include but are not limited to sending pages and emails, energizing outputs to activate lights, locks, or alarms, changing the system threat level, switching to an appropriate video monitor, displaying ID photos, and flashing device icons on a graphic floor plan, positioning a PTZ camera, and recording video.
8. Live IP Camera Surveillance: The system shall provide IP camera-based surveillance capability. The number of supported cameras shall be limited only by license. The system's video capabilities shall include video monitor switching based on access activity.

The system shall provide monitoring, configuration, and administration of live IP video. Cameras can be separately monitored or monitored in groups. The system shall also support the capture of snapshots from any camera.

a. The system shall support IP video cameras from multiple manufacturers.

9. Video Management System (VMS) Integration: The system shall support the integration of Digital Video Recorder systems and Network Video Recorder systems. The system shall provide for the auto-discovery of camera resources through the integration interface.

The VMS shall support automatic video recording of events. It shall also support both live and recorded video viewing.

It shall be possible for the VMS to report camera on-line, camera off-line, video loss detection, and motion detection events to the network controller.

The system shall support integrated camera telemetry functions in all camera displays. It shall also support one-click access to historical video through a video browser.

The system shall have a single user interface for DVR, NVR, and IP camera display.

All VMS and camera viewing, monitoring, and management shall be web-based and available through a browser interface as an integrated part of monitoring and event management.

10. Graphical Map Management of Sites and Devices: The system shall provide graphic floor plan capability including graphic display of links to other floorplans, alarms, system re- sources such as portals, IP video cameras, inputs, outputs, and temperature monitoring points. The Network Administrator shall be able to graphically configure device icons onto the floor plan images. JPEG and PNG images shall be supported.
 - a. The device images placed on the floor plan shall provide the following functions in real time:
 - 1) Portal icons shall indicate access activity and permit lock control.
 - 2) Video camera icons shall permit the display of the camera view.
 - 3) Temperature point icons shall display the current temperature and allow the display of temperature graphs of temperature data from the last hour, day, week, or month.
 - 4) Links shall provide one-click access to other floor plans.
 - 5) Inputs and outputs shall graphically indicate alarm and activation states.
 - 6) Alarm icons shall graphically indicate that an alarm is active.
 11. System Administration: The system shall provide for the performance of system administration tasks from any network-connected computer with a browser. These administrative tasks shall include but not be limited to monitoring all system activity including IP video, generating reports, enrolling personnel and credentials, and configuring system devices, and arming alarm panels.
 12. Person Management: The system shall maintain person data relating to access control, system user privileges, photo identification, system activity, and contact information. All person data in the system shall be integrated onto one tabbed page for viewing, editing, and deletion by system administrators. This data shall be kept on the network controller and shall not require the use of separate storage devices.
 - a. All decisions regarding persons in the system shall be made based upon this data. This includes access control decisions, system administrator privileges, and email or SMS notification of system events.
 13. Open Database Connectivity Compliance: The system shall be Open Database Connectivity (ODBC) compliant. The on-board DBMS shall be MySQL.
 14. Data Import: The system shall support, via and API, the import of names, access levels, card numbers, card formats, and person IDs to facilitate the pre-populating of cardholders into the system database.
 15. Warranty: Any hardware components proved defective in material or workmanship during a period of one year after the date of shipment, shall be replaced or repaired. Level 2 and Level 3 systems include an additional one-year warranty on hardware components. The system warranty shall include 90 days from the date of shipment for all replacement parts and repairs.
- L. Operating System: The embedded operating system shall be Linux. The operating system kernel shall be open-source. No training or certification shall be necessary.
- M. Hardware Capacities and Operation
1. Network Controller
-

- a. **Network Communication:** The system shall support the following networking, communication, and encryption standards and shall run on existing building network infrastructure:

□	Network:	NTP, TCP/IP
□	Web:	HTTP, HTTPS, XML
□	Email:	POP, SMTP
□	Messaging:	SMS
□	Encryption:	SSL, SHA-1
□		

- b. **Data Security:** The system shall protect browser communications using SSL (128-bit) encryption. Administrative access to the security management application and the personnel security data shall also be password protected. In addition, communication between the network controller and network nodes shall be authenticated using the SHA-1 algorithm.

- c. **Database and Event Storage Capacities:** Database and event storage capacities vary based upon the system configuration. Onboard memory on the network controller is dynamically allocated. In general, the network controller shall be capable of storing up to 50,000 records of system activity. This shall be settable by the system administrator.

- 1) It shall be possible to configure regular automatic database backups to on board ROM and to save backups to separate network attached storage and FTP servers. It shall also be possible to setup regular automatic creation of database archive files.
- 2) Each night the system shall truncate a sufficient number of the oldest records held onboard to reduce the database to its set limit, if required. This shall create the needed storage space for additional system activity records. Truncation will be performed on a First-in, First-out (FIFO) basis.

- 2. **Network Node:** Network nodes shall communicate with the network controller using TCP/IP. There shall be two types of communications. Initially nodes shall multicast non-encrypted communications for the purpose of discovery. Once communication is established all further communications shall be socket-to-socket from the node to the network controller. Socket-to-socket communications shall be encrypted and authenticated.

- a. Communications to and from the node's application blades does not occur on the network. This communication occurs on the node's internal communications bus.
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- b. Data Security: The system shall protect the security of data communicated between the node and the network controller using SSL (128-bit) encryption, and SHA-1 authentication.
 - c. Application Blade Capacities: Each network node shall be capable of supporting seven application extension blades. The seven (7) application blades can be any combination of supervised input, relay output, temperature input, or access control blades.
 - d. Database and Event Storage Capacities: Each node shall be capable of storing up to 20,000 credentials for access control decisions. In addition, each node shall be capable of logging and storing up to 27,000 system events if it is offline from the network controller.
 - 1) Each node shall, whenever network connectivity to the network controller is available, upload all logged system events currently held in its buffer. Nodes shall no longer store system activity logs once those logs have been uploaded to the network controller.
3. Access Control Application Blade
- a. Communication Format: Communication packets between the access control blade and the node shall not move over the network. This communication shall occur only on the node's internal communications bus and shall include only input state changes, output relay firing commands, and card information from a connected reader.
 - b. Supported Readers, Input and Output Devices: The access blade shall support readers that use the Wiegand Reader Interface. Beeper and LED color control are also supported for many brands.
 - 1) The relay outputs shall support any output devices that operate on the following maximum electrical ratings: 30 Volts DC or AC, 2.5 Amps inductive, or 5.0 Amps non-inductive.
 - c. Capacities: Each access control application blade shall support up to two readers, four alarm inputs, and four control point outputs.
 - 1) Reader connectors shall have seven pins and be capable of LED color and beeper control. The access control blades shall be capable of providing a total of 400 milliamps of power for readers. Readers requiring more power shall have separate power supplies.
 - 2) Alarm input connectors are two-pin. The system shall support a wide variety of input supervision types including normally-open circuit and normally-closed circuits, and zero, one or two resistor configurations.
 - 3) Output connectors shall be three pin and shall be capable of supporting both normally-energized and normally-not-energized output devices.
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4. Alarm Input Application Blade
 - a. Communication Format: Communication packets between the alarm input blade and the node shall not move over the network. This communication shall occur only on the node's internal communications bus and shall include only input resistance state changes.
 - b. Capacities: Each alarm input application blade shall support up to eight (8) alarm inputs. Alarm input connectors are 2-pin. The system shall support a wide variety of input supervision types including normally-open circuit and normally-closed circuits, and zero, one or two resistor configurations. Input devices can be no more than 2000 feet (610 meters) from the input application blade.
 5. Control Point Relay Output Application Blade
 - a. Communication Format: Communication packets between the relay output blade and the node shall not move over the network. This communication shall occur only on the node's internal communications bus and shall include only output firing commands.
 - b. Supported Output Devices: The output blade shall support any output devices that operate on the following maximum electrical ratings: 30 Volts DC or AC, 2.5 Amps inductive, or 5.0 Amps non-inductive.
 - c. Capacities: Each control point output application blade shall support up to eight re- lay outputs. Output connectors shall be three pin and shall be capable of supporting both normally-energized and normally-not-energized output devices. Output devices can be no more than 2000 feet (610 meters) from the output application blade.
 6. Temperature Monitoring Application Blade

Communication Format: Communication packets between the alarm input blade and the node shall not move over the network. This communication shall occur only on the node's internal communications bus and shall include only temperature data. Temperature data can be displayed in either Centigrade or Fahrenheit scales.

Supported Devices: The temperature monitoring application blade shall support the use of an analog temperature sensor.

Capacities: Each temperature monitoring application blade shall support up to eight analog temperature monitoring inputs. Temperature input connectors shall have two pins. Temperature sensors shall be no more than 1000 feet (305 meters) from the temperature monitoring application blade. The temperature probe shall have an operating range of -55° to +100° C. The temperature probe precision from -10° to +85° C shall be $\pm 0.5^\circ$ C.
- N. UPS: Self-contained; complying with requirements in Division 16 Section "Static Uninterruptible Power Supply."
- a. Size: Provide a minimum of 2 hours of operation of the central-station equipment, including 2 hours of alarm printer operation.
 - b. Batteries: Sealed, valve regulated, recombinant, lead calcium. c. Accessories:
 - 1) Transient voltage suppression.
 - 2) Input-harmonics reduction.
 - 3) Rectifier/charger.
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- 4) Battery disconnect device.
- 5) Static bypass transfer switch.
- 6) Internal maintenance bypass/isolation switch.
- 7) Remote UPS monitoring.
- 8) Remote battery monitoring. d.

Acceptable Manufacturer: APC

O. Card Readers:

1. Power: Card reader shall be powered from its associated Controller, including its standby power source.
2. Response Time: Card reader shall respond to passage requests by generating a signal that is sent to the Controller. Response time shall be 800 ms or less, from the time the card reader finishes reading the credential card until a response signal is generated.
3. Enclosure: Suitable for surface, flush, semi-flush, or pedestal mounting. Mounting types shall additionally be suitable for installation in the following locations:
 - a. Indoors, controlled environment.
 - b. Indoors, uncontrolled environment.
4. Display: Visual and audible status indications and user prompts. Indicate power on/off, whether user passage requests have been accepted or rejected, and whether the door is locked or unlocked.
5. Proximity Readers:
 - a. Active detection proximity card readers shall provide power to compatible credential cards through magnetic induction, and shall receive and decode a unique identification code number transmitted from the credential card.
 - b. Passive detection proximity card readers shall use a swept-frequency, RF field generator to read the resonant frequencies of tuned circuits laminated into compatible credential cards. The resonant frequencies read shall constitute a unique identification code number.
 - c. The card reader shall read proximity cards in a range from contact with to at least 6 inches from the reader.
6. Contactless Smart Card Readers.
7. Combination Smart Card and Proximity Card Readers: Meets specified requirements for individual Smart Card Readers and Proximity Card Readers in a single card reader housing.
8. Keypad and Proximity Reader Combination: Designed to require card read and/or keypad entry (configurable by the DWM).
 - a. Keypad: Allow the entry of four numeric digits that are associated with a specific credential. Keys of keypads shall contain an integral alphanumeric/special symbol keyboard with symbols arranged in ascending ASCII-code ordinal sequence. Keypad display or enclosure shall limit viewing angles of the keypad as follows:
 - 1) Maximum Horizontal Viewing Angle: 5 degrees or less off in either direction of



- a vertical plane perpendicular to the plane of the face of the keypad display.
- 2) Maximum Vertical Viewing Angle: 15 degrees or less off in either direction of a horizontal plane perpendicular to the plane of the face of the keypad display.

b. Card Reader: Compliant with specified Proximity Card Reader requirements.

9. Acceptable Products: HID RK40

P. Push-Button Switches:

1. Available Manufacturers:

a. Securitron Magnalock Corporation; an ASSA ABLOY Group Company.

2. Push-Button Switches: Momentary-contact push buttons, with stainless-steel switch enclosures.

a. Enclosures: Flush or surface mounting. Push buttons shall be suitable for flush mounting in the switch enclosures.

b. Enclosures shall additionally be suitable for installation in the following locations:

- 1) Indoor, controlled environment.
- 2) Indoor, uncontrolled environment.
- 3) Indoor, hazardous (Classified) environment.
- 4) Outdoor, exposed to environment.
- 5) Outdoor, exposed to environment and flammable gases or vapors.

c. Power: Push-button switches shall be powered from their associated Controller, using dc control.

3. Acceptable Products: Securitron EEB2

Q. Door and Gate Hardware:

1. Exit Device with Alarm: Operation of the exit device shall generate an alarm condition that is annunciated at the designated monitoring station. Where indicated on Drawings or Specifications, local alarm shall also be annunciated at door location. Exit devices are specified in Division 8 Section "Door Hardware".

2. Exit Alarm: Operation of a monitored door shall generate an alarm. Exit devices and alarm contacts are specified in Division 8 Section "Door Hardware".

3. Electric Door Strikes: Use end-of-line resistors to provide power line supervision. Signal switches shall transmit data to Controller to indicate when the bolt is not engaged and the strike mechanism is unlocked, and shall report a forced entry. Power and signal shall be from the Controller. Electric strikes are specified in Division 8 "Door Hardware".

4. Electromechanical Locks: Lock status sensing signal shall positively indicate door is secure. Power and signal shall be from the Controller. Where provided, Request to Exit switches internal to lock hardware shall inhibit alarm when door is opened from the secure

side in the free-movement direction. Electromechanical locks are specified in Division 8 Section "Door Hardware".

5. Electromagnetic Locks: End-of-line resistors shall provide power line supervision. Lock status sensing signal shall positively indicate door is secure. Power and signal shall be from the Controller. Electromagnetic locks are specified in Division 8 Section "Door Hardware".
6. Vehicle Gate Operators: Interface electrical operation of gate with controls of this Section. Vehicle gate operators shall be connected, monitored, and controlled, by the security access Controllers. Vehicle gate and accessories are specified in Section 02850 "Parking Equipment Control Gate".

R. Cables:

1. Available Manufacturers:
 - a. Belden Inc.; Electronics Division. b. Berk-Tek; a Nexans Company.
 - c. BIW Cable Systems; a Draka USA Company. d. General Cable Technologies Corporation.
 - e. West Penn Wire/CDT; a division of Cable Design Technologies.
 2. PVC-Jacketed, RS-232 Cable: Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors, polypropylene insulation, and individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage; PVC jacket. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
 - a. NFPA 70, Type CM.
 - b. Flame Resistance: UL 1581 Vertical Tray.
 3. Plenum-Type, RS-232 Cable: Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors, plastic insulation, and individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage; plastic jacket. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
 - a. NFPA 70, Type CMP.
 - b. Flame Resistance: NFPA 262 Flame Test.
 4. RS-485 communications require 2 twisted pairs, with a distance limitation of 4000 feet.
 5. PVC-Jacketed, RS-485 Cable: Paired, 2 pairs, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors, PVC insulation, unshielded, PVC jacket, and NFPA 70, Type CMG.
 6. Plenum-Type, RS-485 Cable: Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors, fluorinated-ethylene-propylene insulation, unshielded, and fluorinated-
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ethylene-propylene jacket.

- a. NFPA 70, Type CMP.
 - b. Flame Resistance: NFPA 262 Flame Test.
7. Multiconductor, PVC, for Card Readers and Weigand Keypads Cables: No. 22 AWG, paired and twisted multiple conductors, stranded (7x30) tinned copper conductors, semi rigid PVC insulation, overall aluminum foil-polyester tape shield with 100 percent shield coverage, plus tinned copper braid shield with 65 percent shield coverage, and PVC jacket.
- a. NFPA 70, Type CMG.
 - b. Flame Resistance: UL 1581 Vertical Tray. c. For TIA/EIA-RS-232 applications.
8. Paired PVC, for Card Readers and Weigand Keypads Cables: Paired, 3 pairs, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors, polypropylene insulation, individual aluminum foil-polyester tape shielded pairs each with No. 22 AWG, stranded tinned copper drain wire, 100 percent shield coverage, and PVC jacket.
- a. NFPA 70, Type CM.
 - b. Flame Resistance: UL 1581 Vertical Tray.
9. Paired PVC, for Card Readers and Weigand Keypads Cable: Paired, 3 pairs, twisted, No. 20 AWG, stranded (7x28) tinned copper conductors, polyethylene (polyolefin) insulation, individual aluminum foil-polyester tape shielded pairs each with No. 22 AWG, stranded (19x34) tinned copper drain wire, 100 percent shield coverage, and PVC jacket.
- a. NFPA 70, Type CM.
 - b. Flame Resistance: UL 1581 Vertical Tray.
10. Plenum-Type, Paired, for Card Readers and Weigand Keypads Cable: Paired, 3 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors, plastic insulation, individual aluminum foil-polypropylene tape shielded pairs each with No. 22 AWG, stranded tinned copper drain wire, 100 percent shield coverage, and fluorinated-ethylene-propylene jacket.
- a. NFPA 70, Type CMP.
 - b. Flame Resistance: NFPA 262 Flame Test.
11. Plenum-Type, Multiconductor, for Card Readers and Weigand Keypads Cable: 6 conductors, No. 20 AWG, stranded (7x28) tinned copper conductors, fluorinated-ethylene-propylene insulation, overall aluminum foil-polyester tape shield with 100 percent shield coverage plus tinned copper braid shield with 85 percent shield coverage, and fluorinated-ethylene-propylene jacket.
- a. NFPA 70, Type CMP.
 - b. Flame Resistance: NFPA 262 Flame Test.
12. Class 2 or Class 3 Paired Lock Cable: 1 pair, twisted, No. 16 AWG minimum, stranded
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(19x29) tinned copper conductors, PVC insulation, unshielded, and PVC jacket.

- a. NFPA 70, Type CMG.
 - b. Flame Resistance: UL 1581 Vertical Tray.
13. Class 2 or Class 3 Plenum-Type, Paired Lock Cable: 1 pair, twisted, No. 16 AWG minimum, stranded (19x29) tinned copper conductors, PVC insulation, unshielded, and PVC jacket.
 - a. NFPA 70, Type CMP.
 - b. Flame Resistance: NFPA 262 Flame Test.
 14. Class 2 or Class 3 Paired Lock Cable: 1 pair, twisted, No. 18 AWG minimum, stranded (19x30) tinned copper conductors, PVC insulation, unshielded, and PVC jacket.
 - a. NFPA 70, Type CMG.
 - b. Flame Resistance: UL 1581 Vertical Tray.
 15. Class 2 or Class 3 Plenum-Type, Paired Lock Cable: 1 pair, twisted, No. 18 AWG minimum, stranded (19x30) tinned copper conductors, fluorinated-ethylene-propylene insulation, unshielded, and plastic jacket.
 - a. NFPA 70, Type CMP.
 - b. Flame Resistance: NFPA 262 Flame Test.
 16. Class 2 or Class 3 Paired Input Cable: 1 pair, twisted, No. 22 AWG minimum, stranded (7x30) tinned copper conductors, polypropylene insulation, overall aluminum foil-polyester tape shield with No. 22 AWG, stranded (7x30) tinned copper drain wire, 100 percent shield coverage, and PVC jacket.
 - a. NFPA 70, Type CMR.
 - b. Flame Resistance: UL 1666 Riser Flame Test.
 17. Class 2 or Class 3 Plenum-Type, Paired Input Cable: 1 pair, twisted, No. 22 AWG minimum, stranded (7x30) tinned copper conductors, fluorinated-ethylene-propylene insulation, aluminum foil-polyester tape shield (foil side out), with No. 22 AWG drain wire, 100 percent shield coverage, and plastic jacket.
 - a. NFPA 70, Type CMP.
 - b. Flame Resistance: NFPA 262 Flame Test.
 18. Class 2 or Class 3 Paired AC Transformer Cable: 1 pair, twisted, No. 18 AWG minimum, stranded (7x26) tinned copper conductors, PVC insulation, unshielded, and PVC jacket.
 - a. NFPA 70, Type CMG.
 19. Class 2 or Class 3 Plenum-Type, Paired AC Transformer Cable: 1 pair, twisted, No. 18 AWG minimum, stranded (19x30) tinned copper conductors, fluorinated-ethylene-propylene insulation, unshielded, and plastic jacket.
-

- a. NFPA 70, Type CMP.
 - b. Flame Resistance: NFPA 262 Flame Test.
20. LAN Cabling: Comply with Division 16 Section "Voice and Data Communication Cabling." a.
NFPA 262.
- S. Extra materials quantities for each site project shall be as follows:
- a. Two (2) HID RK40 Card Readers
 - b. Five (5) Surface Mount Door Position Switch
 - c. Five (5) Recessed Mounted Door Position Switch
 - d. Two (2) Overhead Door Position Switch
 - e. One (1) Magnetic Lock
 - f. One (1) S2 Input Application Blade
 - g. One (1) S2 Network Controller Blade
 - h. One (1) S2 Output Application Blade
 - i. One (1) Access Control Application Blade
 - j. One (1) Request to Exit Push Button
 - k. One (1) Request to Exit Motion Detector (PIR)

2.04 VOICE INTERCOMMUNICATION SYSTEMS, STANDALONE

A. Acceptable Manufacturers:

- 1. Aiphone
- 2. Mobotix

B. Functional Requirements:

- 1. System provides local two-way or multi-point audio and video communications between remote station(s) and master stations, as indicated.
 - 2. Equipment in locations accessible by public shall be vandal-resistant, and of substantial construction, typical of that used in detention environments.
 - 3. Equipment located outside, in environmentally uncontrolled rooms, or where exposed to liquids or sprays, shall be weatherproof.
 - 4. Intercom Sequence of Operations:
 - a. Intercom calls from remote intercom stations shall cause visual and audible call indication at operator location, but shall not open audio path between master and remote stations.
 - b. Upon selection of intercom call at local operator station, audio path between operator and remote intercom stations shall be opened, and intercom at operator location shall be placed in "listen" mode.
 - c. Operator activates "Push To Talk" control and speaks into microphone at operator console location to speak to remote station(s). Deactivation of PTT leaves the
-

- d. intercom session active and places operator station in “listen” mode.
Operator resets intercom session by activating “Intercom Call Reset” at operator location or by answering another intercom call.

C Extra materials quantities for each site project shall be as follows:

- a. Two (2) HID RK40 Card Readers
- b. Five (5) Surface Mount Door Position Switch
- c. Five (5) Recessed Mount Door Position Switch
- d. Two (2) Overhead Door Position Switch
- e. One (1) Magnetic Lock
- f. One (1) Request to Exit Push Button
- g. One (1) Request to Exit Motion Detector (PIR)
- h. One (1) S2 Access Control Application Blade
- i. One (1) S2 Input Application Blade
- j. One (1) S2 Output Application Blade

EMERGENCY COMMUNICATION SYSTEMS

A. Acceptable Manufacturers:

- 1. Code Blue
- 2. Talk A Phone

B. Functional Requirements:

- 1. System provides emergency two-way audio communications between remote station and either emergency 911 (E-911) call center or 24-hour staffed the DWM emergency response location, as determined by the DWM.
- 2. SMS shall log, display, and record all emergency calls and associated CCTV video.
- 3. Where local CCTV video coverage is available, SMS shall automatically call-up, display, record, and tag video to emergency alarm.
- 4. Equipment located outside, in environmentally uncontrolled rooms, or where exposed to liquids or sprays, shall be weatherproof and suitable for local environmental conditions.
- 5. All remote stations shall be of substantial construction and vandal resistant.
- 6. Emergency stations shall be interfaced with SMS over networked connections and local E-911 service over telephone circuits.
- 7. Provide accessories, line cards, communication interfaces, consolidators, licenses, as required for functional system.

2.06 WIRELESS ACCESS CONTROL

A. Acceptable Manufacturers:

1. SALTO

B. Components:

1. Control Unit

- a. The Control Unit shall have the ability to have 1 or 2 wall readers connected, have 2 control relays outputs
- b. The Control Unit shall have an Ethernet 10Base-T connection c.
Acceptable Product: SALTO CU50ENSVN

2. Control Unit Adapter

- a. The control unit adapter shall allow for the integration of third party devices b.
Acceptable Product: SALTO CUADAPT

3. Modular Wall Reader

- a. Wall readers shall read and write information on contactless smart cards b.
Wall readers shall be IP46 compliant
- c. Shall include all necessary mounting bases d.
Acceptable Product: SALTO WRM9000

4. Networked Electric Lock

- a. The networked electric locks shall be wire free stand alone networked
- b. Confirm handle type and finish with DWM representative prior to purchasing c.
Acceptable Product: SALTO A9600

2.07 NETWORK SWITCHES

A. Acceptable Manufacturer

1. Cisco

B. Functional Requirements

- 1. Network Switch shall have 24 Gigabit Ethernet ports
- 2. Network Switch shall have 2 Gigabit SFP ports
- 3. Acceptable Product: Cisco 3750 Series

2.08 WIRELESS SYSTEM

A. Acceptable Manufacturer

1. Firetide 7000 Series

- B. The Contractor shall provide equipment, software and license with bandwidth capabilities to transmit/receive data for the equipment shown on the drawings plus 25% spare bandwidth capacity for future expansion.

- C. The Wireless System shall provide a secure, fast and reliable transmission of voice/data, live streaming video and two way access control data without interferences and intrusions to the system. The Contractor may use compatible equipment that is approved prior to the bid date.
-

The system shall consist, at a minimum of, the following components:

1. Outdoor Base Station. Outdoor Unit is to be complete with Base Receiver, Antenna, Mounting hardware and all wiring required to provide a complete working system for all sites and equipment shown on the project drawings. Base Unit is to be fully compatible and UL labeled and listed to work with all other wireless equipment. Base Station is to have a minimum capability of the following criteria.
 - a. Transmission of all information in the 5GHz range (4.90 – 5.925 GHz). b. Support up to 124 unit radios.
 - c. Data transmission rates up to 108 Mbps
 - d. Secure authentication of all transmissions.
 - e. Compatibility with all standard 100/10 Mbps Ethernet switches and routers, VPN's, Trunk and VoIP Protocols.
 - f. Integral Antenna Alignment Tools.
 - g. Remote power capable for installations up to 325 feet away from your network, using the power over Ethernet technology.
 - h. Multiple Point Capability for up to 10 miles and maintain transmission speed.

 2. Outdoor Wireless Bridge. Bridge Unit is to be complete with Bridge Unit, Antenna, Mounting hardware and all wiring required to provide a complete working system for all sites and equipment shown on the project drawings. Bridge Unit is to be fully compatible and UL labeled and listed to work with all other wireless equipment. Bridge Unit is to have a minimum capability of the following.
 - a. Transmission of all information in the 5GHz range (4.90 – 5.925 GHz). b. Data transmission rates up to 108 Mbps.
 - c. Unit range of up to 30 miles with external antenna option.
 - d. Compatibility with all standard 100/10 Mbps Ethernet switches and routers, VPN's, Trunk and VoIP Protocols.
 - e. Secure Authentication Encryption of all data transmission. f. Integral Antenna Alignment Tools.

 3. Wireless Full-Duplex Backhaul Point-to-Point Links. Backhaul link is to be complete with Backhaul Link, Antenna, Mounting hardware and all wiring required to provide a complete working system for all sites and equipment shown on the project drawings. Backhaul Unit is to be fully compatible and UL labeled and listed to work with all other wireless equipment. Backhaul Link is to have a minimum capability of the following.
 - a. Integrated Indoor/Outdoor architecture with dedicated transmit (TX) and receive (RX) radio path.
 - b. Data transmission rates up to 216 Mbps.
 - c. Secure Authentication Encryption of all data transmission.
 - d. Compatibility with all standard 100/10 Mbps Ethernet switches and routers, VPN's, Trunk and VoIP Protocols.
 - e. Integral Antenna Alignment Tools.
 - f. Integral Real-time Monitoring of wireless network components.
 - g. Remote power capable for installations up to 325 feet away from your network,
-

using the power over Ethernet technology.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

- A. Comply with recommendations in SIA CP-01.
 - B. Comply with EIA/TIA-606, "Administration Standard for the Telecommunications Infrastructure of Commercial Buildings."
 - C. Obtain detailed Project planning forms from manufacturer of access-control system; develop custom forms to suit Project. Fill in all data available from Project plans and specifications and publish as Project planning documents for review and approval.
 - 1. Record setup data for control station and workstations.
 - 2. For each Location, record setup of Controller features and access requirements.
 - 3. Propose start and stop times for time zones and holidays, and match up access levels for doors.
 - 4. Set up groups, facility codes, linking, and list inputs and outputs for each Controller.
 - 5. Assign action message names and compose messages.
 - 6. Set up alarms. Establish interlocks between alarms, intruder detection, and video surveillance features.
 - 7. Prepare and install alarm graphic maps.
 - 8. Develop user-defined fields.
 - 9. Develop screen layout formats.
 - 10. Propose setups for guard tours and key control.
 - 11. Discuss badge layout options; design badges.
 - 12. Complete system diagnostics and operation verification.
 - 13. Prepare a specific plan for system testing, startup, and demonstration.
 - 14. Develop acceptance test concept and, on approval, develop specifics of the test.
 - 15. Develop cable and asset management system details; input data from construction documents. Include system schematics and Visio Technical Drawings.
 - D. Prior to installation of electronic security equipment in control rooms and/or equipment rooms, complete all room finishes and provide a clean conditioned space for the electronic equipment installation. Maintain a secure, clean and conditioned space throughout the installation process. Where dust, dirt or moisture generating environment is anticipated or encountered after start of installation of equipment, cease work and wrap/seal all equipment in waterproof protective material. When environment is clean and conditioned, protective wrapping shall be removed, equipment cleaned, and work resumed.
 - E. In meetings with the Consultant (Architect, Security Consultant, etc.) and the DWM, present Project planning documents and review, adjust, and prepare final setup documents. Use final documents to set up system software.
 - F. Grounding:
-

1. Comply with Division 26 Section 260526 "Grounding and Bonding."
 2. Comply with IEEE 1100, "Power and Grounding Sensitive Electronic Equipment."
 3. Ground cable shields, drain conductors, and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.
 4. Bond shields and drain conductors to ground at only one point in each circuit.
 5. Signal Ground:
 6. Terminal: Locate in each equipment room and wiring closet; isolate from power system and equipment grounding.
 7. Bus: Mount on wall of main equipment room with standoff insulators.
 8. Backbone Cable: Extend from signal ground bus to signal ground terminal in each equipment room and wiring closet.
- G. Push Buttons: Where multiple push buttons are housed within a single switch enclosure, they shall be stacked vertically with each push-button switch labeled with 1/4-inch- high text and symbols as required. Push-button switches shall be connected to the Controller associated with the portal to which they are applied, and shall operate the appropriate electric strike, electric bolt, or other facility release device.
- H. Develop, install, and test software and databases for the complete and proper operation of systems involved. Assign software license to the DWM.
- I. Engage a factory-authorized service representative to supervise and assist with startup service. Complete installation and startup checks according to approved procedures that were developed in "Preparation" Article and with manufacturer's written instructions.
1. Enroll and prepare badges and access cards for the DWM's operators, management, and security personnel.
- J. Maintain strict security during the installation of equipment and software. Rooms housing the control station, and workstations that have been powered up shall be locked and secured, with an activated burglar alarm and access-control system reporting to a Central Station complying with UL 1610, "Central-Station Burglar-Alarm Units," during periods when a qualified operator in the employ of Contractor is not present.
- 3.02 WIRING
- A. Comply with EIA/TIA-569, "Commercial Building Standard for Telecommunications Pathways and Spaces."
 - B. Cable application requirements are minimum requirements and shall be exceeded if recommended or required by manufacturer of system hardware.
 - C. RS-232 Cabling: Install at a maximum distance of 50 feet.
 - D. RS-485 Cabling: Install at a maximum distance of 4000 feet. E.
- Card Readers and Keypads:
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1. Install number of conductor pairs recommended by manufacturer for the functions specified.
 2. Unless manufacturer recommends larger conductors, install No. 22 AWG wire if maximum distance from Controller to the reader is less than 250 feet, and install No. 20 AWG wire if maximum distance is between 250 feet and 500 feet.
 3. For greater distances, install "extender" or "repeater" modules recommended by manufacturer of the Controller.
 4. Install minimum No. 18 AWG shielded cable to readers and keypads that draw 50 mA or more.
- F. Install minimum No. 16 AWG cable from Controller to electrically powered locks. Do not exceed 25 feet.
- G. Install minimum No. 18 AWG ac power wire from transformer to Controller, with a maximum distance of 25 feet.
- H. Examine pathway elements intended for cables. Check raceways, cable trays, and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions affecting installation.
- I. Examine roughing-in for LAN and control cable conduit systems to PCs, Controllers, card readers, and other cable-connected devices to verify actual locations of conduit and back boxes before device installation.
- J. Proceed with installation only after unsatisfactory conditions have been corrected. K.
- Comply with NECA 1, "Good Workmanship in Electrical Contracting."
- L. Install cables and wiring according to requirements in Division 16 Section "Voice and Data Communication Cabling."
- M. Wiring Method: Install wiring in raceway and cable tray except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Use NRTL-listed plenum cable in environmental air spaces (where permitted), including plenum ceilings. Conceal raceway and cables except in secure, unfinished spaces. Maintain separation between wiring classes in strict accordance with NEC Article 725 requirements. Install all wiring in conduit in areas accessible to public.
- N. Install LAN cables using techniques, practices, and methods that are consistent with Category 5E or Category 6 rating of components and that ensure Category 5E or Category 6 performance of completed and linked signal paths, end to end.
- O. Install cables without damaging conductors, shield, or jacket.
- P. Boxes and enclosures containing security system components or cabling, and which are easily accessible to employees or to the public, shall be provided with a lock. Boxes above ceiling level in occupied areas of the building shall not be considered to be accessible. Junction boxes and small device enclosures below ceiling level and easily accessible to employees or the public shall be covered with a suitable cover plate and secured with tamperproof screws.
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- Q. Install end-of-line resistors at the field device location and not at the Controller or panel location. R.

Identification:

1. In addition to requirements in this Article, comply with applicable requirements in Division 16 Section "Electrical Identification" and with TIA/EIA-606.
2. Using cable and asset management software specified in Part 2, develop Cable Administration Drawings for system identification, testing, and management. Use unique, alphanumeric designation for each cable, and label cable and jacks, connectors, and terminals to which it connects with same designation. Use logical and systematic designations for facility's architectural arrangement.
3. Label each terminal strip and screw terminal in each cabinet, rack, or panel.
 - a. All wiring conductors connected to terminal strips shall be individually numbered, and each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with the name and number of the particular device as shown.
 - b. Each wire connected to building-mounted devices is not required to be numbered at the device if the color of the wire is consistent with the associated wire connected and numbered within the panel or cabinet.
4. At completion, cable and asset management software shall reflect as-built conditions.

3.03 TESTING AND COMMISSIONING

- A. General: The Contractor shall verify that all requirements of this specification are met. Verification shall be through a combination of analyses, inspections, demonstrations and tests, as described below.
 - B. Verification by Inspection: Verification by inspection includes examination of an item and the comparison of pertinent characteristics against the qualitative or quantitative standard set forth in the cited paragraph. Inspection may require moving or partially disassembling the item to accomplish the verification. Inspection shall be made of all equipment installations, proper functioning of all locking hardware and lock controls, mounting and wiring of electrical and signal distribution cabinets and components, and mounting and placement of sensors, cameras, etc. to ensure requirements of the specifications are complied with and that the overall installation is accomplished in a professional and workmanlike manner and in accordance with manufacturer's written recommendations. The DWM's quality control representative(s) shall have full opportunity to witness the required inspections or to conduct his own inspections of the installation.
 - C. Verification by Test and Demonstration: The Contractor shall verify by formal demonstrations or tests that the requirements of this Specification have been met.
 - D. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.
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- E. Testing Agency: Engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
 - F. Test Verification Requirements: Paragraphs 1-3 below list specific requirements which shall be verified by formal demonstration/test. The DWM shall be notified in writing at least 14 days prior to the performance of all tests, so that the DWM may attend or have a representative attend the tests.
 - 1. Factory Tests: Factory tests are optional, but highly recommended, as they have been shown to result in reduced rework and fewer problems at construction site. Following factory engineering and assembly, the Contractor shall individually test each sensor and other related devices to verify all elements of the under test are properly functioning. Each subsystem shall be similarly tested until all system equipment and operational equipment have been verified to be properly operating. All deficiencies shall be corrected by the Contractor prior to shipment of the equipment to the project site.
 - 2. Preliminary Tests: Following installation, the Contractor shall individually test each sensor and other components and verify the proper functioning of each component within a particular subsystem. Each subsystem shall be tested until all detection zones, alarm assessment components, alarm reporting and display, and access control functions have been verified. All deficiencies shall be corrected by the Contractor prior to final functional and operational tests of the system. When subsystem verification is complete, the entire system shall be tested to assure that all elements are compatible and function properly as an integrated system.
 - 3. System Operation Test: Following completion of the preliminary tests and the security system and component formal demonstrations, the Contractor shall conduct a formal test, to be known as the "System Operation Test", in which all components and subsystems of the security system are demonstrated to operate together as a system. This test shall be performed over a continuous period determined by the designer for each project. A formal test plan and test procedures for each portion of the test shall be prepared by the Contractor and submitted to the DWM for approval.
 - G. Tests upon Completion of Work:
 - 1. Upon completion of the Contractor's Work, all security systems shall be subjected to complete functional and operational tests as part of contractor's startup testing. After all required corrections have been accomplished; the system shall be retested in the presence of the DWM or authorized representative. Final tests shall include, but not limited to the following:
 - a. Visual inspection of all wiring and physical installation of equipment and devices.
 - b. LAN Cable Procedures: Inspect for physical damage and test each conductor signal path for continuity and shorts. Use Class 2, bidirectional, Category 5 tester. Test for faulty connectors, splices, and terminations. Test according to TIA/EIA-568-1, "Commercial Building Telecommunications Cabling Standards - Part 1 General Requirements." Link performance for UTP cables must comply with minimum criteria in TIA/EIA-568-B.
 - c. Test each circuit and component of each system. Tests shall include, but are not
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limited to, measurements of power supply output under maximum load, signal loop resistance, and leakage to ground where applicable. System components with battery backup shall be operated on battery power for a period of not less than 10 percent of the calculated battery operating time. Provide special equipment and software if testing requires special or dedicated equipment.

- d. Operational Test: After installation of cables and connectors, demonstrate product capability and compliance with requirements. Test each signal path for end-to-end performance from each end of all pairs installed. Remove temporary connections when tests have been satisfactorily completed.
 - e. Test of all computers, processors, and control functions.
 - f. Test electrical supervision of all communication circuits.
 - g. Test of video surveillance system equipment.
 - h. Test of UPS equipment, back-up batteries and battery chargers.
 - i. Test of SMS system and all subsystem devices.
 - j. Complete operation tests at transition from normal to emergency power, and under emergency power.
 - k. Test of all intercommunications system components including amplifiers, staff stations, administrative stations, call stations, and wiring system
- H. Perform indicated tests to demonstrate workmanship, operation, and performance.
- 1. Conduct tests in presence of Architect or Engineer and, if required, inspectors of agencies having jurisdiction.
 - 2. Arrange date of tests in advance with Architect, manufacturer and installer.
 - 3. Give all inspectors minimum of 24 hours notice.
 - 4. Furnish all labor and materials required for period of test.
- I. Repair or replace equipment and systems found inoperative or defective and re-test.
- 1. If equipment or system fails re-test, replace it with products which conform with Contract Documents.
 - 2. Continue remedial measures and re-tests until satisfactory results are obtained.
- J. Test equipment and systems as indicated for each item, unless otherwise recommended by manufacturer.
- K. Coordinate work of this section with work of other sections to insure timely delivery and installation of work.
- L. Design all systems for continuous 24 hour operation.
- M. Provide testing of each system as stand alone and with interface to related systems. Tests to be as indicated in individual specification section and as recommended by the manufacturer.
- N. The Contractor shall carefully plan and coordinate the final acceptance tests so that all tests can be satisfactorily completed within **XX** cumulative hours of testing, as indicated for each project. The Contractor shall provide all necessary instruments, labor and materials required for tests, the equipment manufacturer's technical representative, and qualified technicians in sufficient numbers to perform the tests within the time limits imposed by this Specification.
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- O. In the event that the Architect and/or Engineer are required to witness a retest at a later date because the Contractor is not adequately prepared to conduct the acceptance tests or because the systems being tested have failed such tests, which shall be solely determined by the Architect, the costs of witnessing additional tests (based on time and materials at the established rates of the Architect and Engineer) shall be borne exclusively by the Contractor. In such an event, a change order to the General Construction Contract will be executed for compensation of the Architect and Engineer witnessing the tests.
- P. Remove and replace malfunctioning devices and circuits and retest as specified above.

3.04 DEMONSTRATION AND TRAINING

- A. Engage a factory-authorized service representative to train the DWM's maintenance personnel to adjust, operate, and maintain security access system.
- B. Provide professionally prepared training materials for each student.
- C. Provide not less than the training hours required by the DWM, as indicated for each individual project.
- D. Record all training sessions.
- E. Develop and provide suitable separate training modules for the following types of groups, as indicated for each project:
 - 1. Computer system administration personnel to manage and repair the LAN and databases and to update and maintain software.
 - 2. Operators who prepare and input credentials to man the control station and workstations and to enroll personnel.
 - 3. Security operating personnel.
 - 4. Security supervisors.
 - 5. System Administrators.
 - 6. Hardware maintenance personnel.
 - 7. The DWM management.

END OF SECTION 280000

Camera Standards

Minimum specifications for selected DWM approved cameras:

1. Fully supported by the OnSSI Ocularis ES VMS (Video Management System)

<http://www.onssi.com/>

2. Minimum operational temperature range: 0 deg. F to 120 deg. F
3. Designed for indoor/outdoor usage (minimum ingress protection rating IP66)
4. Built in varifocal lens (focal length 3.00 mm to 9.00 mm)
5. Ability to produce a minimum of 2 video streams with minimum 15 frames per second in each stream
6. The camera should be a True Day/Night (D/N) functional camera
7. Camera shall contain Wide Dynamic Range (WDR) technology (>80 dB)
8. Camera must be Open Network Video Interface Forum (ONVIF) compliant to ensure interoperability between products regardless of manufacturer.

<http://www.onvif.org/>

9. Cameras must support both H.264 and MJPEG video coding formats
10. Cameras must have vandal-resistant feature for protecting the camera from destructive behaviors.
11. The camera shall have a Smartphone viewer, which can display the camera image and operate the unit
12. Camera shall include an SD Card and slot which can support a minimum of 32 Gbytes. SD cards (class 10) needed to cache images in the event of a network failure shall be included.
13. Powered by IEEE 802.3af/IEEE 802.3at power over ethernet (PoE/PoE+) compliant

On the following pages suggested selections for cameras are grouped by camera types:

- a) BULLET
- b) PAN/TILT/ZOOM (PTZ) DOME
- c) FIXED DOME
- d) FIXED BOX
- e) PANORAMIC/SPECIAL USE

In order to simplify maintenance moving forward cameras models were limited to manufacturers. One camera from each manufacturer was chosen for each of the categories (a-e) indicated above:

- Sony
- Panasonic: DWM has already has many Panasonic cameras (problem with Panasonic NVR integration with APD CNL software needs to be rectified)
- Pelco by Schneider: may not have edge recording with ONSSI LS/ES platform
- Axis

One Arecont (360 degree awareness) and a couple of 360 degree awareness cameras were also recommended in the panoramic category. Some approximate cost data was included where possible. The cost of the camera mounting hardware may add to camera cost. Where possible all cameras from a particular site should be obtained from a single manufacturer.

BULLE		
ONVIF/OS/ONSSI	Manufacturer/Model	Notes
Y/Win XP, Vista, 7, 8/Y	Sony/ SNCEB632R	Network 1080p/30fps Full HD Outdoor IR Bullet Camera Powered by IPELA ENGINE EX™ (Wide D, High Sensitivity, True Day/Night, ABF, PoE, IP66)
Y/Win XP, Vista, 7	Panasonic/WV-SW316L	720p HD images up to 30 fps, 1.3 Megapixel high sensitivity MOS Sensor, Full frame (Up to 30 fps) transmission at 1,280 x 960 image size, IR LED equipped, \$1,000
Y/Win XP, 7	Pelco/ IBP319-ER	-Up to 30 Images per Second (ips) at 1080p -Autofocus Motorized Remote Zoom Lens -Integrated Adaptive IR Illumination -Motion Detection and Camera Sabotage Analytics, \$1,000 est. price
Y/?/Y	AXIS P1405-LE	HDTV 1080p/2 megapixel resolution at full frame rate Day & Night functionality Built-in IR LED Edge storage



Sony/
 SNCEB632R

PAN/TILT/ZOOM (PTZ)		
ONVIF/OS /ONSSI	Manufacturer/Model	Notes
Y/Win XP, Vista, 7, 8	Sony/ SNCWR632C	Network 1080p/60fps Full HD Outdoor Rapid PTZ Dome Camera - W Series - Powered by IPELA ENGINE PRO™ (30x optical zoom, 700°/sec pan speed, Wide dynamic (View-DR 130dB), true D/N, , SD card, HPoE+/AC, IP66, IK10), no IR
Y/Win XP, Vista, 7, 8	Panasonic/WV-SW598	Advanced Auto Tracking High Resolution(1080p Full HD images up to 30fps), High sensitivity with Day/night function (IR), Face Detection with Super Dynamic Technology, Functions of motion detection, sound detection and alarm detection,
Y/Win XP, Vista, 7 w Direct X/Y	Pelco/ Spectra S5230	Up to 1920 x 1080 Resolution, 16:9 Aspect Ratio; 1080p at 30 Images per Second (ips), 2.0 Megapixel (MPx), 30X Optical Zoom, 12X Digital Zoom, Built-in Analytics, \$3,300, no edge recording
Y/?/Y	Axis/Q6045-E	HDTV 1080p and 20x optical zoom Outdoor-ready and Arctic Temperature Control Vandal-resistant and shock detection Intelligent video including highlight compensation High Power over Ethernet \$3,600



Pelco/ Spectra S5230

FIXED		
ONVIF/OS /ONSSI	Manufacturer/Model	Notes
Y/Win XP, 7, 8/Y	Sony/SNCEM632RC	Network 1080p/30fps Full HD Outdoor IR Ruggedized Mini Dome Camera - E Series - Powered by IPELA ENGINE EX™ (Wide D, High Sensitivity, True Day/Night, ABF, IP66, IK10)
Y/Win XP, 7, 8	Panasonic/ WV-NW502S	This 3.0 megapixel vandal-resistant IP camera. The WV-NW502S provides images at 30 frames per second in H.264 format (in 1.3 megapixel mode). No IR capability. , Video Motion Detection (VMD) \$940.
Y/ Vista, 7, Mac OS X/Y	Pelco/IME 3122-1EP	3 Megapixel (MPx) Resolution (1080p) Up to 30 Images per Second (IPS) at 3MPx 9-22mm Autofocus Varifocal Lens Power over Ethernet (PoE), IEEE 802.3af Adaptive Motion Detection and Camera Sabotage Analytics ONVIF Profile S Conformant, \$1,100, no edge recording
Y/?/Y	AXIS M3026-VE	Compact, vandal-resistant, outdoor-ready design 3 MP / HDTV 1080p Day/night functionality Power over Ethernet Edge storage



Pelco/IME 3122-1EP

FIXED		
ONVIF/OS /ONSSI	Manufacturer/Model	Notes
Y/Win XP, 7, 8/Y	Sony/SNCEB630B	Network 1080P/30fps Full HD fixed camera powered by IPELA ENGINE EX (Wide D, High Sensitivity, electrical Day/Night, PoE), No IR capability , \$900, no edge
Y/Win XP, Vista, 7, 8	Panasonic/WV-NP502	Lens varies, must be specified, suggest 3.6x vari-focal 2.8mm-10mm for normal use, no IR capability , \$600
Y/Win XP, Vista, Mac OS X/Y	Pelco IXE20DN8-EL	Open IP Standards Up to 2.1 Megapixel Resolution (1920 x 1080) Up to 30 Images per Second (ips) at 1920 x 1080 H.264 and MJPEG Day/Night Sensitivity Down to 0.03 lux Power over Ethernet (IEEE 802.3af) or 24 VAC Up to 2 Simultaneous Video Streams Build in Analogue, No IP capability, \$1,200, no edge recording
Y/?/Y	AXIS P1355-E	Superb video quality with HDTV 1080p P-Iris control Multiple H.264 video streams Digital PTZ and multi-view streaming Outdoor-ready, IP66 rating, \$1,200



Sony/SNCEB630
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PANORAMIC/SPECIAL		
Category	Manufacturer/Model	Notes
IP-cameras		
Y/Vista/Y	Pelco/EVO-05NMD	Vandal resistant 360° IP camera with a 5-megapixel sensor and no moving parts, Vandal-Resistant enclosure, Constant 360° surveillance; no blind spots, no mechanical parts, Power over Ethernet (PoE), \$900, no edge recording
Y/?/Y	AXIS M3027-PVE	360°/180° panoramic views in up to 5 MP resolution Compact, vandal-resistant, outdoor-ready design Input/output ports for external devices Digital PTZ and multi-view streaming with dewarped views
	Arecont/AV8365DN	integrate four sensors with IR corrected lenses in an IP66 / IK-10 dome. 8-, 12-, 20- or 40-megapixels at fast frame rates. H.264 compression for bandwidth and storage reduction. Day/Night or Color-only models. Wide Dynamic Range (12MP). Binning mode (12MP, 20MP and 40MP). \$1,400



Pelco/EVO-05NMD



Arecont/AV8365DN

Approvals

Name	Title	Signature	Date