AGREEMENT

24-0046-RFP

Security Card Badge Access System and Closed Circuit Television (CCTV) Security Camera System Maintenance, Installation, & Repairs

This Agreement (the "agreement" or "contract") is entered into on the date last executed below ("Effective Date"), by and between Pinellas County, a subdivision of the State of Florida whose primary address is 315 Court Street, Clearwater, Florida 33756 ("COUNTY" or "Owner") and ADT Commercial LLC whose primary address is 1309 North Ward Street, Tampa, FL 33607, (hereinafter "CONTRACTOR" or "Custodian") (jointly, the "Parties").

NOW THEREFORE, the Parties agree as follows:

A. **Documents Comprising Agreement**

1. This Agreement, including the Exhibits listed below, constitutes the entire agreement and understanding of the Parties with respect to the transactions and services contemplated hereby and supersedes all prior agreements, arrangements, and understandings relating to the subject matter of the Agreement. The documents listed below are hereby incorporated into and made a part of this Agreement:

   a. This Agreement

   b. Pinellas County Standard Terms & Conditions, located on Pinellas County Purchasing's website, effective 1/1/2023, posted at https://pinellas.gov/county-standard-terms-conditions/

   c. Exhibit 1 - Non-Disclosure Agreement

   d. Exhibit 2 - Solicitation Section 5, Titled Insurance Requirements

   e. Exhibit 3 - Solicitation Section 6, Scope of Work / Specifications

   f. Exhibit 4 - Pricing Proposal

   g. Attachment A - Division 27 0 2022-Pinellas County

   h. Attachment B - 280500 common work results for electronic safety and security

   i. Attachment C - 281000 electronic security systems

   j. Attachment D - 281010 Intrusion Detection Systems

   k. Attachment E - 282000 closed circuit television- video surveillance system

2. In the case of a conflict, the terms of this document govern, followed by the terms of the attached Exhibits, which control in the order listed above.

B. **Term**

1. Duration of the Agreement will be for a period of 60 months, commencing August 22, 2024, with unit prices adjustable at 12 months and thereafter annually for the life of the contract, in an amount not to exceed the average of the Consumer Price Index (CPI) or 5 %, whichever is less, for all Urban Consumers, Series Id: CUUR0000SA0, Not Seasonally Adjusted, Area: U.S. city average, Item: All items, Base Period: 1982-84=100 for the twelve months prior.

2. It is the Contractor's responsibility to request any pricing adjustment under this provision. For any adjustment to commence annually, the Contractor's request for adjustment will be submitted between 90-120 days prior to Agreement anniversary date, utilizing the available index at the time of request. The Contractor adjustment request will not be in excess of the relevant pricing index change. If no adjustment request is received from the Contractor, the County will assume the Contractor has agreed to continue without a pricing adjustment. Any adjustment request received outside of the 90-120 day period above will not be considered.

C. **Term Extension(s) of Contract** The Agreement may be extended subject to written notice of agreement from the Owner and CONTRACTOR, for two (2) additional twelve (12) month period(s) beyond the primary contract period. Term extensions will allow for price adjustments (Decrease/Increase) in an amount not to exceed the average of the Consumer Price Index (CPI) or 5%, whichever is less, for all Urban Consumers, Series Id: CUUR0000SA0, Not Seasonally Adjusted, Area: U.S. city average, Item: All items, Base Period: 1982-84=100 for the twelve months prior to extension. The extension shall be exercised only if all terms and conditions remain the same and the Owner grants approval. It is the vendor's responsibility to request any pricing adjustment under this provision.
For any adjustment to commence on the first day of any exercised extension period, the vendor's request for adjustment should be submitted at time of the extension request from the Owner, utilizing the available index at the time of request. The vendor adjustment request should not be in excess of the relevant pricing index change. If no adjustment request is received from the vendor, the Owner will assume the vendor has agreed that the extension term may be exercised without pricing adjustment. Any adjustment request received after the commencement of a new extension period may not be considered. Owner has the right to request pricing decreases at any time.

D. **Pricing & Expenditures Cap**

1. Payment and pricing terms for the initial and renewal terms are subject to the fee schedule in Exhibit 4 - Pricing Proposal. Notwithstanding the above, County expenditures under the Agreement will not exceed the annual expenditure of $350,000.00, for a total not to exceed expenditure of $1,380,750.00 for the 60-month term without a written amendment to this Agreement.

E. **Entire Agreement**

1. This Agreement constitutes the entire agreement between the Parties.

IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed by their undersigned officials, who are duly authorized to bind the Parties to the Agreement.

For Contractor: ADT Commercial / DBA Everon

Signature:

Print Name and Title: Jonathan Collins GM/ VP Mid FL District

Date: 6/4/24

For Owner: Pinellas County

Signature:

Print Name and Title: Chair, Kathleen Peters

Date July 16, 2024

ATTEST: KEN BURKE, CLERK

By:

BOARD OF COUNTY COMMISSIONERS SEAL PINELLAS COUNTY, FLORIDA

APPROVED AS TO FORM

By: *Keiah Townsend*

Office of the County Attorney

Exhibit 1 - Non-Disclosure Agreement

INDIVIDUAL NON-DISCLOSURE AGREEMENT

I, Jonathan Walker, understand that I will have access to confidential information and that I am responsible for safeguarding this information. In particular, I understand the following (Please initial):

JW In consideration of the County disclosing to me certain County confidential and security sensitive information, including, but not limited to, County Information Technology Assets, Physical Security Systems, Operations Security, Infrastructure Interdependencies, Impact Analysis and Risk Characterization, as identified and more specifically defined by the RFP, I agree to receive and maintain such information in trust and confidence and to take reasonable precautions against disclosure of such information to any third persons. I understand that disclosure of such information could pose a security threat to the County and impact the health, safety and welfare of the public. Nothing herein shall by construed to prohibit disclosure of information required pursuant Chapter 119, Public Records Law.

JW Any and all intellectual property, including but not limited to copyright, invention, trademark, trade name, service mark, and/or trade secrets created or conceived pursuant to or as a result of this contract and any related subcontract ("Intellectual Property"), shall be considered work for hire and the County shall be considered the creator of such Intellectual Property. Contractor shall notify the County, within thirty (30) days, of the creation of any Intellectual Property by its employees, agents, or subcontractor(s). Contractor, agrees to execute any and all document(s) necessary to assure ownership of the Intellectual Property vests in the County and shall take no affirmative actions that might have the effect of vesting all or part of the Intellectual Property in any entity other than the County. The Intellectual Property shall not be disclosed by Contractor to any other entity without the express written authorization of the County. If by operation of law, the Intellectual Property is not owned in its entirety by the County automatically upon its creation, then Contractor agrees to assign and hereby assigns to the County the ownership of the Intellectual Property. The Contactor agrees to take such further action and execute and deliver such further agreements and other instruments as the County may reasonably request to give effect to this clause. It is expressly agreed by Contactor that these covenants are irrevocable and perpetual." All work created, originated and/or prepared by Contractor in performing Services pursuant to the Agreement and other documentation or improvements related thereto, to the extent that such work, products, documentation, materials or information are described in or required by the Services (collectively, the "Work Product") shall be County's property when completed and accepted, if acceptance is required in this Agreement, and the County has made payment of the sums due therefore. The ideas, concepts, know-how or techniques developed during the course of this Agreement by the Contractor or jointly by Contractor and the County may be used by the County without obligation of notice or accounting to the Contractor. Any data, information or other materials furnished by the County for use by Contractor under this Agreement shall remain the sole property of the County.

By signing, I've read, understood, and will comply with being responsible for safeguarding this information.

Print First and Last Legal Name

Jonathan Walker

Signature

6/4/24

Date

5. Insurance Requirements

5.1. INSURANCE (General)

The Vendor must provide a certificate of insurance and endorsement in accordance with the insurance requirements listed below, prior to recommendation for award. The Vendor shall obtain and maintain, and require any subcontractor to obtain and maintain, at all times during its performance of the Agreement in Phase 1 insurance of the types and in the amounts set forth. For projects with a Completed Operations exposure, Vendor shall maintain coverage and provide evidence of insurance for 2 years beyond final acceptance. All insurance policies shall be from responsible companies duly authorized to do business in the State of Florida and have an AM Best rating of VIII or better.

5.2. INSURANCE (Requirements)

A. Submittals should include, the Vendor's current Certificate(s) of Insurance. If Vendor does not currently meet insurance requirements, Vendor shall also include verification from their broker or agent that any required insurance not provided at that time of submittal will be in place prior to the award of contract. Upon selection of Vendor for award, the selected Vendor shall email certificate that is compliant with the insurance requirements. If the certificate received is compliant, no further action may be necessary. The Certificate(s) of Insurance shall be signed by authorized representatives of the insurance companies shown on the Certificate(s).

B. **The Certificate holder section shall indicate Pinellas County, a Subdivision of the State of Florida, 400 S Fort Harrison Ave, Clearwater, FL 33756. Pinellas County shall be named as an Additional Insured for General Liability. A Waiver of Subrogation for Workers Compensation shall be provided if Workers Compensation coverage is a requirement.**

C. Approval by the Owner of any Certificate(s) of Insurance does not constitute verification by the Owner that the insurance requirements have been satisfied or that the insurance policy shown on the Certificate(s) of Insurance is in compliance with the requirements of the Agreement. Owner reserves the right to require a certified copy of the entire insurance policy, including endorsement(s), at any time during the Bid and/or contract period.

D. If any insurance provided pursuant to the Agreement expires or cancels prior to the completion of the Work, you will be notified by CTrax, the authorized vendor of Owner. Upon notification, renewal Certificate(s) of Insurance and endorsement(s) shall be furnished to Pinellas County Risk Management at InsuranceCerts@pinellascounty.org and to CTrax c/o JDi Data at PinellasSupport@ididata.com by the Vendor or their agent prior to the expiration date.

1. Vendor shall also notify Owner within twenty-four (24) hours after receipt, of any notices of expiration, cancellation, nonrenewal or adverse material change in coverage received by said Vendor from its insurer Notice shall be given by email to Pinellas County Risk Management at InsuranceCerts@pinellascounty.org. Nothing contained herein shall absolve Vendor of this requirement to provide notice.

2. Should the Vendor, at any time, not maintain the insurance coverages required herein, the Owner may terminate the Agreement.

E. If subcontracting is allowed under this Bid, the Primary Vendor shall obtain and maintain, at all times during its performance of the Agreement, insurance of the types and in the amounts set forth; and require any subcontractors to obtain and maintain, at all times during its performance of the Agreement, insurance limits as it may apply to the portion of the Work performed by the subcontractor; but in no event will the insurance limits be less than $500,000 for Workers' Compensation/Employers' Liability, and $1,000,000 for General Liability and Auto Liability if required below.

1. All subcontracts between the Vendor and its Subcontractors shall be in writing and are subject to the Owner's prior written approval. Further, all subcontracts shall

   a. Require each Subcontractor to be bound to the Vendor to the same extent the Vendor is bound to the Owner by the terms of the Contract Documents, as those terms may apply to the portion of the Work to be performed by the Subcontractor;

   b. Provide for the assignment of the subcontracts from the Vendor to the Owner at the election of Owner upon termination of the Contract;

   c. Provide that Owner will be an additional indemnified party of the subcontract;

   d. Provide that the Owner will be an additional insured on all insurance policies required to be provided by the Subcontractor except workers compensation and professional liability;

   e. Provide a waiver of subrogation in favor of the Owner and other insurance terms and/or conditions

   f. Assign all warranties directly to the Owner; and

   g. Identify the Owner as an intended third-party beneficiary of the subcontract. The Vendor shall make available to each proposed Subcontractor, prior to the execution of the subcontract, copies of the Contract Documents to which the Subcontractor will be bound by this Section C and identify to the Subcontractor any terms and conditions of the proposed subcontract which may be at variance with the Contract Documents.

F. Each insurance policy and/or certificate shall include the following terms and/or conditions:

1. The Named Insured on the Certificate of Insurance and insurance policy must match the entity's name that responded to the solicitation and/or is signing the agreement with the Owner.

2. Companies issuing the insurance policy, or policies, shall have no recourse against Owner for payment of premiums or assessments for any deductibles which all are at the sole responsibility and risk of Vendor.

3. The term "Owner" shall include all Authorities, Boards, Bureaus, Commissions, Divisions, Departments and Constitutional offices of Pinellas County and individual members, employees thereof in their official capacities, and/or while acting on behalf of Owner.

4. All policies shall be written on a primary, non-contributory basis.

The minimum insurance requirements and limits for this Agreement, which shall remain in effect throughout its duration and for two (2) years beyond final acceptance for projects with a Completed Operations exposure, are as follows:

5.3. WORKERS' COMPENSATION INSURANCE

Worker's Compensation Insurance is required if required pursuant to Florida law. If, pursuant to Florida law, Worker's Compensation Insurance is required, employer's liability, also known as Worker's Compensation Part B, is also required in the amounts set forth herein.

A. Limits

1. Employers' Liability Limits Florida Statutory

   a. Per Employee $ 500,000

   b. Per Employee Disease $ 500,000

   c. Policy Limit Disease $ 500,000

If Vendor is not required by Florida law, to carry Workers Compensation Insurance in order to perform the requirements of this Agreement, Owner's Waiver Form for workers compensation must be executed, submitted, and accepted by Risk Management. The Owner's Waiver Form is found at https://pinellas.gov/services/submit-a-workers-compensation-waiver-request/. Failure to obtain required Worker's Compensation Insurance without submitting and receiving a waiver from Risk Management constitutes a material breach of this Agreement.

5.4. COMMERCIAL GENERAL LIABILITY INSURANCE

Includes, but not limited to, Independent Vendor, Contractual Liability Premises/Operations, Products/Completed Operations, and Personal Injury. No explosion, collapse, or underground damage exclusions allowed.

A. Limits

1. Combined Single Limit Per Occurrence $ 1,000,000

2. Products/Completed Operations Aggregate $ 2,000,000

3. Personal Injury and Advertising Injury $ 1,000,000

4. General Aggregate $ 2,000,000

5.5. EXCESS OR UMBRELLA LIABILITY INSURANCE

Excess of the primary coverage required, in paragraphs above. No explosion, collapse, or underground damage exclusions allowed.

A. Limits

1. Each Occurrence $ 1,000,000

2. General Aggregate $ 1,000,000

5.6. CYBER RISK LIABILITY (NETWORK SECURITY/PRIVACY LIABILITY) INSURANCE

To include cloud computing and mobile devices, for protection of private or confidential information whether electronic or non- electronic, network security and privacy; privacy against liability for system attacks, digital asset loss, denial or loss of service, introduction, implantation or spread of malicious software code, security breach, unauthorized access and use; including regulatory action expenses; and notification and credit monitoring expenses with at least minimum limits as follows:

A. Limits

1. Each Occurrence $ 1,000,000

2. General Aggregate $ 1,000,000

B. For acceptance of Cyber Risk Liability coverage included within another policy required herein, a statement notifying the certificate holder must be included on the certificate of insurance and the total amount of said coverage per occurrence must be greater than or equal to the amount of Cyber Risk Liability and other coverage combined.

5.7. PROPERTY INSURANCE

Vendor will be responsible for all damage to its own property, equipment and/or materials.

6. Scope of Work / Specifications

6.1. OBJECTIVE/JUSTIFICATION

In accordance with the attached specifications, Owner intends to establish a contract for Security Card Access System and Closed-Circuit Television (“CCTV”) Security Camera System maintenance, installation, and repairs for the Utilities and Solid Waste Departments, as and when required.

6.2. APPROVED MANUFACTURERS

A. Bosch

B. Honeywell,

C. HID

D. Lenel

E. Axis

6.3. LOCATIONS

The Contractor will provide service to the eighteen (18) Utilities and Solid Waste Department sites located throughout Pinellas County (listed below) and shall accommodate any additions or deletions of locations during this agreement. The Contractor shall have the ability to provide maintenance and repairs of the current security card access systems and closed-circuit television (“CCTV”) security camera systems, install and upgrade the systems,as and when needed, in accordance with the specifications outlined herein.

The Owner is searching for a turn-key solution.

CURRENT SITE LOCATIONS

1) Logan Pump Station

(Includes 4 buildings A, B, C, & Booster)

1620 Ridge Road

Largo, FL 33778

2) Field Services

9837 Ulmerton Road

Largo, FL 33778

3) Solid Waste

(Various buildings at this location)

3095 114th Avenue North

St. Petersburg, FL 33716

4) Utilities Administration Building

14 South Fort Harrison

Clearwater, FL 33756

5) Keller Pump Station

(Various buildings at this location)

7050 Keystone Road

Tarpon Springs, FL 34689

6) WE Dunn AWRF

(Various buildings at this location)

4111 Dunn Drive

Palm Harbor, FL 34683

7) GMD South

(Various buildings at this location)

6730 142nd Avenue North

Largo, FL 33771

8) South Cross AWRF

(Various buildings at this location)

7401 54th Street North

St Petersburg, FL 33710

9) Gulf Beach

Booster Station 4501 Gulf Blvd

St Petersburg, FL 33706

10) Island Of Capri

Booster Station 12050 2nd Street

Treasure Island, FL 33706

11) 580 North Booster Station

27707 U.S. 19 North

Clearwater, FL 33462

12) McKay Creek Pump Station

11700 Hamlin Blvd.

Largo, FL 33774

13) Lake Seminole Alum Station

Northeast corner of Lake Seminole in the Lake Park Subdivision from 102nd.

14) Oldsmar Pump Station

Off of Winners Way

15) GMD North

3900 Douglas Drive, Palm Harbor

16) Pump Station 16

10548 Park Blvd, Seminole

17) Pump Station 54

1405 Indian Rocks Rd., Largo

18) Pump Station 80

1075 Ponce de Leon Blvd, Clearwater

6.4. ABBREVIATIONS

ADA	Americans with Disabilities Act
API	Application Programming Interface
ASCII	American Standard Code for Information Interchange
BPS	Bits Per Second
BTS	Business Technology Services
CIF	Common Intermediate Format (352 X 240)
2CIF	Common Intermediate Format (704 X 240)
4CIF	Common Intermediate Format (704 X 480)
DIN	German Institute of Standardization
DPS	Door Position Switch

DVI	Digital Visual Interface
FCC	Federal Communications Commission
FDLE	Florida Department Law Enforcement
GUI	Graphical User Interface
HDMI	High-Definition Multimedia Interface
HID	Hughes Identification Devices
ID	Identification
I/O	Input /Output
IPS	Images Per Second
ISC	Intelligent System Controller
MBPS	Mega Bits per Second
NDAA	National Defense Authorization Act
NTP	Network Time Protocol
NTSC	National Television Standard Committee
ODBC	Open Database Connectivity
ONVIF	Open Network Video Interface Forum
OSDP	Open Supervise Device Protocol
O&M	Operations and Maintenance
PAL	Phase Alternating Line
PCU	Pinellas County Utilities
PIN	Personal Identification Number
PTZ	Pan/Tilt/Zoom
RAID	Redundant Array of Independent Disks
REX	Request to Exit
RoHS	Restriction of Hazardous Substances Directive
SCADA	Supervisory Control and Data Acquisition
SCS	Security Control System
SDRAM	Synchronized Dynamic Random Access Memory

STP	Shielded Twisted Pair
TCP/IP	Transmission Control Protocol/Internet Protocol
UL	Underwriters Laboratories, Inc.
UPS	Uninterrupted Power Supply
USB	Universal Serial Bus
UTP	Unshielded Twisted Pair
VOC	Volatile Organic Compounds

6.5. MATERIALS ALTERNATES AND SUBSTITUTIONS

A. **Definitions**

1. Basis of Design: A product or group of products from an identified manufacturer that was used as the basis of system layouts and installation details, part of the contract documents.
2. Prototype: Is a product or a group of products that are not yet ready for commercial use because they are in the testing phase (Beta testing) of the product development.
3. Alternates: Products or manufacturers listed in the contract documents as acceptable compared to the basis of design. Use of alternates shall follow the same system architecture as the basis of design.
4. Obsolete: A product that has been discontinued by the manufacturer or declared in end of life, and it is no longer being manufactured.
5. Substitution: A product not listed in the contract documents but capable of similar characteristics as the basis of design operating as a direct replacement in the system in reference. The installers can propose a substitution if all requirements are met as indicated in this specification.
6. Substitutions that create a change in system architecture: A product(s) that create a very different system configuration impacting other trades (i.e., change in power/cooling requirements, changes in raceways layout or sizes, changes in equipment space requirements, changes in low voltage wiring layouts, types and quantities, etc.) but providing a similar end result as the system/products basis of design.

B. **Use of Prototype**. Prototypes are not allowed in any security system unless authorize by appropriate security management.

C. **Use of alternates**. Alternates are allowed and installer shall follow these requirements:

1. Where several brand names make or manufacturers are listed as acceptable alternates each shall be regarded as equally acceptable, based on the design selection. Where a

manufacturer's model number is listed, this model shall set the standard of quality and performance required. Where no brand name is specified, the source and quality shall be subject to the Pinellas County Engineering Department's review and acceptance. Where three or more manufacturers are listed, one of the listed manufacturers shall be submitted for acceptance.

2. The use of alternate products does not allow the change of system architecture with such products.

D. **Use of substitutions**. Substitutions are only allowed when they meet all the requirements below:

1. Substitutions are only allowed when a particular specification section for a security system, allows the use of substitutions for that particular system.

2. The performance of all substituted components must meet or exceed those of the basis of design. Should an installer wish to submit a substitution product, or a product set stated in the construction documents as 'acceptable', it shall be the responsibility of the installer to submit to the Pinellas County Engineering Department an item-for-item CROSS REFERENCE for all specifications of the product, all related specifications and product data sheets, for the proposed substitution. Use the substitution request form indicated in Division 27.

3. The Pinellas County Engineering Department, the Owner or BTS has the authority to reject a substitution without cause and the installer shall provide the basis of design and no additional compensation.

4. Substitutions of unnamed manufacturers will not be acceptable.

5. Certification of substitutions: When a basis of design is specified to be in accordance with a trade association or government standard requested by the Pinellas County Engineering Department, installer shall provide a certificate that the substitution complies with the referenced standard. Upon request of Pinellas County Engineering Department, contractor shall submit supporting test data to substantiate compliance.

6. Substitutions that create a change in system architecture are not allowed.

7. Sensors or door security devices, with the exception of card readers, shall allow for substitutions as approved by the Owner.

6.6. GLOSSARY OF TERMS

The following terms are defined for the purposes of this specification:

A. Access Group: A logical group of card readers (terminals) which may be connected to one or more sub-controllers, and which represent a collection of readers for which a particular cardholder may have access privileges.

B. Access Mode: The mode of operation in which the security control system shall only annunciate tamper and trouble conditions at a monitored point. Alarm conditions shall not be annunciated in this mode. Also referred to as alarm shunting.

C. Acknowledge The action taken by a security control system operator to indicate that he/she is aware of a specific alarm or tamper state.

D. Action Messages: A set of instructions automatically provided to the operator when an alarm condition is generated.

E. Advisory: A message provided by the security control system to the operator to inform him/her of a condition as reported by the security control system.

F. Alarm Condition: A change of state, as sensed by the security control system, indicating that the security control system has detected a condition that its sensors were designed to detect.

G. API Integration: a method to transfer information between two systems by means of APIs, through an Ethernet communication network.

H. Cardholder: A person who has been issued a valid access card.

I. Card Reader: A device usually located at access points, designed to decode the information contained on or within a card key credential for the purposes of making an access decision or for identity verification.

J. Clear: The action taken by a security control system operator to respond to an alarm condition or advisory so that other alarms may be serviced or so that other actions may be taken.

K. Download: To send computer data from the File Server to a controller for the purposes of making access decisions without the intervention of the File Server.

L. Facility Code: A coded number, in addition to the individual card number, stored within each card key that uniquely identifies the facility at which the card is valid. This feature prevents cards from one facility from being used at another facility that has a similar access control system.

M. File Server: Primary host computer in the networked security system, which maintains the access control system database.

N. Line Supervision: The monitoring of an electrical circuit via electrical and software systems to verify the electrical integrity of the supervised circuit.

O. Off-line: A condition in which a controller(s) is not communicating with the File Server. In the off-line mode, the controller continues to make access decisions and process alarms according to the information stored in its local database.

P. Password: A combination of numbers or letters unique to the security control system operator that defines commands and data fields he/she may view, edit, or command.

Q. Relay integration: A method to transfer signals between two systems by means of using potential free contact closures to input points.

R. Reset: A command or feedback signal that indicates that a monitored point has returned to its normal state after having transferred to the alarm or trouble state.

S. Secure Mode: The normal state of an alarm input point from which it will be monitored for change of state to either an alarm or trouble condition.

T. Secured Area: A physical location within the facility to which access is controlled by one or more card readers.

U. Secured side: The side of a security door where a higher security level needs to be granted for a user to be authorized to be in that side of the door.

V. Serial line integration: A method to transfer information between two systems by means of an RS-232/RS-422 or RS-485 line, using ASCII strings.

W. Tamper: A condition within the circuitry of a monitored point that indicates the electrical integrity of that sensing circuit has been compromised.

X. Tamper-proof screws: A screw with a security hexalobular internal driving feature as described in ISO 10664. As an example, a security TORX head, as developed by Camcar LLC.

Y. Time Interval: A timestamp of one start time and one-stop time within a time period.

Z. Time Period: A user-programmable period of time made up of days of the week and hours in the day.

AA. Trouble: A condition within the circuitry of a monitored point that indicates that an equipment malfunction, single break, single fault or a wire-to-wire short exists.

BB. Unsecured side: The side of a security door where a lower security level needs to be granted for a user to be authorized to be in that side of the door.

CC. User Definable: An attribute of a security control system function that the System Administrator may easily tailor.

DD. Workstation: A personal computer connected to the main security control system File Server via a local area network connection for the purpose of programming the system and responding to alarms.

6.7. PROJECT REQUIREMENTS

1. Contractor shall provide a technical roadmap for the proposed solutions. How does the proposed solution fit into the Contractor's current product lifecycle?

2. Contractor shall provide a list of policies on firmware updates for the proposed solution.

a. How often are changes released?

b. How is the customer notified about changes?

c, How are they applied?

6.8. SPECIFICATIONS AND TECHNICAL REQUIREMENTS

A. The Contractor must be a direct manufacturer-authorized representative of the product they propose to provide.

B. The preferred manufacturer of software would be Lenel; for cameras, the preferred manufacturer would be Axis; and for access control, the preferred manufacturer would be HID. Bosch and Honeywell are also approved manufacturers.

C. All technicians assigned to install and configure this system shall be factory-trained and certified to install this equipment properly.

D. The Contractor must have a minimum of five (5) qualified and factory-trained technicians to support this system. This company must have an established reputation and experience and be regularly engaged in the supply and support of such systems for at least five (5) consecutive years.

E. Florida Department of Law Enforcement (FDLE) security clearance is required for every employee of the contractor assigned to perform services under this contract. The security clearances must be approved before starting work and submitted to the designated Owner's representative. The Contractor will bear the burden of the cost of the security clearances. Security policies may change over the course of this contract, and the Contractor is expected to meet these changing requirements and pay for any associated costs.

F. The Contractor shall provide a single point of contact that will be readily available 24/7/365 to service the Contract. The Contractor is responsible for notifying the Owner of any changes to the account manager or contact information. The account manager's responsibilities shall include but are not limited to overseeing all aspects of implementation, management, and oversight of all aspects of servicing, reporting, and issue resolution.

G. The Contractor employee(s)/representative clothing must clearly depict the Contractor's company name, or they must carry company identification.

H. The Contractor shall not subcontract any part of this contract without the prior written approval of the Owner's Facility Manager or Contract Administrator unless notified otherwise. All technicians and subcontractors working on Owner's equipment must be employed by and responsible to the contractor.

I. The Contractor's employee(s)/representative will be required to sign in and out in a logbook provided by the Owner upon commencement and termination of work assignment.

J. The Contractor must keep legible and detailed documentation on all work performed under this contract. Details of the following information should be submitted as a backup to each monthly invoice.

1. Building/location
2. Equipment serviced/installed.
3. Hourly rate charged.
4. Standard purchase order number
5. Date of service
6. Services performed.
7. Receipts for items/services not listed (reimbursed at cost +)

K. If at any time the Owner is dissatisfied with the service and/or labor performed under this contract, the Owner may request and receive a new technician(s) to service its buildings.

L. The Contractor shall inform the Owner of the availability of any/all applicable hardware and operational software upgrades when providing services during this contract. The Contractor will provide installation and configuration services as requested by the Owner. The Owner may elect to provide the software at its sole discretion.

M. The Contractor shall provide unlimited technical telephone support to the Owner 24 hours a day, seven days a week, to troubleshoot and correct any camera, software, or system outages as needed. Onsite technical support shall be billed as per the hourly rate bid.

N. Upon request, with the installation of new, upgraded, or previously unused equipment types or software, the Contractor must provide at least two (2) hours of onsite field training. All changes made to existing equipment shall be documented and submitted to the Owner. Wherever necessary, the Contractor shall update all blueprints and written documentation.

O. The Contractor shall facilitate the registration for up to 2 PCU staff to attend Lenel-provided training. Training should be at the level to allow PCU staff direct access to Lenel Technical Support (currently "LGE Specialist" Training).

P. The Contractor shall provide telephone and on-site technical and software support to the Owner as part of the services offered.

Q. Service calls may be requested on a 24-hour, 7-day per-week basis.

R. Emergency calls shall be responded to within four (4) hours and service initiated. The emergency status will be determined by the Owner's representative initiating the call.

S. The Contractor will respond to non-emergency but designated priority calls within thirty-six (36) hours.

T. The Contractor will coordinate with Owner to schedule non-emergency, non-priority calls.

U. Upon request, Contractor will provide a written service report detailing all work performed and conduct a debriefing meeting with appropriate Owner's personnel (including, but not limited to, the representative, plant manager, SCADA, security, and safety representatives at the conclusion of each service call.

V. The Owner's normal operating hours are from 7:00 a.m. to 3:30 p.m., Monday through Friday. After-hours services will be from 3:31 p.m. to 6:59 a.m. Monday through Friday and on all weekends and Owner-recognized holidays. HOLIDAY SCHEDULE – The following days shall be recognized as holidays for the purposes of this contract.

1. New Year's Day
2. Martin Luther King's Birthday
3. President's Day
4. Memorial Day
5. Juneteenth
6. Independence Day
7. Labor Day
8. Veterans Day
9. Thanksgiving Day
10. Christmas Holiday
11. New Year's Day

W. The Contractor will be paid on a time and material basis and shall provide a detailed written estimate of all new installation or project work. The estimate will have a "not to exceed price" for evaluation by an Owner's representative for approval of the cost prior to authorization and commencement of the work. The estimate must list all required parts and the number of labor hours required to complete the job. The Owner reserves the right to obtain competitive quotes outside this contract should the estimate exceed expectations.

X. All work associated with new installations shall commence within 15 days after receiving authorization from an Owner's representative.

Y. The Contractor shall be responsible for all costs associated with picking up and returning defective materials.

Z. The Contractor shall issue a Return Goods Authorization (RGA) or similar, numbered form listing all materials and quantities.

AA. The Contractor warrants that it shall perform the services requested by the Owner in a competent, qualified, and professional manner and that all services shall be provided on a best-effort basis.

BB. The Contractor warrants that it shall solely be responsible for training and supervising its employees, agents, and consultants to facilitate its duties under this Agreement.

CC. The Contractor warrants that at no time and under no circumstances is the Contractor considered an employee of Owner, nor are the Contractor employees to be considered employees of Owner. Rather, the contractor and its employees shall always be and, regarded as contractors. The Contractor warrants that it will be responsible for its self-employment and all other taxes and shall maintain its insurance coverage for health, medical, disability, and life. It is expressly understood that the Owner will provide no insurance or other benefits to the Contractor or Contractor employees.

DD. The Contractor shall have sole financial responsibility for all its taxes and insurance as may be required for the Contractor to conduct business.

EE. The Contractor warrants that all materials shall be suitable for the specific purposes for which Owner is procuring the same and will not infringe upon or violate any patent, copyright, trademark, trade secret, or other property right of any third party. The contractor will indemnify and hold harmless Owner, its corporate affiliates, and any agent or employee from and against any loss, cost, liability, or expense (including reasonable counsel fees) arising from any breach or claim breach of this warranty. Contractor's obligation to indemnify Owner will survive the expiration or termination of this Agreement by either party for any reason.

FF. The Contractor will warrant no infringement on any 3rd party products, patents, or rights. If any such infringement should occur and be discovered after installation, the Contractor will be responsible for the replacement of equipment, payment of license fees, or royalties.

GG. The Contractor is responsible for following all Federal, State, or Local Laws, Standards, and Regulations pertaining to the safety and health of their workers and shall be accountable for such violations. The Contractor shall be solely responsible for identifying and abatement workplace hazards and for identifying appropriate personal protective equipment (PPE) and providing such PPE to their workers. The Contractor is responsible for any on-the-job injuries or illnesses of contract employees per Federal, State, or Local Laws, Standards, or Regulations. The Contractor is responsible for providing safety training to contract workers. The safety and health of contract workers are the sole responsibility of the Contractor.

HH. All materials purchased under this Agreement must be new, the latest model, first quality, and carry the manufacturer's standard warranty.

II. The Contractor has taken reasonable actions necessary for the Contractor to be in compliance in all material respects with the disclosure requirements of applicable U.S. federal securities laws related to Conflict Minerals.1.

1. Columbite- tantalite (coltan), cassiterite, gold, wolframite, or their derivatives, which are limited to tantalum, tin, and tungsten, unless the Secretary of State of the United States determines that additional derivatives are financing conflict in the Democratic Republic of the Congo or a country that shares an internationally recognized border with the Democratic Republic of the Congo; and any other mineral or its derivatives determined by the Secretary of State of the United States to be financing conflict in the Democratic Republic of the Congo or a country that shares an internationally recognized border with the Democratic Republic of the Congo.

JJ. Contractor shall be an OnGuard Certified Professional in access control and digital video.

KK. PERMITS, FEES AND COSTS IMPOSED BY OWNER TO BE OBTAINED BY AND/OR BORNE BY CONTRACTOR: The Contractor is responsible for (1) determining and paying any fees that may be necessary to perform this contract and (2) determining and acquiring any and all permits and licenses required by any Federal, State or local government entity, agency or board that may be necessary to perform this contract. The Contractor shall maintain any and all permits and licenses required to complete this contract.

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6.9. SECURITY AND BACKGROUND CHECKS

All Contractor employees are required to submit to a background check. The background check process shall be completed at least ten (10) days prior to the start of the contract. The Contractor shall be responsible for all costs associated with the background checks. A valid driver's license and Social Security card are required for completing the background check and obtaining a security clearance. Orientation for the Security Clearance workflow process will be provided to the awardee.

Step One – The Contractor shall obtain a Level One Criminal History Records Check through the Florida Department of Law Enforcement (FDLE) for each assigned employee.

Step Two – The Contractor shall submit the **FDLE Records Check** along with a copy of the driver's license, Social Security card, and completed Sheriff's Office Security Clearance Application, for each employee, to the Facility Operations support team.

The Pinellas County Sheriff's Office shall have and exercise full and complete control over granting, denying, withholding, withdrawing, or terminating security clearances for the Contractor.

Employees. **If a submitted employee is denied for any reason, there is no opportunity to re-apply.**

Additional Requirements for Areas with confidential law enforcement documents and Data: The Contractor shall submit for fingerprinting all personnel working in any area deemed confidential. The Contractor will schedule through the Facility Operations Support team a time for the employees to be

fingerprinted by the Sheriff's Office. All personnel who have successfully completed fingerprinting are required to complete online Security and Awareness training.

Step Three - The Facility Operations Support team will communicate the results of the Sheriff's Office review to the Contractor.

A. A list of all assigned personnel, showing the employee's full name, address, telephone number, date, and place of birth, and driver's license or State ID number and their assigned work location shall be submitted to the Facility Operations support team. This list is to be kept current by the Contractor and promptly submitted to the Facility Operations Support team at the beginning of each month. This referenced document is called the Employee Assignment Sheet (EAS). The EAS template will be provided to the awardee.

B. The Contractor shall provide an updated FDLE Level One Criminal History Records Check for all personnel on an annual basis. The annual updates are to be sent to the Facility Operations support team for review by the Sheriff's Office. Background check updates shall remain on file at the Contractor's location for three (3) years from the date of the last invoice.

C. All Contractor employees are required to wear identification (ID) badges, to be furnished by Owner for the various facility sections. The Contractor shall make the employees available for photographs on a schedule to be worked out with the Facility Manager. Access to sites not managed by the Real Estate Management Department needs to be coordinated with the Owner's site representative for the specific department. The badges shall be made by the Owner before an individual may begin work and only after a favorable security clearance has been received. Contractor employees shall sign each badge at the time of receipt.

D. The Contractor will notify the respective Facility Manager when an employee badge is lost. It shall be the responsibility of the Contractor to pay for replacement badges at the rate of $10.00 per badge. No employee shall be allowed to work without a current badge. Any contract employee who does not have proper identification shall be cause for the Owner to require removal of that employee from the property. The Contractor shall see that all badges are returned to the Facility Manager when employees are dismissed or terminated.

6.10. CYBERSECURITY

The Contractor and its subsidiaries have taken all technical and organizational measures necessary to protect the information technology systems and data used in connection with the operation of the Contractor and its subsidiaries' businesses. Without limiting the foregoing, the Contractor and its subsidiaries have used reasonable efforts to establish and maintain, and have established, maintained, implemented, and complied with, reasonable information technology, information security, cyber security, and data protection controls, policies, and procedures, including oversight, access controls, software patch management, encryption, technological and physical safeguards, and business continuity/disaster recovery and security plans that are designed to protect against and prevent a breach, destruction, loss, unauthorized distribution, use, access, disablement, misappropriation or modification, or other compromise or misuse of or relating to any information technology system or

data used in connection with the operation of the Contractor, its subsidiaries' businesses ("Breach"). There has been no such Breach, and the Contractor, its subsidiaries have not been notified of and have no knowledge of any event or condition that would reasonably be expected to result in any such Breach. Should any breach occur involving Contractor staff or Owner's data systems, the Contractor and its subsidiaries will notify the Owner immediately. The Contractor will also notify the Owner within 72 hours of any major vulnerabilities discovered within their hardware/software and will supply available updates to critical/high exploits within 30 days. The continuous functionality and threat protection of the Owner's Utility Security System is critical. The Contractor must comply with all Owner's Government Business and Technology Services Cyber and Information Security policies and procedures. In the absence of specific guidance, users should contact the Pinellas County Utilities (PCU) SCADA & Security section for recommendations. Policy violations may result in a temporary or permanent loss of system access.

A. Requirements include but are not limited to:

1. Secure Laptops both onsite and offsite Security work requiring network or device connectivity is restricted to specially configured laptops or computers provided by Owner's Utilities Department. These laptops may not be used for any other purpose, including internet and email access.

2. Network access by unauthorized personnel or Contractor business devices, including laptops, PCs, cellphones, and tablets, is strictly prohibited.

3. SCADA and Security will coordinate with the Owner's IT Department (BTS) to establish a Virtual Private Network (VPN) connection for each user requiring access. Shared accounts or login information is banned.

4. Security servers utilize Multifactor Authentication (MFA), which involves the use of cell phones and/or security dongles.

5. Remote Access **–** Remote access is reserved for special circumstances, must be approved by the SCADA and Security section and is subject to additional restrictions.

6. Access is limited to SCADA Secure devices through a PCU VPN.

7. Planned Access - The Contractor must notify SCADA in advance regarding scheduled remote access. Remote hours may be restricted to Owner's Utilities Department standard business hours to ensure Owner's staff is available to monitor and support the engagement.

8. Unplanned Access – The Contractor must notify and receive approval from SCADA before connecting to the network. After-hours access should be limited to startup or requested downtime troubleshooting.

9. File transfers are limited to approved methods and may require the assistance of the SCADA and Security section. USB storage drives and unauthorized device connections to Secure devices are prohibited.

10. Place Of Service. In the performance of all services under this Agreement, the Contractor may require its property and/or employees, subcontractors, consultants, or other agents to go upon the Owner's property and be in proximity of the Owner's employees and Contractors. The Contractor agrees that in doing so, proper precautions will be taken to carry on its operations in a safe, competent, and professional manner at all times, both in performing the services under this Agreement and in entering and leaving the Owner's property. Neither the Contractor nor its employees, subcontractors, consultants, or other agents shall permit or enable any unnecessary person to enter Owner's premises, nor permit or enable to enter Owner's premises any person Owner has requested be removed from and precluded from entering Owner's premises, whether for reasons of security of persons, property or information. The Contractor shall require its employees, subcontractors, consultants, and other agents to comply with the policies and procedures made known by the Owner concerning entry, exit, and conduct upon the Owner's premises, including background screening and use of security badges or access cards if required by the Owner. The Contractor shall not permit any person to obtain or retain possession of any access card or device beyond the conclusion of the work or otherwise beyond the duration of the Owner's express authorization. The Contractor shall obtain appropriate background checks on all of the Contractor's employees, agents, or consultants prior to their entry on Owner's premises and will ensure all subcontractors are held to the same standard relating to their employees, agents, or consultants performing services on the Purchaser's premises.

11. The Contractor shall honor requests for immediate removal of Contractor's employees, sub-contractors, consultants, agents, etc. in instances deemed to involve a conflict of interest or for any other reason(s) deemed to be in Owner's best interest, at Owner's sole reasonable discretion.

6.11. SYSTEM DESCRIPTION

A. The security systems primary purposes shall be to provide access control and alarm monitoring capabilities for this project. The system shall provide functionality such as the ability to regulate and control access through specific areas of the facility and integrate with other security components such as closed-circuit television, alarm system, intercom, and digital video recording.

B. The system must utilize a single seamlessly integrated relational database for all functionalities. The operating environment shall be the fully multi-tasking multi-threading Microsoft Windows or Windows Server Operating System.

C. In many instances the Owner has facilities where the security system is critical. In such cases operation of the system shall be a key priority over many other features.

D. Alarm monitoring and administrative workstations must be able to connect to, and monitor, field hardware devices such as card readers and intelligent system. controllers. Administrative

tasks including defining asset information, access groups, time zones, configuring digital video devices, generating reports, creating maps, etc. shall be provided from any client workstation on the network that is licensed to do so. All systems must utilize a single database on the network and must be accessible in real time to any security workstation connected to the network. This shall allow for automatic change propagation to all client workstations as well as common database consolidation.

E. As requested by the Owner, real-time graphical map representing the layout of this building shall indicate if an electronically controlled door is in a secure or unsecured mode. Control modules will be required to lock, or unlock, any electronically controlled door or vehicle gate at this facility. An automatic cardholder call-up feature shall allow for the quick search and display of images in the database. A System's Operator journal shall be available to log important daily events. A trace function shall be available for System Operator's to locate and track activity on a specific cardholder or at a specific card reader. All system hardware must be controllable using a mouse to click on the associated system icon.

F. The security system shall be designed to support an advanced distributed network architecture, whereas Intelligent System Controllers do not need to be home-run wired back to the database server. All Intelligent System Controllers shall be connected to an Ethernet network via industry standard TCP/IP communication protocol. Network based Intelligent System Controllers shall be able to communicate back with the database server through industry standard network switches and routers.

G. New security components or software must be compatible with any data encryption features used by the existing system. In utilizing encryption technologies, data communication shall be protected between workgroups, local area network computers, domain clients and servers, branch sites which may be physically remote, extranets, roving clients, and remote administration of computers.

6.12. SYSTEM CHARACTERISTICS

A. Security System Software: The Contractor shall provide additional reader licenses, when applicable, for new projects or upgrades.

B. Computer System Hardware: All computer hardware for the security systems shall be provided as part of this project. All software licenses installed on those machines shall be registered to the Owner's facility manager.

C. Intelligent System Controller (ISC) and other hardware.

1. An Intelligent System Controller (ISC) and other panel hardware shall be provided for each project following these guidelines.

2. All hardware shall be the latest generation hardware from approved manufacturers.

3. All card reader panels shall be OSDP compliant: Lenel X-series panels or Honeywell current Pro-series model (i.e., Pro4200).

D. All panels shall be provided with the following.

1. ISC and other panel hardware shall be installed in clusters in telecom rooms or other type of equipment room. They shall not be installed above ceilings as much as possible.

2. At least one ISC with TCP/IP network interface shall be install with each cluster of hardware at the telecommunications room or equipment room.

3. An ISC shall not be controlling more than 12 modules such as reader modules, input modules, output modules, etc., even though the manufactured capacity of the ISC is 32 devices. If more than 12 modules are needed another ISC shall be provided. Exceptions must be approved by the Owner's security representative.

4. All clusters of panels shall include a power supply for locks and a power supply for panels.

5. All power supplies for panels or for locks shall include battery backup power.

6. At each cluster of panels there shall be an installed spared capacity of reader ports equivalent to 5% of the total reader capacity installed but no less than two (2) spare reader ports.

7. All ISC and panel hardware shall be installed in UL metal enclosures designed by the manufacturers for that purpose. Custom enclosures are not acceptable.

6.13. POWER SUPPLY/ENCLOSURES – ACCESS CONTROL SYSTEM

A. All ISCs and other boards part of the access control system shall be installed inside a metal enclosure with a power supply as recommended and designed by the manufacturer of the equipment.

B. The low voltage power supply shall convert a 115 VAC or 24 VAC 60 Hz input to a continuously supplied current of 12 VDC. The power supply shall be UL listed, fused protected and class 2 rated.

C. The power supply shall include a battery charger to provide backup power when main power goes down. If ISC has a battery charger and input built in, then the power supply does not need this feature.

D. Plug in transformers feeding a low voltage power supply feeding an access control panel are not allowed unless they are mounted inside another lockable enclosure. External multi-output individually fused protected outputs power supplies feeding all access control board are acceptable as long as they are located next to the access control panels.

E. Maintenance free batteries shall be provided with all power supplies or ISC and shall be mounted inside the same enclosure. Batteries shall be sized to allow at least 4 hours of power backup. All power supplies shall be monitored for low battery through the access control system.

F. All enclosures for ISCs, other electronic boards, power supplies or battery cabinets shall be UL listed NEMA 1 hinged cover enclosures when mounted indoors and in fully weatherproof NEMA 4X enclosures when located outdoors or in an exposed or covered area. All enclosure doors shall be key lockable, keyed alike, and shall include a tamper switch for monitoring by the security system. Any cabinet opening shall initiate an alarm condition to the security monitoring system.

G. Basis of design: Altronix, Life Safety Power supplies or Honeywell.

6.14. TAMPER SWITCH

A. All security enclosures, including power supplies and terminal cabinets shall include a tamper switch for direct supervision of the cabinet door. Any opening of these doors shall initiate an alarm condition to the security monitoring system. All tamper contacts shall be a reed actuated self-adjusting plunger style switch. If a tamper-contact is provided by the manufacturer with the enclosure this device may be used.

B. Tamper switches shall be wired as to report separate alarms to the system for each panel.

C. Basis of design: Amseco PSW-1, or built-in with access control system enclosure

6.15. CONTACTLESS SMART CARD READER

A. The standard smart card reader for use throughout sites shall be a switch plate style reader in low profile weatherized polycarbonate housing suitable for mounting in either an indoor or outdoor environment. The reader shall be constructed of a polycarbonate material sealed to a NEMA rating of 4X IP65. The reader shall contain an integral magnet for use with an external magnetic reed switch to provide tamper protection when connected to an external alarm. The reader shall be UL/C 294 listed and shall conform to FCC and ISO standards. The reader shall operate at a frequency of 125KHz, 13.56MHz and 2.4 Ghz. All RF data transmitted between this device and the smart card shall be encrypted for additional protection using a secure algorithm. The reader shall provide an audiovisual indication to signify access granted or access denied. This operation shall be displayed by a high intensity LED light bar which shall change from red, amber, or green based on the status of the operation. The housing shall mount on an industry standard single gang electrical junction box. It shall have a read range of 4.0 to 4.5 inches when used with a standard smart access card and 1.0 to 2.0 inches when used with a key tag.

B. The mullion style readers shall only be used where wall mounting is not possible (for example glass/aluminum store-front systems).

C. The smart card reader with keypad shall have a standard contactless smart card and shall have a twelve (12) key keypad. Communications between the readers and the ISC shall be through a OSDP interface.

D. The contactless Smart Card reader shall be compatible with the following credentials:

1. HID Seos, iClass SE, iClass SR, iClass, Mifare Classic, Mifare DESfire,
2. HID Proximity, Indala Proximity, AWID Proximity and EM Proximity
3. NFC devices (HID Monile Access).

E. Basis of design selection: HID **Signo**™ readers.

F. *NOTE TO DESIGNERS OR CONSULTANTS*: The designer or consultant for each project shall communicate with the Owner's Project Manager to establish what party in particular will be managing the building to determine what system needs to be specified, based on the existing systems above. No different systems than the ones mentioned above shall be installed in a new or renovated facility at Owner's facilities. The Owner can provide details about the latest version of the software used by each party.

6.16. CONTACTLESS SMART CARD

A. All credentials for Owner's projects shall be purchased by the Owner as they shall be part of the HID Corporate 1000 program with the Owner’s unique Facility Code.

6.17. LOCKING DEVICES

A. The Contractor shall coordinate with the door hardware installer on the placement of electronic locking hardware required for this project. The Contractor shall provide all necessary wire and cable, and the low voltage power supplies for door locks. The Contractor shall also be responsible for terminating all connections and interface this equipment with the integrated security system.

B. Locking electronic door hardware is not covered in this specification.

6.18. DOOR RELEASE BUTTONS (REQUEST TO EXIT SWITCH/BUTTON)

A. Where requested, a door release button shall be provided to function as a secondary method of door release on locked doors. The door release button shall have the following specifications:

B. Button type: Illuminated.

C. Button size: two inches square

D. Lettering: “Push to Exit”

E. Box size: Single gang

F. Contacts: Momentary DPDT or (1 SPST N/O and 1 SPST N/C) 5A @ 30 VDC

G. Built-in timer: Pneumatic timer, only required when used with electromagnetic locks.

H. Finish: Bright Chrome

I. Basis of design: RCI 991-PTD or equal.

J. For applications where the door release buttons will be located under a desk a rocker switch shall be used instead of the regular exit device. The design selection for the rocker switch is the RCI 909 surface mounted.

6.19. REQUEST TO EXIT EGRESS MOTION SENSOR

A. The egress sensors shall utilize passive infrared technology to detect the motion of individuals approaching a door. Upon activation this device shall release the lock and shunt the magnetic door position switch to allow unobstructed egress through the door. This device shall be field adjustable to fit the monitoring requirements of the location where installed.

B. All requests to exit motion sensors shall be provided with a trim plate for mounting the detector over a standard single gang junction box.

C. Basis of design: Honeywell IS-310 or an approved equal.

6.20. MAGNETIC DOOR POSITION SWITCH – DPS

A. The standard recessed door position switch shall be Interlogix 1078 series or approved equal. The contact and the magnet shall be hermetically sealed in a one piece, molded, flame retardant ABS plastic housing for maximum strength and durability. The contact and magnet shall snap-lock into a predrilled 3/4" or 1" diameter hole. Color of the housing shall be off white, gray, or mahogany, and shall be provided in the appropriate color to match the door and doorframe. The magnet shall be made of Alnico V.

B. The standard position switch for a roll up door shall be an Interlogix 2207AH high security contact or approved equal.

C. On banks of doors where multiple doors are being monitored, door contacts shall be wired in series. All double doors shall receive (1) magnetic door position switch on each door leaf and shall report as one alarm point.

D. On exterior doors with impact resistant listings, use only surface mounted door position switches in lieu of the standard recessed door position switches. The design selection is the Interlogix 1085T or approved equal.

6.21. SURGE PROTECTION

A. All security components mounted outside the building and wired through low voltage copper conductor back to the building shall be provided with surge and lighting protection. Provide UL listed multi-stage protection on all low voltage and signal transmission lines. All 120 VAC surge suppression devices shall be EDCO HSP121BT-1RU or an approved equal. For RS-485 or RS-422

connections provide PC642C-008LC with base PCB1B manufactured by EDCO or an approved equal.

B. For exposed Ethernet connections with PoE, use EDCO CAT6-E PoE or approved equal.

6.22. POWER SUPPLY – DOOR LOCKING HARDWARE AND SENSORS

A. Power supplies for door locks or powered sensors (i.e., request to exit motion sensors) shall be completely separate from power supplies for ISC or electronic hardware part of the card access system.

B. The power supply for door locks and powered sensors shall convert a 115 VAC 60 Hz input to a continuously supplied current of 12 or 24 VDC. The power supply shall be UL listed, NFPA compliant, and have multiple class 2 rated outputs. The power supply shall be housed in NEMA 1 hinged cover enclosures when mounted indoors and in fully weatherproof NEMA 4 enclosures when located outdoors or in an exposed or covered area. All enclosure doors shall be key lockable, keyed alike, and shall include a tamper switch for monitoring by the security system. Any cabinet opening shall initiate an alarm condition to the security monitoring system.

C. The power supply for door locks and powered sensors shall include a battery charger and a battery input to provide power to the locks after a main power system failure. The switchover to stand-by battery shall be automatic when main AC power fails.

D. Power supplies for regular locking hardware shall be installed next to access control panels.

E. Maintenance free batteries shall be provided with all power supplies. Batteries shall be sized to allow at least 4 hours of power backup. All power supplies shall be monitored for low battery through the access control system.

F. The power supply for door locks and powered sensors shall have the following features:

6.23. LOCAL ALARM

A. Local alarms shall be used as local notification devices for alarm conditions when required for the project. Not all doors in the project will require local alarms. It is mostly for delayed egress doors and unlocked doors that require security control.

B. The local alarm shall be a buzzer with strobe light that mounts in a double gang electrical box. The buzzer shall have an output capacity of 70 db @ 10 ft. from the source and. The strobe light shall radiate light at 75 cd.

C. The local alarm shall be white and shall have no lettering.

D. Basis of design: Gentex GEC3-12PWW or approved equal.

6.24. VEHICLE CARD READER, CAMERA, AND INTERCOM PEDESTAL

A. The stand shall include a fitted flange cover to conceal the mounting baseplate and associated fasteners required to secure this unit to the concrete platform. The enclosure shall be an aluminum design with a secure cover to prevent unauthorized access. This enclosure shall be weatherproof to protect electronics from environmental conditions. Dimensions and configuration of the pedestals shall be as indicated the design drawings. The custom pedestal shall be manufactured from 2-inch aluminum square tubing with a welded backplate and a square mounting baseplate with tapped holes.

6.25. EXTERIOR EQUIPMENT HOUSING

A. NEMA 4X rated stainless steel enclosures shall be provided to house electronic security equipment to all vehicle gates. The enclosure shall be constructed of 14 gauge stainless and shall have dimensions as required to hold electronics.

B. All enclosures shall be provided with a pad lock and a tamper switch for direct supervision. Any door opening shall initiate an alarm condition to the security monitoring system. All cores shall be keyed alike. A grounding package shall be provided for connection to a ground rod. A #8 solid copper ground wire shall be provided and installed from the ground lug to a grounding rod installed next to the enclosure.

C. All exterior enclosures shall include a compact air condition unit, if the equipment inside does not support the temperatures above 75 deg F. s. All air condition units shall be monitored for proper operation through relay contacts through the access control system.

D. Basis of design: nVent Watershed, Type 4X

6.26. WIRE & CABLE

A. Cables for un-powered security sensors shall have the following specification.

1. Minimum cable gauge: AWG 20
2. Number of conductors: 2, stranded conductors.
3. Conductor type: Bare copper
4. Cable insulation: Color coded PVC
5. Conductor insulation colors: Black and red.
6. Voltage rating: 300V
7. Cable shield: No cable shields

B. Cables for powered security sensors shall have the following specifications:

1. Minimum cable gauge: AWG 20

2. Number of conductors: 4, stranded conductors
3. Conductor type: Bare copper
4. Cable insulation: Color coded PVC
5. Voltage rating: 300V
6. Cable shield: No cable shields

C. Cables for access control readers shall have the following specifications.

1. Minimum cable gauge: AWG 22
2. Number of conductors: 6, stranded conductors
3. Conductor type: Tinned copper
4. Cable insulation: Color coded PVC
5. Voltage rating: 300V
6. Cable shield: Aluminum/polyester foil (overall) with a AWG 24 tinned copper drain wire

D. Cables for RS-232, RS-422 or RS-485 control lines shall have the following specifications.

1. Minimum cable gauge: AWG 24
2. Number of conductors: 2-paired, stranded conductors
3. Conductor type: Tinned copper
4. Cable insulation: Polyethylene
5. Voltage rating: 300V
6. Cable shield: Aluminum/polyester foil (overall), a tinned copper braid (90% coverage) and an AWG 24 tinned copper drain wire
7. Nominal characteristic impedance: 120 Ohms
8. Nominal capacitance: 12.8 pF/ft.
9. Nominal delay: 1.6 ns/ft
10. Nominal attenuation: 0.6 dB/100 ft @ 1 MHz.
11. Cables for door locks and low voltage power supplies shall have the following specifications..
12. Minimum cable gauge: AWG 18
13. Number of conductors: 2, stranded conductors
14. Conductor type: Bare copper

15. Cable insulation: PVC
16. Conductor insulation colors: Black and red.
17. Voltage rating: 300V
18. Cable shield: No cable shields
19. All UTP Category horizontal cables and fiber optic cables for the security system shall be in compliance of all requirements in specification section division 27 issued by Pinellas County BTS.
20. Cable gauge: All cable gauges shall be estimated as to allow a maximum of 5% voltage drop from the source to the load. Sizes given previously are only minimum gauges accepted. The Contractor shall always estimate proper values.
21. Cable jackets: All cable jackets shall be suitable for the environment in which the cables will be installed. Use plenum-rated cables when cables are installed in plenum spaces. Use riser-rated cables when cables are installed through floor sleeves. Use cable jackets with water-blocking material when installed in underground conduits. All spaces above ceilings in this project shall be treated as plenum spaces. All cables with an NEC type TC shall be run fully in conduit from the panel to the device and shall be separated from other communication or Class 2 rated cables.
22. Cable jackets for this project: Except when cables are run continuously in conduit all cable jackets for access control cables shall be plenum rated.
23. All cables shall be RoHS compliant and free of VOC. The contractor shall provide proof of compliance for all cables during the submittal process.
24. Acceptable manufacturers: Belden, Alpha Wire Company, General Cable and West Penn Wire.

6.27. IDENTIFICATION AND LABELING TAGS

A. The Contractor shall follow labeling materials indicated in the attached specification section Division 27 from Pinellas County BTS. ATTACHMENT A

6.28. EXECUTION

A. SOFTWARE PROGRAMMING.

1. All basic software programming such as adding modules, IP address for new ISC, reader names, input/output definition, and logic shall be done by the contractor and Owner. This will be defined on a project-by-project basis.
2. All programming associated with access rights or cardholder information will be done by the owner.

6.29. INSTALLATION PRACTICES

A. The Contractor shall follow all installation practices indicated in the attached specification Division 27, including adhering to the current American Disabilities Act (ADA) and all current Occupational Safety and Health Administration (OSHA).

B. Access control panels and multi-output power supplies shall be installed so as to have in any cluster of panels no less than two spare ports (reader ports for access control) available per cluster of panels.

C. All power supplies shall be monitored for AC failure. When the power supply provides a form c relay with low battery signaling, this contact shall also be monitored. All AC fail, and battery low alarms shall be monitored through individual alarm inputs. Series connections of multiple alarm points shall not be allowed.

D. As requested by the Owner, buzzers inside card readers shall be wired to function to alert users of different door statuses like (door held open alarm and door-forced open alarm).

E. As requested by the Owner, local alarms shall be wired with separate wires for the buzzer and for the strobe, so that the user can select independent use of the strobe and buzzer.

6.30. WIRING METHODS

A. All proposed wires and cables shall meet or exceed the recommendations established by the equipment manufacturers and shall comply with all state and local codes.

B. Visually inspect all wires and cables for faulty insulation prior to installation. Protect cable ends at all times with acceptable end caps.

C. Provide grommets and strain relief materials where necessary to avoid abrasion and excess tension on wire and cable.

D. All termination of UTP Category type multi pair cables shall be done in Insulation Displacement Connectors (IDC), modular plugs or connectors. The use of wire nuts or manually twisting cables and protecting them with electrical tape are not acceptable means of termination.

E. All cable with gauges larger or equal to AWG-18 and all types of stranded conductors shall be terminated on termination blocks part of an active equipment or in termination blocks supplied by the Contractor. The use of wire nuts or manually twisting cables and protecting them with electrical tape are not acceptable means of termination.

F. All termination blocks shall always be mounted inside a security enclosure, with a hinged cover and lock. Up to 2 conductors can be terminated in the same point in a termination block as long as the combined diameter of the conductors does not exceed the maximum cable diameter allowed by the termination block. No more than 2 conductors shall be terminated in the same point at a termination block regardless of the cable gauges.

G. Termination blocks shall be used for wire terminations next to access control panels or for termination above the security doors. Termination blocks are not required for connection to security devices at the door side.

H. When equipment supplied has wire leads instead of termination end points for connections, the only acceptable methods of connection to field wiring are insulated butt splices, quick release connectors (both ends provided) or quick lock self-stripping pig tail connectors. All connectors or splices shall be selected according to the gauge of the cable to be terminated.

I. All penetrations through fire rated barriers shall be provided, by the contractor, with appropriate fire stopping materials in accordance with NFPA requirements and local fire authority having jurisdiction.

J. All cable runs shall be continuous from the device to the equipment. Cable splices shall not be allowed inside conduits, or cable trays.

K. Cables of similar signal level shall be bundled together and kept physically separate from power cords, plug strips or other circuits with different potential. Exposed wire bundles or individual cables shall be neatly secured with self-clinching nylon "TY-Raps" (Thomas & Betts or equal).

L. All cables run part of the security system in areas where the ceiling is not accessible or on building exterior shall be in conduit at all times.

M. Components of the distribution system shall be installed in a neat, workmanlike manner consistent with all best practices.

N. Wiring color codes shall be strictly observed, and terminations shall be uniform throughout the building.

O. Finger duct wire managers shall be used inside all equipment panels to properly dress cables.

6.31. IDENTIFICATION AND TAGGING

A. All cables, wires, wiring forms, terminal blocks, and terminals shall be clearly identified by pre-printed labels or tags. The permanent markings shall clearly indicate the function, source, and destination of all cabling, wire, and terminals. All cables shall be labeled at both ends of the cable with the same and unique identifier label.

B. Cable and equipment identifiers shall follow a standard labeling system like ANSI TIA-606. The identification system chosen by the Contractor shall be submitted for approval to the Architect and Engineer (A&E).

C. All access control panels, alarm panels, PLCs, or Intercom exchanges shall include a work sheet attached to the interior of the panel/ equipment in plastic envelops. This work sheet shall include the location, type of device and part number of all devices connected to the boards inside that equipment. All names used to identify devices in these worksheets shall match all

names and identifiers used in the software or the user interface of the system. A second copy of this worksheet shall be delivered to as part of the as-built information.

6.32. REQUEST OF IP ADRESSES

A. The Contractor shall comply with all requirements indicated in attached specification section Division 27 for requesting IP address for the security system.

6.33. SYSTEM WARRANTY AND SERVICE

A. New installations will have at a minimum, a twelve (12) month, on-site, parts and labor warranty. All repair parts and labor services shall be warranted for a minimum of thirty (30) days. Any unit, which has a subsequent failure within these time frames, shall be re-inspected and repaired at no charge to the Owner.

6.34. PINELLAS COUNTY ENGINEERING DEPARTMENT/OWNER'S FINAL ACCEPTANCE TEST

A. Upon request of new installations, the Contractor will facilitate a Final Acceptance Test for any equipment or software modifications representing a significant change or addition to the system.

B. General: The Contractor shall follow all test requirements indicated in the attached specification section Division 27. Attachment A

C. Additional requirements for the system acceptance test:

1. The final acceptance test will be done with two groups of people. Each group will have at least one member of each stakeholder of the project (Contractor, Owner's Utilities Department, SCADA & Security, and facility Staff of where work was performed. One group will be stationed in the monitoring room and the other group will be going to all locations in the project where security equipment is installed.

2. During the final acceptance test, new or impacted devices in the security system will be tested for normal operation and for simulated alarm conditions at both ends (the field devices and in the monitoring room). When possible, security equipment will be tested for operation during main power failure. All features requested in this specification will be tested.

3. Testing of all structured cabling system part of the Security System shall be done in accordance with specification section Division 27 issued by Pinellas County BTS

6.35. SPARE PARTS

A. The Contractor shall coordinate with the Owner's representative if there is a need for spares for the system or not, and also agree on the number of spares.

B. All repair or replacement parts supplied shall be new Original Equipment Manufacturer (OEM) meeting OEM specifications. Upgrade of OEM equipment shall be evaluated at time of repair.

C. Current MSRP list price sheets shall be supplied via a DVD disk or hard copy by the Contractor at the start of the contract and at any time during the life of the contract if there is a manufacturer's price change for any spare associated with this contract.

D. User training:

1. User training shall be provided for security personnel interacting with the security system in areas different from the security monitoring rooms. The purpose of this training is to explain clearly how the field devices operate and what the different status indicators mean.
2. This training shall cover operation of devices and doors like:
3. Operation and indication of all types of readers in the project
4. Operation of all roll-up doors.
5. Operation of all vehicular gates.
6. Resetting alarms (local) for all door and detection device types.
7. This training shall be provided by personnel working directly for the Contractor.
8. Different training sessions shall be planned with the owner.
9. Each session could have up to 20 trainees.
10. The approved O&M manuals shall be available at the time of the training.

6.36. TRAINING AND INSTRUCTION

A. General: The Contractor shall follow all training requirements indicated in the attached specification section Division 27. ATTACHMENT A

B. Upon request, the Contractor shall provide up to 24 hours of training as explained in this section.

C. User training:

1. User training shall be provided for security personnel interacting with the security system in areas different from the security monitoring rooms. The purpose of this training is to explain clearly how the field devices operate and what the different status indicators mean.
2. This training shall cover operation of devices and doors like:
3. Operation and indication of all types of readers in the project
4. Operation of all roll-up doors.
5. Operation of all vehicular gates.

6. Resetting alarms (local) for all door and detection device types.
7. This training shall be provided by personnel working directly for the Contractor.
8. Different training sessions shall be planned with the Owner.
9. Each session could have up to 20 trainees.
10. The approved O&M manuals shall be available at the time of the training.

D. Administration and Maintenance Training. The training shall be limited to the following actions:

1. Indicate location of all power supplies and clusters of access control panels.
2. Location of all sensors and doors.
3. Troubleshooting and replacement of all field devices.

6.37. AS-BUILT DOCUMENTS AND CLOSEOUT INFORMATION

A. General: The Contractor shall follow all as built and closeout information requirements indicated in the attached specification section Division 27. ATTACHMENT A

B. Additional requirements for as-built documentation shall include:

1. Approved as-built drawings shall be a complete set of floor plan drawings, riser diagrams, and wiring details indicating the layout and interconnection of the system All cable routings and elevation of each outlet, tie, and riser cable terminations shall be required.
2. Each access control panel shall include information inside the panel with the readers and doors being services by each panel. The information shall include the port# in the panel, the name of the reader using the system, the type of locks installed at the door, and all the ports used.
3. Close-out information shall also include:
4. Testing reports for the structured cabling system used for the Security system.

6.38. CLOSED CIRCUIT TELEVISION/VIDEO SURVEILLANCE SYSTEM SCOPE OF WORK

Video Management System:

The proposed solution should describe the administration/management interface that will be used. Preference will be given to submittals that demonstrate systems that are easy to use, that have the option to integrate with Active Directory, have an HTML client, have the ability to record on alarm, supports video aging, and have the option to search by thumbnails. Additionally, the system must be able to do the following.

A. Provide multiple levels of administrators that will have varying roles in the system.

B. Provide email notification of critical system events.

C. Has the capability to store 36TB or more.

D. Has the capability to provide video monitors.

E. Has the capability to view live video and review historical video up to 1 month.

F. The scope of work shall include furnishing all labor, all security video cameras, mounts, housings, power supply systems, cabling, connectors, and head-end components, including all other hardware and software and documentation required to provide a completely operational and working Closed Circuit Television (CCTV) System.

G. All materials for the structured cabling system (4-pair UTP cables, fiber optic cables and 24-AWG multi-pair (25 pairs or higher) components required for the video surveillance system shall be in compliance with specification Section Division 27, as issued by Pinellas County BTS.

H. The following parts of the system are not included in this specification, these devices are owner procured. Nevertheless, the cost of these items shall be included in the project budget:

1. All networking equipment (switches, routers, etc.) for the operation of the system

2. All computers and software to run the security system.

6.39. EXISTING SYSTEMS

A. For all facilities managed by Owner's Utilities and Solid Waste departments, the video surveillance system is Lenel/Seneca LNVRs with a variety of Axis, Honeywell, Interlogix, and Bosch cameras.

B. NOTE TO DESIGNERS OR CONSULTANTS. The designer or consultant for each project shall communicate with the Owner's Project Manager to establish what party will be managing the building to determine what system needs to be specified, based on the existing systems above. No different systems than the ones mentioned above shall be installed in a new or renovated facility at Owner's facilities unless requested specifically by the Owner. The Owner can provide details about the latest version of the software used by each party.

6.40. CCTV INSTALLER QUALIFICATIONS

A. A. The Video Surveillance or CCTV installer (CI) selected for this project must be a direct representative of the products they intent to provide. All technicians assigned to install and configure this system shall be factory trained. This company must be of established reputation and experience, regularly engaged in the supply and support of such systems for a period of at least five consecutive years under the current company name.

B. Other required CI qualifications are:

1. The CI shall provide telephone and on-site technical and software support to the Owner as part of the services offered.
2. Owner's service calls may be requested on a 24 hour per, 7 days a week basis.
3. Emergency calls shall be responded to within four (4) hours and service initiated. Emergency status will be determined by the Owner's representative initiating the call.
4. The Contractor will respond to non-emergency but designated High-Priority calls within thirty-six (36) hours.
5. The CI shall have staff trained in programming the CCTV system as described in this specification. The CI shall submit as part of the qualifications required, the resume of the programmers for the CCTV system as well as the training certificates for this staff from the manufacturer of the system.

6.41. MATERIALS ALTERNATES AND SUBSTITUTION

A. Definitions:

1. Basis of design: A product or group of products from an identified manufacturer that was used as the basis of systems layouts and installation details, part of the contract documents.
2. Prototype: Is a product or a group of products that are not yet ready for commercial use because they are in the testing phase (Beta testing) of the product development.
3. Alternates: Products or manufacturers listed in the contract documents as acceptable compared to the basis of design. Use of alternates shall follow the same system architecture as the basis of design.
4. Obsolete: A product that has been discontinued by the manufacturer or declared in end of life, and it is no longer being manufactured.
5. Substitution: A product not listed in the contract documents but capable of similar characteristics as the basis of design operating as a direct replacement in the system in reference. The installers can propose a substitution if all requirements are met as indicated in this specification.
6. Substitutions that create a change in system architecture are products that create a very different system configuration impacting other trades (i.e., changes in power/cooling requirements, changes in raceways layout or sizes, changes in equipment space requirements, changes in low voltage wiring layouts, types, and quantities, etc.) but providing a similar end result as the system/products basis of design.

B. Use of Prototype. Prototypes are not allowed in any security system.

C. Use of alternates. Alternates are allowed and the installer shall follow these requirements:

1. Where several brand names make or manufacturers are listed as acceptable alternates each shall be regarded as equally acceptable, based on the design selection. Where a manufacturer's model number is listed, this model shall set the standard of quality and performance required. Where no brand name is specified, the source and quality shall be subject to Pinellas County Engineering Department's review and acceptance. Where three or more manufacturers are listed, one of the listed manufacturers shall be submitted for acceptance.

2. The use of alternate products does not allow the change of system architecture with such products.

3. Use of substitutions. Substitutions are only allowed when they meet all the requirements below:

4. The performance of all substituted components must meet or exceed those of the basis of design. Should an installer wish to submit a substitution product, or a product set stated in the construction documents as 'acceptable', it shall be the responsibility of the installer to submit to the Pinellas County Engineering Department an item-for-item CROSS-REFERENCE for all specifications of the product, all related specifications and product data sheets, for the proposed substitution. Use the substitution request form indicated in ATTACHMENT A of this specification.

5. The Pinellas County Engineering Department, the Owner, or BTS has the authority to reject a substitution without cause and the installer shall provide the basis of design and no additional compensation.

6. Substitutions of unnamed manufacturers will not be acceptable.

7. Certification of substitutions: When a basis of design is specified to be in accordance with a trade association or government standard requested by the Pinellas County Engineering Department, the installer shall provide a certificate that the substitution complies with the referenced standard. Upon request of the Pinellas County Engineering Department, Contractor shall submit supporting test data to substantiate compliance.

8. Substitutions that create a change in system architecture are not allowed.

6.42. SHOP DRAWINGS AND SUBMITTALS

A. For Owner's designated projects of significant scope, the Contractor shall follow all requirements for shop drawings indicated in specification section Division 27. ATTACHMENT A

B. The submittal process for this scope of work will be a two-stage process. The first stage is product/installer approval. Within 30 business days of receiving contract approval and notice to

proceed, the following items shall be submitted to the Architect and Engineer (A&E) of the project for review, as part of the product/installer approval process.

C. Proof of Installer qualifications, addressing all requirements of this specification, must be submitted with their proposal.

D. Product numbers, specifications, and datasheets for all equipment.

E. A complete explanation of the identification method to be used for all equipment and cabling parts of the CCTV system.

F. Detailed drawings of all custom products to be used in the project.

G. The second stage of the submittal process is the shop drawing process. Shop drawings shall only be submitted after all portions of the product/installer approval have been accepted by the A&E. The following information is required as part of the shop drawings:

H. Floor plans indicate all devices to be provided and all cable runs to all devices or junction boxes. All cameras shall indicate the camera number in the system and the type of camera and mounting.

I. Point-to-point wiring diagrams indicating all termination points for each conductor and for each device, cable types, and color coding of each termination. These diagrams shall be submitted for each camera type.

J. Storage calculation. The Contractor shall provide a spreadsheet with all the cameras in the project and the proposed recording frame rates, resolutions, retention period, activity percentages, and times of recording with the total number of storage bytes per camera and a total for the system. The total storage capacity shall be indicated in Terabytes.

K. Bandwidth calculation. The Contractor shall provide a network bandwidth calculation for the system. This calculation shall be presented in the form of a spreadsheet using MBPS as the units listing all cameras in the project. The spreadsheet shall have subtotals per network region associated with a storage area.

L. Fill out the network configuration template provided by Owner or Pinellas County BTS upon request, to explain all network devices to be used in a project and to get IP addresses from the network administrator.

M. Video recording server assignment. A list of all the video servers to be provided in the project with a list of all cameras assigned to each server. Each server shall have a total bit rate estimated for all the cameras recorded, showing that the capacity requirements of the server comply with the requirements in this specification.

N. Panel schedules in a table format, indicating all ports being used and what device is connected to each port. Panel schedules shall be submitted for all camera power supplies, multiport

encoder/decoders, computer monitor outputs, fiber optics distribution frames, Ethernet switches, patch panels, termination blocks, etc.

O. Overall system diagrams indicating all head-end components, their room location, and all configuration characteristics like IP addresses, serial ports used, etc.

6.43. SYSTEM DESCRIPTION

A. Any Cameras installed must be National Defense Authorization Act ("NDAA") compliant.

B. The CCTV system shall be a TCP/IP network-based, fully distributed digital video system. The CCTV system will utilize local area networks (LAN) as a transmission medium for video, configuration, as well as storage of all data. The CCTV system shall provide full video control at the management point indicated in the design drawings, with additional full selection capability at any point within the network from a computer workstation. The CCTV system shall provide unlimited expansion capability for the addition or modification of any video device or computer workstation.

C. The CCTV system shall permit normal and event monitoring of all secured areas on digital monitors as required or shown in the specifications and drawings. In all cases, the equipment shall be state-of-the-art, standardized commercial off-the-shelf, and modular. In all cases, the method of communication from remote locations within the network to the central components shall be transparent to the user. Equipment shall be selected and installed so repairs may be accomplished on-site by module replacement, utilizing spare components whenever possible.

D. this specification intends to provide the Owner with a distributed networked digital security system. Supplied by the Contractor, the CCTV system shall be complete and operational per the performance requirements and objectives of these specifications. The Contractor shall be responsible for the coordination of related work with other trades affecting his/her work or the work of others.

E. All cameras shall be connected and controlled through a CCTV workstation utilizing a standard mouse and keyboard.

6.44. PRODUCTS

A. Digital Video Management System.

1. The digital video management system shall be composed of off-the-shelf management servers, a storage system, and DVMS Software. There are multiple options for acceptable Storage solutions. The recommended storage solution for each project needs to be discussed with the Owner on a project-by-project case. Two examples of storage solutions are.

B. The recording system shall be based on a Storage Array Network (SAN) configuration. The storage system shall be composed of DVMSa management server, DVMS recording servers, storage arrays, and storage expansion units.

C. The recording system shall be based on a unified NVR composed of a complete server, storage array, storage drives, and expansion modules as required.

D. The DVMS recording servers shall process all video streams for recording, live viewing, and playback for the cameras assigned to that recorder. Servers shall be provided in quantities so as to not any single server being used at more than 75% of the maximum bit rate capacity of the server. Quantities of servers indicated in the drawings are preliminary and the CI shall provide calculations to the A&E of the final quantity of servers to be provided.

6.45. CCTV WORKSTATION

A. All new workstations to view the CCTV system will be Owner-provided but paid for by the project.

6.46. PTZ IP CAMERA

A. The PTZ IP camera dome system shall include a built-in 1000 Base-TX network interface or better for live streaming to a standard Web browser.

B. The PTZ IP dome camera dome system shall operate in an IP video system environment specified for this project and shall be controllable from that platform, as well as open architecture connectivity for third-party software recording solutions. The PTZ IP dome camera shall be an ONVIF compliant camera.

C. The video imager of the PTZ IP camera meet or exceed the following design and performance specifications:

1. Imager type: Progressive scan CMOS
2. Maximum Resolution: As indicated in the design drawings.
3. Frame rate: up to 50/60 frames per second @ maximum resolution.
4. Video compression: H.264 (MPEG-4 Part 10/AVC) Baseline, Main and High Profiles, H.265 (MPEG-H Part 2/HEVC) Main Profile or Motion JPEG.
5. Video streams: Multiple, individually configurable streams in H.264, H.265 and motion JPEG.
6. Minimum illumination: Color: 0.15 lux at 50 IRE, F1.6 B/W: 0.003 lux at 50 IRE, F1.6
7. Gain control: automatic
8. Audio (when required by Owner): Two-way, full duplex audio with a 24-bit LPCM compression system.D. The lens of the PTZ IP camera meet or exceed the following design and performance specifications:

D. Focus: Automatic

E. Iris: auto-iris

F. Zoom: Optical zoom 40X, 32X or 30X and digital zoon of X12.

G. The dome drive for the PTZ IP camera system shall meet or exceed the following design and performance specifications:

1. Pan capabilities: 360° endless
2. Tilt capabilities: 180° with auto-flip capabilities
3. Pan/Tilt Speed: Variable between 450° per second continuous pan to 0.05° per second

H. Additional PTZ drive features:

1. Preset positions: >100 positions.
2. Proportional Pan/Tilt Speed: Speed decreases in proportion to the increasing depth of zoom.
3. Tour recording (max 10, 16 minutes each)
4. Guard tour: max 100

6.47. PTZ IP CAMERA NETWORK SECURITY FEATURES/PROCESSING ABILITIES:

A. Security features:

1. Password protection
2. IP address filtering
3. HTTPS encryption
4. IEEE 802.1x (EAP-TLS) network access control
5. Digest authentication
6. User access log
7. Centralized certificate management
8. Brute force delay protection

B. Supported protocols: IPv4, IPv6 USGv6, HTTP, HTTPSa, SSL/TLSa, QoS Layer 3 DiffServ, FTP, SFTP, CIFS/SMB, SMTP, Bonjour, UPnP®, SNMP v1/v2c/v3 (MIB-II), DNS, DynDNS, NTP, RTSP, RTP, SRTP, TCP, UDP, IGMP, RTCP, ICMP, DHCP, ARP, SOCKS, SSH, NTCIP, LLDP, MQTT,

6.48. DESIGN SELECTION:

A. The Contractor shall select a camera that complies with the performance requirements indicated above from the approved manufacturer's list.

6.49. FIXED IP DOME/BULLET CAMERA

A. The fixed IP camera for this project shall be an integrated camera and dome or bullet.

B. The fixed IP camera shall include a built-in 1000 Base-TX network interface or better for live streaming to a standard Web browser.

6.50. FIXED IP DOME/BULLETCAMERA SHALL MEET OR EXCEED THE FOLLOWING DESIGN/PERFORMANCE SPECIFICATIONS

A. Image sensor type: Progressive scan RGB CMOS

B. Maximum imager resolution: As indicated in design drawings.

C. Frame rate: 30 fps at the maximum resolution possible in the camera.

D. Video streaming: Multiple, individually configurable streams in H.264 and H.265

E. Video compression: H.264 (MPEG-4 Part 10/AVC) Baseline, Main and High Profiles and H.265 (MPEG-H Part 2/HEVC) Main Profile.

F. Lens: Varifocal with an ability to provide a horizontal field of view from 50° to 90°

G. Focus/zoon (back focus): Manual

H. Minimum illumination: 0.12 lux at 50 IRE

I. Camera adjustment: manual pan adjustment 360° and tilt adjustment 80°

J. Audio (When required by Owner): Two-way, full duplex audio with a 24-bit LPCM compression system.

K. Audio input/output (when required by Owner) t: Input for external microphone or line-level device, Line output with automatic gain control.

L. Network security: Password protection, IP address filtering, IEEE 802.1X (EAP-TLS) network access control, TTPSa encryption, digest authentication, user access log, centralized certificate management, brute force delay protection, signed firmware.

M. Supported protocols: IPv4, IPv6 USGv6, HTTP, HTTPS, SSL/TLSa, QoS Layer 3 DiffServ, FTP, SFTP, CIFS/SMB, SMTP, Bonjour, UPnPTM, SNMP v1/v2c/v3 (MIB-II), DNS, DynDNS, NTP, RTSP, RTP, SFTP, TCP, UDP, IGMP, RTCP, ICMP, DHCP, ARP, SOCKS, SSH, SIP, LLDP, MQTT.

N. Analytics: included when required by the owner

6.51. INCLUDED ANALYTICS:

A. Video motion detection.

B. Tripp line alarms

C. Loitering behavior.

D. Audio detection

E. Casing: Polycarbonate impact resistant (IK10 rated) and weather resistant IP52 (rated).

F. Lower dome: clear.

G. Power connection: PoE IEEE 802.3af/802.3at Type 1

H. IR illumination: as requested by the Owner.

I. Local storage: not required.

J. Operating temperature: 0° C to 50° C (32° F to 122°F)

K. Operating humidity: 10–95% RH (non-condensing)

6.52. PANORAMIC MULTI-IMAGER FIXED IP DOME CAMERA

A. The panoramic multi-imager fixed IP dome camera for this project shall be an integrated camera and dome.

B. The panoramic multi-imager fixed IP dome camera shall include only one built-in 1000 Base-TX or better network interface for live streaming to a standard Web browser.

C. The panoramic multi-imager fixed IP dome camera shall operate in an IP video system environment specified for this project and shall be controllable from that platform, as well as open architecture connectivity for third-party software recording solutions.

D. The panoramic multi-imager fixed IP dome camera shall meet or exceed the following design and performance specifications:

1. Image sensor type: Three (3) or four (4) Progressive scan RGB CMOS

2. Maximum imager resolution: As indicated in design drawings but no less than 3 MP per imager.

3. Frame rate: 30 fps at all resolutions.

4. Video streaming: Multiple, individually configurable streams in H.264 and H2.265

5. Video compression: H.264 (MPEG-4 Part 10/AVC) Baseline, Main and High Profiles, and H.265 (MPEG-H Part 2).

6. Lens: Fixed focus or varifocal with the ability to provide 180° or 360° field of view, as indicated in the design drawings, with all the imagers.
7. Minimum illumination: 0.3 lux at 50 IRE
8. Audio: Two-way (when required by Owner), full duplex audio with a 24-bit LPCM compression system.
9. Audio input/output (when required by Owner): Input for external microphone or line-level device, Line output with automatic gain control.
10. Network security: Password protection, IP address filtering, IEEE 802.1X (EAP-TLS) network access control HTTPSa encryption, digest authentication, user access log, centralized certificate management, brute force delay protection, signed firmware.
11. IP address: One IP address for all imagers.

E. Analytics: included when required by the owner.

1. Video motion detection
2. Tripp line alarms
3. Loitering behavior

6.53. CASING

A. Polycarbonate impact resistant (IK9 rated or higher) and weather resistant IP66 (rated).

B. Lower dome: clear.

C. Power connection: PoE IEEE 802.3af/802.3at Type 1

D. IR illumination: when required by the Owner

E. Local storage: not required.

F. Operating temperature: 0 °C to 50 °C (32 °F to 122 °F)

G. Operating humidity: 10–95% RH (non-condensing)

6.54. DESIGN SELECTION

A. The panoramic single imager fixed IP dome camera for this project shall be an integrated camera and dome.

B. The panoramic single imager fixed IP dome camera shall include only one built-in 1000 Base-TX or better network interface for live streaming to a standard Web browser.

C. The panoramic single imager fixed IP dome camera shall operate in an IP video system environment specified for this project and shall be controllable from that platform, as well as open architecture connectivity for third-party software recording solutions.

D. The panoramic single imager fixed IP dome camera shall meet or exceed the following design and performance specifications:

E. Image sensor type: One (1) Progressive scan RGB CMOS

F. Maximum imager resolution: 12 MP or better

G. Frame rate: 30 fps at all resolutions.

H. Video streaming: Multiple, individually configurable streams in H.264 and Motion JPEG

I. Video compression: H.264 (MPEG-4 Part 10/AVC) Baseline, Main and High Profiles and Motion JPEG.

J. Lens: Fixed focus, fixed iris with the ability to provide 180° in the vertical and horizontal directions.

K. Minimum illumination: 0.19 lux at 50 IRE

L. Audio (when required by Owner): Two-way, full duplex audio with a 24-bit LPCM compression system.

M. Audio input/output (when required by Owner): Input for external microphone or line-level device, Line output with automatic gain control.

N. Network security: Password protection, IP address filtering, IEEE 802.1X (EAP-TLS) network access control a, HTTPSa encryption, digest authentication, user access log, centralized certificate management, brute force delay protection, signed firmware.

O. IP address: One IP address for all imagers.

P. Supported protocols: IPv4, IPv6 USGv6, HTTP, HTTPS, SSL/TLSa, QoS Layer 3 DiffServ, FTP, SFTP, CIFS/SMB, SMTP, Bonjour, UPnPTM, SNMP v1/v2c/v3 (MIB-II), DNS, DynDNS, NTP, RTSP, RTP, SFTP, TCP, UDP, IGMP, RTCP, ICMP, DHCP, ARP, SOCKS, SSH, SIP, LLDP, MQTT.

Q. Analytics: when required by Owner

R. Included Analytics

1. Video motion detection
2. Tripp line alarms
3. Loitering behavior

S. Casing: Polycarbonate impact resistant (IK10 rated) and weather resistant IP66 (rated).

T. Lower dome: clear.

U. Power connection: PoE IEEE 802.3af/802.3at Type 1

V. IR illumination: when required by owner.

W. Local storage: not required.

X. Operating temperature: 0 °C to 50 °C (32 °F to 122 °F)

Y. Operating humidity: 10–95% RH (non-condensing)

Z. The DVMS used in the project shall have the de-warping software required to make the video image more usable.

6.55. CAMERA MOUNTS AND ADAPTERS

A. All cameras shall be provided with the mounts and adapters as indicated in the floor types and mounting types indicated in part 3 of this specification. Each camera type indicated in the floor plans shall be matches to one camera type. Examples of mount and adapters include wall mount, trim rings, corner mounts, pole mounts, suspended pole mounts, etc.

B. The CI shall choose the mounts based on the equipment being supported. All mounts shall be made by the same manufacturer of the cameras. Custom made mount are not acceptable, unless approved by the A&E.

6.56. FIBER OPTIC TRANSCEIVERS

A. When wiring for cameras exceed 300 ft of wiring distance and or on a site, one of the solutions is the use of Fiber optic transceivers.

B. Fiber optic transceivers shall be available for single mode and multimode fiber optic cable.

C. Field mounted transceivers shall be single port (RJ-45) and shall be capable of being installed inside a 12" x 12" junction box. The field mounted transceiver shall be the Comnet CNFE100 series or approved equal.

D. Where installed in a rack, provide a rack mount chassis with transceivers designed to mount in the chassis. The chassis shall include a 120 VAC power supply. If the quantity of rack mount transceivers required in an IDF is greater than 3, then a redundant 120 VAC power supply shall be provided. The three-transceiver card cage shall be the Comnet C3 or approved equal. The card cage designed to house more than three transceivers shall be the Comnet C2 or approved equal.

E. Other solutions, different than fiber optics transceiver, for long reaching devices can be discussed with Owner and request specific approval.

6.57. OUTDOOR CCTV CAMERA POWER SUPPLY

A. All cameras in exterior environments connected to the system through fiber optics and installed far away from a telecommunications room shall be powered through a local outdoor CCTV camera power supply.

B. The outdoor CCTV camera power supply shall allow for a variety of configurations for powering up to four outdoor units from a single power source and shall allow for 24 VAC output for 1-4 units. The power supply shall allow the capability to handle pan/tilt, heater, and blower operation in addition to the camera; shall allow for one fused output; and be capable of handling up to 4 A (100 VA).

C. The outdoor power supply shall meet or exceed the following design and performance specifications.

1. Input Voltage 100/120/240 VAC, 50/60 Hz
2. Output Voltage 4/26/28 VAC
3. Required Input Current: 1 A
4. Output Fuse/Circuit Breaker Ratings 4 A
5. Input Connectors: Screw-type barrier strips
6. Output Connectors: Screw-type barrier strips.
7. Input Wire Size: 12-16 gauge solid wire
8. Output Wire Size 16-20 gauge solid or stranded wire
9. Environment: Outdoor
10. Operating Temperature: -50° to 122°F (-46° to 50°C)
11. Construction: Aluminum
12. Finish: Gray polyester powder coat
13. Cable Entry: Hole plugs for 0.75-inch (1.9 cm) conduit
14. Latch: Stainless steel link-lock latch; can be secured with a padlock.
15. Certifications: UL
16. Surge suppression must be provided subject to any hazardous environment.

6.58. DESIGN SELECTION

Pelco WCS1-4 or equal

6.59. SURGE PROTECTION

A. All CCTV components mounted outside the building shall be provided with surge and lightning protection. Provide UL listed multi-stage protection on all low voltage and signal transmission lines. All 120 VAC surge suppression devices shall be EDCO HSP121BT-1RU or an approved equal.

B. For exposed Ethernet connections with PoE, use EDCO CAT6-E PoE or approved equal.

6.60. WIRE & CABLE

A. Cables for camera power supply shall have the following specifications:

1. Minimum cable gauge: AWG 18
2. Number of conductors: 2, stranded conductors
3. Conductor type: Bare copper
4. Cable insulation: PVC
5. Conductor insulation colors: Black and red.
6. Voltage rating: 300V
7. Cable shield: No cable shields
8. HDMI or DVI cables shall be factory made and tested cables. For all DVI connections use an HDMI cable with HDMI to DVI adapters. All HDMI cables shall be capable of passing a signal at 340 MHz.
9. All UTP Category horizontal cables and fiber optic cables for the CCTV system shall be in compliance of all requirements in specification section 271000 issued by Pinellas County BTS and shall be under the same warranty as all UTP category cables and fiber optic cables described in specification section Division 27.
10. Cable gauge: All cable gauges shall be estimated as to allow a maximum of 5% voltage drop from the source to the load. Sizes given previously are only minimum gauges accepted. The Installer shall always estimate proper values.
11. Cable jackets: All cable jackets shall be suitable for the environment on which the cables will be installed. Use plenum rated cables when cables are installed in plenum spaces. Use riser rated cables when cables are installed through floor sleeves. Use cable jackets with water-blocking material when installed in underground conduits.
12. Cable jackets for this project: Except when cables are run continuously in conduit all cable or patch cord cables; jackets for CCTV cables shall be plenum rated.
13. All cables shall be RoHS compliant and free of VOC. The contractor shall provide proof of compliance for all cables during the submittal process.
14. Acceptable manufacturers: Belden, Alpha Wire Company, General Cable, and West Penn Wire.

6.61. IDENTIFICATION AND LABELING TAGS

A. The Contractor shall follow labeling materials indicated in the attached specification section Division 27.

6.62. EXECUTION

A. CAMERA MOUNTING TYPES

B. GENERAL. Cameras in the project can have different mounting types depending on how they will be installed. This is regardless of if the cameras are PTZ, fixed or panoramic. The mounting type definitions are all the same regardless of the imager type. The CI shall select the correct accessories for mounting the cameras according to the types indicated in the floor plan drawings.

C. **TYPE 1:** Ceiling recessed or semi-recessed application. This type of mount is for interiors, mostly in accessible ceiling spaces although it can be used in hard ceilings. Required accessories for this camera type:

D. Dome backbox to protect the electronics above the ceiling, allowing for flex conduit connections and the use of secondary support string if required.

E. **TYPE 2**: Surface mounted vertical mount. This type of mount is for interior or exterior applications, wall mounted. Required accessories for this camera type:

F. Adapter plate (if required) to mount directly into an electrical box.

G. For exterior applications, weatherproofing is required between the wall and the camera.

H. For exterior applications, the lower dome shall have a hood with the ability to provide a 180-degree protection at the top of the lower dome to prevent the camera from direct sunlight and water stains.

I. For installation directly in concrete walls, columns or other structures where recessing a box is not possible, a backbox is required to provide conduit knockouts or fittings behind the camera.

J. **TYPE 3**: Wall mounted. This type of mount is for interior or exterior applications, wall mounted. Required accessories for this camera type:

K. Wall mount.

L. Only for fixed cameras: Adapter plate (if required) to mount directly into an electrical box.

M. Housing accessories required to attach the camera to the wall mount.

N. When this camera type is indicated in a building corner, a corner mount adapter shall be provided as well.

O. **TYPE 4:** Surface mounted horizontal mount. This type of mount is for interior or exterior applications, in hard ceiling conditions. Required accessories for this camera type:

P. Adapter plate (if required) to mount directly into an electrical box.

Q. Rings or collars to protect the top part of the dome (if required).

R. For installation directly on concrete/steel decks, a camera base with conduit knockouts or conduit fittings is required.

S. **TYPE 5**: Suspended installation. This type of mount is for interior or exterior applications, suspended from ceiling or slab above. Required accessories for this camera type:

T. Pole mount adapter for housing.

U. Pole extension. This could be a section of steel pipe cut and threaded as required for the pole mount adapter.

V. Pole base: this is the device that attaches the pole to the structure above.

W. For installation directly on concrete/steel decks, a base with conduit knockouts or connections is required above the pole extension.

X. **TYPE 7**: Pole mounted. This type of mount is for exterior applications on a pole. Required accessories for this camera type:

Y. Wall mount.

Z. Pole mount adapter.

AA. Housing accessories required to attach the camera to the wall mount.

6.63. WIRING METHODS

1. All proposed wire and cable shall meet or exceed the recommendations established by the equipment manufacturers and shall comply with all state and local codes.
2. Visually inspect all wire and cable for faulty insulation prior to installation. Protect cable ends at all times with acceptable end caps.
3. Provide grommets and strain relief materials where necessary to avoid abrasion and excess tension on wire and cable.
4. All penetrations through fire rated barriers shall be provided, by the CI, with appropriate fire stopping materials in accordance with NFPA requirements and local fire authority having jurisdiction.
5. All cable runs shall be continuous from the device to the equipment. Cable splices shall not be allowed inside conduits, or cable trays.
6. All cameras shall have a camera interface box with disconnect means to horizontal cabling for testing purposes and service. Camera interface boxes shall be located in accessible ceiling spaces as close as possible to the camera. Disconnect means shall be provided for UTP cables in the form of an 8-pin modular plug and receptacle. Disconnect means shall be provide for low voltage camera power cables in the form of insulated spade connectors (female connectors in load side, male connectors in camera side).

7. All video cable connectors and terminations shall be 3-way crimp-on type and shall including connector cables for 24 VAC input and video/data coax output. Twist on style connectors will not be acceptable for any terminations on this project.

8. Cables of similar signal level shall be bundled together and kept physically separate from power cords, plug strips or other circuits with different potential. Exposed wire bundles or individual cables shall be neatly secured with self-clinching nylon "TY Raps" (Thomas & Betts or equal). Lacing of cables shall not be permitted.

9. All cables run part of the CCTV system in areas where ceiling is not accessible or in building exterior shall be always in conduit.

10. All termination of UTP Category type multi pair cables shall be done in Insulation Displacement Connectors (IDC), modular plugs or connectors. The use of wire nuts or manually twisting cables and protecting them with electrical tape are not acceptable means of termination.

11. Components of the distribution system shall be installed in a neat, workmanlike manner consistent with all best practices.

12. Wiring color codes shall be strictly observed, and terminations shall be uniform throughout the building.

6.64. IDENTIFICATION AND TAGGING

1. All cables, wires, wiring forms, terminal blocks, and terminals shall be clearly identified by pre-printed labels or tags. The permanent markings shall clearly indicate the function, source, and destination of all cabling, wire, and terminals. All cables shall be labeled at both ends of the cable with the same and unique identifier label.

2. Cable and equipment identifiers shall follow a standard labeling system like ANSI TIA-606. The identification system chosen by the CI shall be submitted for approval to the A&E.

3. All camera power supplies, patch panels shall include a work sheet attached to the interior of the equipment cabinet in plastic envelops. This work sheet shall include the location, type of device and part number of all devices connected to the boards inside those cabinets. All names used to identify devices in these worksheets shall match all names and identifiers used in the software or the user interface of the system. A second copy of this worksheet shall be delivered to as part of the as-built information.

6.65. CCTV SYSTEM PROGRAMMING

1. IP Video Management System (IPVMS) programming: The programming responsibility shall be coordinated between Owner and CI on a project-by-project basis.

2. The Contractor shall engage with the system managers for each of the groups at the Owner and determine the precise recording rates and resolutions for each project.

6.66. INSTALLATION PRACTICES

1. General: The Contractor shall follow all installation practices indicated in the attached specification section Division 27 ATTACHMENT A

6.67. INSTALLER RESPONSIBILITIES

A. Upon project commencement, the Contractor shall provide qualified technical personnel on-site. Personnel shall be present on each consecutive working day until the system is fully functional and ready to begin the testing phase of this project.

B. During the installation process the Contractor shall maintain an up-to-date set of as-built shop drawings, which shall always be available for review by the client and/or consulting engineers. This set of documents should be clearly annotated with as-built data as the work is performed. These documents will be reviewed as part of the approval process when evaluating payment request applications.

C. At a minimum, the drawings should contain the following information:

1. Quantity and location of all equipment installed.

2. Cable and wire run along with the designation's tags assigned to each.

3. Wiring diagrams that indicate terminal strip layout, identification, and terminations.

D. The Contractor Project Manager shall maintain continuous coordination with the consulting engineers. The consulting engineers shall be kept informed of the progress and all conflicts that arise during the course of this project. Prior to the start of construction, the Contractor shall submit a complete plan and schedule for proposed operations. This schedule should include information relevant to number of employees assigned to the project, work hours, etc.

6.68. ADDITIONAL INSTALLER RESPONSIBILITIES

A. Upon project commencement, the Contractor shall provide qualified technical personnel on-site. During the installation process of a new system the Contractor shall maintain an up-to-date set of as-built shop drawings, which shall always be available for review by the client and/or consulting engineers. This set of documents should be clearly annotated with as-built data as the work is performed. These documents will be reviewed as part of the approval process when evaluating payment request applications. At a minimum, the drawings should contain the following information:

1. Quantity and location of all equipment installed.

2. Cable and wire that runs along with the designation's tags assigned to each.

3. Wiring diagrams that indicate terminal strip layout, identification, and terminations.

4. As-built drawings may be requested on an as needed basis.

B. The Contractor Project Manager shall maintain continuous coordination with the A&E. The A&E shall be kept informed of the progress and all conflicts that arise during the course of this project. Prior to the start of construction, the Contractor shall submit a complete plan and schedule for proposed operations. This schedule should include information relevant to number of employees assigned to the project, work hours, etc.

6.69. REQUEST OF IP ADRESSES

1. The Contractor shall comply with all requirements indicated in the specification section Division for requesting IP address for the video surveillance system.

6.70. SYSTEM WARRANTY AND SERVICE

1. General: The Contractor shall follow all warranty and service requirements indicated in the attached specification section Division 27. ATTACHMENT A

6.71. PINELLAS COUNTY ENGINEERING DEPARTMENT/OWNER'S FINAL ACCEPTANCE TEST

1. Upon request, the Contractor will facilitate a Final Acceptance Test for any new equipment or software installations or modifications representing a significant change or addition to the system.

2. General: The Contractor shall follow all test requirements indicated in the attached specification section Division 27. ATTACHMENT A

3. Additional requirements for the system acceptance test

   a. 1. The final acceptance test will be done with two or more groups of people. Each group will have at least one member of each stakeholder of the project (Contractor, PCU SCADA & Security, Facility Staff). One group will be station in the monitoring room the other groups will be going to all locations in the project where security equipment is installed.

   b. 2. During the final acceptance test, new or impacted devices in the system will be tested for normal operation. When possible, CCTV equipment will be tested for operation during main power failure. All features requested in this specification will be tested

4. Testing of all structured cabling system part of the Video Surveillance system shall be done in accordance of specification section Division 27 issued by Pinellas County BTS. ATTACHMENT A

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6.72. SPARE PARTS

1. The Contractor shall coordinate with the Owner if there is a need for spares for the system or not and agree on the quantity of spares.

6.73. TRAINING AND INSTRUCTION

1. General: The Contractor shall follow all training requirements indicated in the attached specification section Division.
2. Upon request, the Contractor shall provide up to 40 hours of training as explained in this section.

6.74. OPERATOR/ADMINISTRATION TRAINING

A. Operator/Administration training shall be provided for security and IT personnel interacting with the CCTV system in all security monitoring rooms. The purpose of this training is to explain clearly how the complete system operates and what the different status indicators mean.

B. This training shall cover at least the following topics:

1. Operation of the CCTV system software (all aspects).
2. Alarm response and alarm reset in the security monitoring room.
3. Data backup/restore and achieving.
4. File import/export.
5. Creating reports and print outs.
6. Creating users and password reset

C. This training shall be provided by personnel working directly for the CI or a direct employee of the manufacturer of the system

D. Each session could have up to 20 trainees. The approved O&M manuals shall be available at the time of the training.

6.75. MAINTENANCE TRAINING

A. Maintenance training shall be provided for maintenance and IT personnel. The purpose of this training is to explain how to troubleshoot and replace all field devices and hardware.

B. This training shall cover at least the following topics:

1. This training shall cover at least the following topics:
2. Installation of all cameras and their settings (jumpers, dip switches, etc.).
3. LNVR Configuration

4. Wire labeling system.
5. Software system installation and recover from system crashes.
6. Routine preventive maintenance procedures recommended by equipment manufacturers for all components of the system.

C. This training shall be provided by personnel working directly for the CI or a direct employee of the manufacturer of the system.

D. Each session could have up to 6 trainees.

E. The approved O&M manuals shall be available at the time of the training.

6.76. AS-BUILT DOCUMENTS AND CLOSE OUT INFORMATION

A. General: The Contractor shall follow all as built and close out information requirements indicated in the attached specification section Division 27. ATTACHMENT A

B. Additional requirements for as-built documentation shall include:

1. Approved as-built drawings shall be a complete set of floor plans drawings, riser diagrams, and wiring details indicating the layout and interconnection of the system. All cable routings and elevation of each outlet, tie, and riser cable terminations shall be required.
2. The content of the as-built information shall be no less than the content provided during the shop drawings and shall be modified as per changes done during construction.

C. Close out information shall also include:

1. Two (2) digital backups of all configuration files and databases part of the CCTV system not earlier than the day after the final acceptance test is approved. These backups shall include a list of all the file names used and a complete description of the system that each file name belong to. The media for these backups shall be a compatible media that can be read by the computer system running the specific software program.
2. Testing reports for structured cabling system used for the CCTV system.

6.77. RELATED DOCUMENTS

Supplemental: Refer to Attachments A, B, C, D, and E identified below for additional requirements, which are supplemented by this section.

Exhibit 4 - Pricing Proposal

Line	Description	Quantity	UOM	Unit Cost	Total
1	Labor Rate - Installation (all inclusive) 8:00 a.m. to 4:30 p.m., Monday through Friday	500	Hour	$95.00	$47,500.00
2	Labor Rate - Installation (all-inclusive after-hours) services will be from 4:31 p.m. to 7:59 a.m. Monday through Friday and on all weekends and Owner-recognized holidays.	100	Hour	$105.00	$10,500.00
3	Labor Rate – Repair (all inclusive) 8:00 a.m. to 4:30 p.m., Monday through Friday	500	Hour	$105.00	$52,500.00
4	Labor Rate - Repair (all-inclusive after-hours) services will be from 4:31 p.m. to 7:59 a.m. Monday through Friday and on all weekends and Owner-recognized	100	Hour	$105.00	$10,500.00
5	Labor Rate – Onsite Technical Support 8:00 a.m. to 4:30 p.m., Monday through Friday	120	Hour	$105.00	$12,600.00
6	Labor Rate - Onsite Technical Support (after-hours) services will be from 4:31 p.m. to 7:59 a.m. Monday through Friday and on all weekends and Owner-	30	Hour	$105.00	$3,150.00
7	Labor Rate – Telephone Technical Support 8:00 a.m. to 4:30 p.m., Monday through Friday	120	Hour	$75.00	$9,000.00
8	Labor Rate – Telephone Technical Support (after-hours) services will be from 4:31 p.m. to 7:59 a.m. Monday through Friday and on all weekends and Owner-recognized holidays.	30	Hour	$75.00	$2,250.00
9	Labor Rate – Onsite Training	60	Hour	$105.00	$6,300.00
10	Labor Rate – CAD Drawings	120	Hour	$105.00	$12,600.00
11	Labor - Unspecified – For Unforeseen Conditions ordered and authorized solely at the discretion of the	120	Hour	$105.00	$12,600.00
				Annual Total	**$179,500.00**
				Five-Year Total	**$897,500.00**

Line Item	Description	Annual Budget	Fixed % Discount off MSRP	Extended Total
12	Access Control Equipment and Parts from MSRP	$28,000.00	20%	$22,400.00
13	Video Surveillance Equipment and Parts from MSRP	$35,312.50	20%	$28,250.00
14	Unspecified (Parts) - For Unforseen Conditions ordered and authorized solely at the discretion of the Owner	$32,500.00	20%	$26,000.00
15	Contingency Amount (Service) - For Unforseen Conditions ordered and authorized solely at the discretion of the Owner	$20,000.00	-	$20,000.00

Annual Total	**$96,650.00**
5 Year Total	**$483,250.00**

Total Contract Total	**$1,380,750.00**

DIVISION 27

Technology Systems
Design and Installation Guidelines
for Architects and Engineers

Pinellas County
Business Technology Services

Published November 18, 2022

Table of Contents

SECTION 27 00 10 – TECHNOLOGY GENERAL PROVISIONS

PART 1 - GENERAL

1.1 PURPOSE OF THIS DOCUMENT

A. The purpose of this specification section is to provide Architects & Engineers (A&E) and Designers of low voltage infrastructure working in construction or renovation projects for Pinellas County Government the design requirements by Pinellas County Business Technology Services (BTS). This document will be a starting point for completing a set of construction documents but **SHALL NOT** be used unedited as a bid document.

1.2 GENERAL CONDITIONS AND DEFINITIONS

A. Scope: This specification section applies to all Division 27 specification sections. All systems under the specifications indicated above are referenced in this contract document as “technology systems”.

B. Drawings and Specifications: The words “Drawings” and “Specifications” as used in these specifications, refer to all contract drawings and specifications describing the scope of work of the technology system.

C. Project Owner: The word “Owner” as used in these specifications, refers to the Pinellas County Florida Board of County Commissioners (BCC).

D. BTS: Pinellas County Business Technology Services (BTS) is a department within Pinellas County Government responsible for managing and supporting technology systems located in buildings owned and/or operated by Pinellas County Government.

E. Installer and Contractor: The word “Installer” as used on the drawings and/or specifications without further description shall refer to the Installer of the system. The word “Contractor” as used on the drawings and/or specifications without further description shall refer to the General Contractor (or Construction Manager) holding the prime agreement with the Owner for the construction of the project. Pursuant to Florida Statutes 489.105, the “Contractor” shall be a person or entity qualified to perform work who is registered and licensed under the Florida Department of Business and Professional Regulation (DBPR), and in compliance with local laws or ordinances.

F. Provide and Install: The word, "Provide" as used on the drawings and/or specifications shall mean, furnish, install, mount, connect, test, complete, document, and make ready for operation. The word "Install" as used on the drawings or specifications shall mean, mount, connect, test, complete, and make ready for operation.

G. Engineer: The word “Engineer” as used on the drawings and/or specifications refers to the design Engineer of Record (EOR) of the project working for the Project Architect or the Owner. It does not refer to an Engineer working for the General Contractor, Construction Manager, or any of the Installers on the project.

H. Service Provider: A service provider is an organization that provides access to the internet (ISP), telephone (TSP), Television (TVSP), or other services for accessing, using, or participating in voice, data, and Television services. Service Providers may be organized in various forms, such as commercial or privately owned.

I. Types of sites: Ownership of the buildings where Pinellas County Government provides services or executes business, fall into three categories, as follows:

1. Owned Site: A location owned, operated, maintained, and designed by Pinellas County Government.
2. Leased Site: A location defined by a formal agreement between Pinellas County Government and the location Owner in which the location is designed, operated, and maintained by Pinellas County Government for a specific length of time.
3. Temporary Site: A location that is normally short-term for a specific event or emergency on County property or leased space.

J. Types of telecommunication rooms: Telecommunications rooms in buildings owned or leased by Pinellas County fall into one of the following categories:

1. Telecommunication Services Entrance Room (TSER): TSER refers to the Point of Presence (POP) for local service providers. Service personnel will troubleshoot their systems up to this point.
2. Main Distribution Frame (MDF): The MDF also referred to as the Equipment Room (ER) or Telecomm Room (TR), is the first point of technology systems management for any building. This room is often combined with the TSER to save space. This is the location where underground backbone cabling meets building riser cabling and distributes horizontal Uniform Twisted Pair (UTP) cabling. Rack-mounted, active equipment resides here, and wall space is used for individual system termination cabinets. This space can utilize up to 50 watts (w) per square foot (sq. ft.) and five kilowatts (kW) per cabinet or rack. This room requires emergency power.
3. Intermediate Distribution Frame (IDF): The IDF is the horizontal cabling distribution point for a building or a floor. It provides a coverage area with a radius of 295 ft. in all directions. This room is an extension of the campus or building network infrastructure to the MDF. In multi-floor buildings the MDF and IDFs should be stacked and located near the core of the building. This room can use up to 20w per sq. ft. and 5kW per cabinet or rack. This room requires emergency power.

4. Data Center (DC): The DC is used to house computer systems and associated components, such as technology and electronic data storage systems, application servers, redundant back-ups, contingency equipment, and special security systems. The Data Center generally includes redundant or back-up power, communications connections, environment controls, and can use as much as 100w per sq. ft. and 10kW per cabinet.
5. Network Operations Center (NOC): The NOC is designed as a centralized location for network monitoring and control to support systems including: environmental conditions, electrical consumption, security, life safety, or any system that touches the UTP infrastructure. This space often contains user workstations and a video presentation wall.

1.3 RESPONSIBILITY MATRIX

A. The set of construction documents for a project shall include a Responsibility Matrix for all low voltage systems. This matrix shall be created by the Project Engineer and developed in conjunction with all project stakeholders. The matrix shall consist of the design, procurement, and construction responsibility of all components of the technology systems. A responsibility matrix example is provided below. The information filled out in this matrix is a starting point for Engineers to complete and discuss for each project.

PROJECT NAME					
DESIGN AND CONSTRUCTION RESPONSIBILITIES					
ITEM	SYSTEM	SCOPE	DESIGN RESPONSIBILITY	PROCUREMENT RESPONSIBILITY	CONSTRUCTION RESPONSIBILITY
1.00	**VOICE AND DATA SYSTEM FOR ALL AREAS**				
1.01	RACEWAYS	Conduit, boxes, cable tray, etc.	A&E	G.C./C.M.	G.C./C.M.
1.02	INSIDE PREMISE WIRING	Structured cabling system	A&E	G.C./C.M.	G.C./C.M.
1.03	OUTSIDE PREMISE WIRING IN PRIVATE CAMPUS	Structured cabling system	A&E	G.C./C.M.	G.C./C.M.
1.04	OUTSIDE PREMISE WIRING FROM SERVICE PROVIDERS	Fiber and copper for services	OWNER/S.P.	OWNER/S.P.	OWNER/S.P.
1.05	PATCHING OF VOICE/DATA LINES	Patching at path panel and work areas	N.A.	N.A.	BTS
1.06	VOICE PHONE SWITCH	Equipment selection, sizing, equipment layout, RFP	BTS	ODP	BTS
1.07	ACTIVE ELECTRONICS (NETWORKING EQUIPMENT, SWITCHES, ROUTERS, SERVERS AND COMPUTERS)	Equipment selection, sizing, equipment layout, RFP	BTS	ODP	BTS
1.08	WIRELESS MODELING	Predictive modeling for Wi-Fi propagation	A&E	N.A.	N.A.
1.09	WIRELESS SURVEY	Wirless survey with spectrum analyzer and documentation	BTS	ODP	N.A.
1.10	WAPs ENCLOSURES	Mounts for WAPs	A&E	G.C./C.M.	G.C./C.M.
1.11	WAPs	Wireless access points, including installation labor, support materials	BTS	ODP	G.C./C.M.
2.00	**TELECOM ROOM OUTFIT**				
2.01	PLYWOOD AND WALL SLEEVES	Plywood and sleeves for cables	A&E	G.C./C.M.	G.C./C.M.
2.02	GROUNDING SYSTEM	Ground bar and ground bus	A&E	G.C./C.M.	G.C./C.M.
2.02	RACKS, WIRE MANAGERS AND LADDER TRAY	Racks and all passive elements	A&E	G.C./C.M.	G.C./C.M.
3.00	**CATV DISTRIBUTION (CABLE TV FOR ALL AREAS)**				
3.01	RACEWAYS	Conduit, boxes, cable tray, etc.	A&E	G.C./C.M.	G.C./C.M.
3.02	INSIDE PREMISE WIRING	Coaxial cable	A&E	G.C./C.M.	G.C./C.M.
3.03	DISTRIBUTION DEVICES	TAPS, amplifiers, splitter, DC	A&E	G.C./C.M.	G.C./C.M.
3.04	FLAT PANEL DISPLAYS FOR OFFICES	Displays not part of the system	A&E	ODP	G.C./C.M.
3.05	MOUNTS FOR TFLA PANEL DISPLAYS	Mounts for the displays	A&E	ODP	G.C./C.M.
4.00	**AV SYSTEMS/ PAGING**				
4.01	RACEWAYS	Conduit, boxes, cable tray, etc.	A&E	G.C./C.M.	G.C./C.M.
4.02	INSIDE PREMISE WIRING	AV wiring for systems	A&E	G.C./C.M.	G.C./C.M.
4.03	ACTIVE ELECTRONICS	Projectors, presentation control system, paging system, etc.	A&E	G.C./C.M.	G.C./C.M.
5.00	**SECURITY SYSTEMS, BUILDING CCTV AND ACCESS CONTROL**				
5.01	RACEWAYS	Conduit, boxes, cable tray, etc.	A&E	G.C./C.M.	G.C./C.M.
5.02	INSIDE PREMISE WIRING	Cables for cameras and card access	A&E	G.C./C.M.	G.C./C.M.
5.03	ACTIVE ELECTRONICS	Cameras, DVRs, Access control panels, readers, etc.	A&E	G.C./C.M.	G.C./C.M.
5.04	LOCKING DEVICES	Magnets, electric mortise locks	A&E	G.C./C.M.	G.C./C.M.
6.00	**EMERGENCY POWER BACKUP (UPS) FOR ACTIVE EQUIPMENT**				
6.01	POWER WIRING	Conduit, cables and circuits	A&E	G.C./C.M.	G.C./C.M.
6.02	ACTIVE EQUIPMENT - SMALL UNITS	UPS units in racks or in work areas	BTS	ODP	G.C./C.M.
6.03	ACTIVE EQUIPMENT - LARGE UNITS	Central UPS system	A&E	G.C./C.M.	G.C./C.M.
7.00	**FIRE ALARM AND BUILDING MANAGEMENT SYSTEM**				
7.01	RACEWAYS & WIRING	Conduit, cables, patch panels, cable tray outlets, etc	A&E	G.C./C.M.	G.C./C.M.

PROJECT NAME					
DESIGN AND CONSTRUCTION RESPONSIBILITIES					
ITEM	SYSTEM	SCOPE	DESIGN RESPONSIBILITY	PROCUREMENT RESPONSIBILITY	CONSTRUCTION RESPONSIBILITY
7.02	ACTIVE ELECTRONICS	Data gathering panels, sensors, etc	A&E	G.C./C.M.	G.C./C.M.
8.00	**DISTRIBUTED ANTENNA SYSTEM (LIFESAFETY)**				
8.01	RACEWAYS & WIRING	Conduit, cables, patch panels, cable tray outlets, etc	A&E	G.C./C.M.	G.C./C.M.
8.02	INSIDE PREMISE WIRING	Cable , grounding	A&E	G.C./C.M.	G.C./C.M.
8.01	ACTIVE ELECTRONICS	Head end system and antennas	A&E	G.C./C.M.	G.C./C.M.
9.00	**DISTRIBUTED ANTENNA SYSTEM (CELL PHONES)**				
9.01	RACEWAYS & WIRING	Conduit, cables, patch panels, cable tray outlets, etc	A&E	G.C./C.M.	G.C./C.M.
9.02	INSIDE PREMISE WIRING	Cable , grounding	TBD	TBD	TBD
9.01	ACTIVE ELECTRONICS	Head end system and antennas	TBD	TBD	TBD

NOTES: C.M./G.C.: CONSTRUCTION MANAGER OR GENERAL CONSTRACTOR
A&E: ARCHITECT AND ENGINEER
N.A.: NOT APPLICABLE
BTS: PINELLAS COUNTY BTS
ODP: OWNER DIRECT PURCHASE
TBD: TO BE DETERMINED
S.P.: SERVICE PROVIDER

1.4 ABBREVIATIONS

See Appendix A: Abbreviations

1.5 CODES AND STANDARDS

A. Code compliance: It is the responsibility of the EOR to confirm that plans and specifications used for building low voltage systems are compliant with County and City building codes. Any requirement indicated in these specifications contrary to any building codes shall be waived.

B. Requirements: All articles, products, materials, fixtures, forms, or types of construction covered in the specifications will be required to meet or exceed all applicable standards of manufacturer testing, performance, capabilities, procedures, and installation according to the requirements of American National Standards Institute (ANSI), National Electrical Manufacturers Association (NEMA), Institute of Electrical and Electronics Engineers (IEEE), National Electrical Code (NEC), Building Industry Consultant Services International (BICSI), and Telecommunication Industry Association (TIA) referenced documents when indicated and the manufacturer's recommended practices. Requirements provided on the contract documents which exceed but are not contrary to governing codes shall be followed.

C. UL Labels: All materials shall be new and free of defects, and shall be UL listed, bear the UL labels, or be labeled or listed with an approved, nationally recognized Electrical Testing Agency. No equipment shall be installed if there is no labeling or listing service available for such equipment.

1.6 MATERIAL ALTERNATES AND SUBSTITUTIONS

A. Definitions:

1. Basis of design: A product or group of products from an identified manufacturer that was used as the basis of systems layouts, installation details, and part of the contract documents.
2. Prototype: A product or a group of products that are not yet ready for commercial use; they are in the testing phase (Beta) of product development.
3. Alternates: Products or manufacturers listed in the contract documents as acceptable as compared to the basis of design. The use of alternates shall follow the same system architecture as the basis of design.
4. Obsolete: A product that has been discontinued by the manufacturer or declared end of life and is no longer being manufactured.

5. Substitution: A product not listed in the contract documents but capable of similar characteristics as the basis of design operating as a direct replacement in the system referenced. The Installer can propose a substitution if all requirements are met as indicated in this specification.
6. Substitutions that create a change in system architecture are products that create a different system configuration impacting other trades (i.e., change in power/cooling requirements, changes in raceways layout or sizes, changes in equipment space requirements, changes in low voltage wiring layouts, types, and quantities, etc.) but providing a similar result as the system/products basis of design.

B. Use of Prototype: Prototypes are not permitted in any technology system.

C. Use of alternates: Alternates are permitted when the Installer follows these requirements:

1. Where several brand names, make, or manufacturers are listed as acceptable alternates each shall be regarded as equally acceptable, based on the design selection. Where a manufacturer's model number is listed, this model shall set the standard of quality and performance required. Where no brand name is specified, the source and quality shall be subject to Engineer review and acceptance. Where three or more manufacturers are listed, one of the listed manufacturers shall be submitted for acceptance.
2. The use of alternate products does not allow change of system architecture with such products.
3. If an alternate is submitted, BTS must be notified in writing and provide approval.

D. Use of substitutions: Substitutions are permitted only when they meet the following requirements:

1. Substitutions are only allowed when a particular specification section for a technology system allows the use of substitutions for that system.
2. The performance of all substitution components must meet or exceed those of the basis of design. Should an Installer wish to submit a substitution product, or a product set stated in the construction documents as 'acceptable', it shall be the responsibility of the Installer to submit to the Engineer an item-for-item CROSS-REFERENCE for all specifications of the product, all related specifications, and product data sheets for the proposed substitution. See Appendix B – Substitution Request Form.
3. BTS must be informed of any substitutions.
4. BTS has the authority to reject a substitution without cause and the Installer shall provide the basis of design with no additional compensation.
5. Substitutions of unnamed manufacturers are not acceptable.
6. When a basis of design is specified to be in accordance with a trade association or government standard requested by the Engineer, the Installer shall provide a certificate that the substitution complies with the referenced standard. Upon request of Engineer, Contractor shall submit supporting test data to substantiate compliance.
7. Substitutions that create a change in system architecture are not permitted.

E. Obsolete:

1. Obsolete products should be brought to the attention of BTS at which time an alternate product will be provided.

1.7 SHOP DRAWINGS AND SUBMITTALS

A. Shop drawings shall be submitted for equipment and material as indicated in the individual specification section for each system.

B. All low voltage submittals shall be approved by the A&E and BTS. Materials not approved by BTS can be requested to be changed at no additional cost to the Owner.

C. When manufacturer cut sheets of products are submitted with multiple model numbers or variations of the same product, the cut sheet shall be highlighted by the Installer to indicate the specific product being provided for the project. Submittals of unhighlighted cut sheets will be rejected.

D. All active electronic equipment prone to obsolescence with lead times less than three months shall be submitted for approval no sooner than 12 months before the set date of substantial completion of the project. Electronic equipment prone to obsolescence includes devices such as, but not limited to, flat panel displays, transceivers, servers, players, workstations, and routers.

E. Equipment and materials installed not in accordance with the approved shop drawings shall be replaced at Installer's expense.

F. Multiple stages of shop drawings shall be required as indicated in each specification section. For final completion and testing, the Installer shall provide a submittal with the following information:

1. Detailed course syllabus for each type of training required in the specifications.
2. A proposed schedule of training sessions in compliance with the specification section indicating where the training will take place.
3. A copy of all training material to be used during each session.
4. Test result sheets for all testing done by the Installer prior to the system acceptance test.

PART 2 - PRODUCTS

2.1 IDENTIFICATION AND LABELING TAGS

A. All conduit, cabinets, cables, wires, wiring forms, terminal blocks, and terminals shall be clearly identified with pre-printed labels or tags.

B. Approved types of labels for inside premise environments for any technology systems are:

1. Non-laminated thermal transfer labels printed with a high-quality thermal transfer printer.
2. Laminated thermal transfer labels printed with a high-quality thermal transfer printer.
3. Thermal transfer polyolefin tape printed with a high-quality thermal transfer printer.
4. Self-laminated dot-matrix labels printed with a high-quality dot-matrix printer.
5. Non-laminated dot-matrix labels printed with a high-quality dot-matrix printer.

C. For labeling of cables or equipment in outdoor environments use only marker plates attached to cable or equipment with cable ties. Do not use any labels with adhesive materials. Use different color plates for different cable types. Use only waterproof ink for writing on marker plates.

D. Any type of write-on labels (except for outdoor marker plates), handwriting on cable jackets or directly on equipment, labels made with masking tape, or any other type of tape not listed in previous paragraph are not acceptable and shall be corrected with approved labeling methods at no additional cost to the Owner.

E. Approved manufacturers: See Appendix F - Labeling Diagrams

1. Brady
2. Panduit
3. Or an approved equal

2.2 TECHNOLOGY EQUIPMENT AND MATERIALS

A. General: Each item of equipment or material shall be manufactured by a company regularly engaged in the manufacturer of the type and size of equipment. Each item shall be suitable for the environment in which it is to be installed, shall be approved for its purpose, environment, application, and bear a label as indicated in paragraph 1.5. C of Codes and Standards.

B. Installation Requirements: Each item of equipment or material shall be installed in accordance with instructions and recommendations of the manufacturer and the contract documents on a separate patch panel.

C. Required Accessories: All equipment specified in the technology systems shall be provided with all required accessories for proper operation and mounting. Typically, these accessories are not specifically indicated in the design drawings but shall be provided per this specification section. Such accessories include items such as power supplies, power cords, rack ears, rack rails, bolts, lugs, faceplates, etc.

PART 3 - EXECUTION

3.1 INSTALLATION PRACTICES

A. Workmanship: The installation of materials and equipment shall be performed in a neat, workmanlike, and timely manner by an adequate number of craftsmen knowledgeable of the requirements of the contract documents. They shall be skilled in the methods and craftsmanship needed to produce a quality level of workmanship. Personnel who install materials and equipment shall be qualified by training and experience to perform their assigned tasks.

B. Standard of quality: To define good workmanship, all installation practices described in BICSI standards shall be followed.

C. Protection of equipment: Equipment for technology systems shall always, during construction, be adequately protected against mechanical/chemical damage by the elements or work performed by other trades. Equipment shall be stored in dry permanent shelters. If equipment or materials have been damaged, such equipment shall be replaced at no additional cost or time extension to the contract. Damaged equipment and materials include the following conditions:

1. Equipment that has visible scratches, cracks, or equipment that has paint or finished surface peeled off.
2. Equipment with visible indication of rust or water intrusion.
3. Equipment that has dents on the metal enclosures and are clearly visible to the end user.
4. Equipment that has been sprayed with paint, fire proofing materials, or other type of chemicals, when the equipment was not intended to have this type of material applied to it, per contract documents.
5. Equipment that has been burnt by controlled fires, power surges, power sags, or lightning.
6. Equipment that has known damage to any parts, electronic board, or component, even if such component or board has no specific use in the project.
7. Cables that have visible damage to the jackets even if cables are not broken and still provide electrical continuity.
8. Cables sprayed with paints that affect the warranty of the cable as defined by the cable manufacturer.
9. Equipment with screws with stripped heads.

D. Clean equipment: All equipment installed in spaces accessible to the building occupants such as racks, cabinets, wall-mounted panels, credenzas, etc., shall be free of dust upon receipt of the final Certificate of Occupancy (CO), and upon the acceptance test by the A&E. Clean equipment is defined as being wiped with a finger, on any surface, not leaving visible debris and dust on the finger to include dust inside equipment such as ventilation fans.

E. Identification and tagging: All technology systems shall be labeled and identified as specified in the contract documents. Such identification shall be in addition to the manufacturer's nameplates, shall serve to identify the item's function, and the equipment or system which it serves or controls. Refer to Identification Section of the specifications for additional information. All labels of equipment and wiring shall match the labeling used in the shop drawings for the system.

3.2 TELECOM ROOM/EQUIPMENT ROOM READINESS

A. In any project where the technology system requires the use of network equipment (switches, routers, firewalls, etc.) provided by BTS, the Contractor shall complete all telecom rooms to a point where they are suitable for the Owner to deploy such equipment. At a minimum, the following conditions shall be met in all telecom rooms for the installation of the equipment:

1. All power outlets in telecom rooms shall be fed from a permanent source of power. Temporary power shall not be provided.
2. Backup power (generator and/or Uninterruptible Power Supply (UPS)) shall be operational, tested, and connected to the final power distribution system.
3. The mechanical equipment providing cooling for telecom rooms shall be fully operational. Temporary cooling shall not be accepted.
4. Fire suppression system (sprinkler or gas-based) protecting telecom rooms shall be fully operational and tested.
5. All light fixtures in telecom room shall be fully operational.
6. All walls to telecom rooms shall be completed and include the last coat of paint. (Including plywood walls). Plywood fire ratings shall be visible.
7. Ceiling and flooring of telecom rooms shall be finished.
8. All horizontal and backbone cabling systems as part of the Structured Cabling System (SCS) shall be installed, terminated, and tested.
9. Final and permanent doors to telecom rooms shall be installed with a keycore different from all other construction cores on the site.
10. Telecom rooms shall be cleared of any materials being stored inside the room and shall not be used as storage rooms.
11. Telecom rooms shall be clean. Clean will be measured as not having any debris left in the room and not having dust in rack, cabinets, or wall-mounted panels. If wiping a finger on any surface of equipment leaves visible dust residue on the finger, the room will not be considered clean.
12. Hallways and rooms leading into telecom rooms must be finished to avoid dust from these spaces moving into the telecom rooms.
13. Prior to the Owner deploying the equipment in these rooms, the Contractor shall provide disposable sticky mats at the entrance of each telecom room to capture dust and/or dirt from shoes or boots coming into the room. The sticky mats shall cover the width of the door opening. Sticky mats shall contain no less than 60 sheets in each unit. Used sheets of the mats shall be replaced no less than daily or if worn out before the end of the day. Sticky mats shall be provided until the project receives the final CO.

B. All telecom rooms shall be ready for deployment of equipment no less than 30 days prior to the required completion date of the project or the date established for the Temporary Certificate of Occupancy (TCO) of the project.

3.3 SYSTEMS WARRANTY AND SERVICE

A. General: At a minimum, all technology systems shall include a warranty from the manufacturer and Installer of the system for no less than one year with the following exceptions:

1. Structured cabling systems shall have a warranty longer than one year as indicated in specification section 12.6 Systems Warranty and Service.
2. When specific equipment or software manufacturers include a warranty longer than one year, the manufacturer's warranty shall be transferred to the Owner in the same terms as indicated by the manufacturer.

B. Warranty coverage: The warranty for the technology system shall cover the following elements:

1. All equipment parts, cabling, and materials.
2. Any software updates/patches issued during the warranty period by the manufacturer.
3. The labor to replace parts and programming time to re-configure equipment.
4. Shipping and freight charges to send equipment back and forth from the manufacturer and/or site.
5. Tool rentals such as scaffold or lifts to access equipment.
6. Troubleshooting time to detect faults in the system.
7. All travel time and expenses associated with the service.

C. Start of warranty: The warranty period for the technology systems starts the day the project receives the CO, for new construction projects. For retrofit jobs of a particular system, the warranty starts when the project is accepted by the A&E. For most equipment/software manufacturer's the warranty period starts when the equipment is shipped from the factory, therefore it is the responsibility of the Installer of each system to provide additional warranty coverage from the manufacturer to cover the additional time of warranty up to the CO date, plus one year.

D. Service calls: During the warranty period, the Installer shall support the system when called by the Owner/Contractor for service. All equipment/software service shall be done by personnel with the same qualifications as the personnel who installed the system and as indicated in each technology system specification section. Service calls shall be taken during business hours (same time zone as the project) for normal service and 24 hours, 365 days in the year for emergency service. Emergency service shall be defined as the loss or failure of any critical component necessary to maintain the overall integrity and operation of the system. Normal service shall be defined as the loss or failure of a system component that does not compromise the complete operation of the system and allows the Owner to operate the system at a minimum of 90% of its capacity. See individual specification sections from Manufacturer for delineation on critical components and normal service.

E. Response time for service: The maximum allowed response time after a service call for emergency service shall be four hours, and for normal service shall be two business days.

F. Equipment registration: All equipment/software parts of the technology system shall be registered to the Owner with the manufacturer of the equipment/software for warranty and support. Equipment/software registered with the manufacturer to the name of the Contractor or Installer shall be removed from the project and replaced with equal equipment registered to the Owner at no additional cost.

G. Periodic preventive maintenance visits: During the warranty period, the Installer of the system shall provide no less than two preventive maintenance services. These services shall be provided six months from the start of the warranty period and a few weeks before the end of the warranty period. The Installer of the system shall coordinate with the Owner the precise dates for this type of service. During these visits, the following tasks shall be performed:

1. Clean-up of any active equipment that shows visible accumulation of dirt, dust, or debris of any kind
2. Replacement of any consumable parts in the system that require replacement per manufacturer's instructions during the warranty period, such as but not limited to filters
3. Oiling/greasing of any mechanical parts that require periodic maintenance as per manufacturer's instructions during the warranty period
4. Run manufacturer's recommended tests for each piece of equipment installed. The Installer shall provide, at the end of the service, a report of such test
5. Visual observation of all devices in the system to spot any anomalies.
6. Review of error logs from any system components and analysis of such logs with explanation to Owner on the cause of errors

H. Extended service agreement: Prior to final acceptance testing, and within 30 days of project completion, the Installer of each technology system shall submit to the Owner an option to purchase extended service coverage. This proposal shall provide for the purchase option of one, three, or five-year coverage. Coverage shall include, at a minimum, the same provisions as during the warranty period.

3.4 BTS FINAL ACCEPTANCE TEST

A. The technology systems shall be tested during installation by the Installer as frequently as required to solve any installation issues and non-compliance of system specifications. Technology systems will not be considered delivered to the Owner until final acceptance test is passed. The final acceptance test shall be done in presence of the A&E and/or BTS. The Installer shall request in writing, two weeks in advance, the presence of the A&E and/or Owner for the final acceptance test.

B. For the Installer of the system to request final acceptance, the following tasks shall be completed:

1. All components shall be inspected to ensure they have been properly installed, securely attached, and remain clean and unmarred.
2. All equipment shall be properly adjusted, clearly labeled, and fully operational.
3. The Installer shall have tested the system to ensure the final acceptance test will be successful. Detailed proof of test shall be sent to the A&E with the request for final acceptance.
4. All permanent and final labels as requested in section 12.3 Identification and Tagging are completed.
5. No temporary conditions shall be present in the system.
6. All batteries on all system components shall be connected.
7. All system programming shall be completed as indicated in each technology system specification.

C. All test equipment required for the final acceptance shall be provided by the Installer of the system unless specifically indicated by the A&E and/or BTS.

D. The A&E shall define the scope of the testing, but the Installer shall be prepared for testing every single component of the system. During the day of the test, the A&E will indicate the testing process and procedures for each system. Tests could include operation of the system during power outages. The Installer of the system shall be available during the complete testing process to answer questions from the Engineer and to demonstrate specific parts of the system. If personnel from the Installer or test equipment is not available, the test will be marked as a failure.

E. A punch list of the items to be corrected will be prepared by the A&E during the final acceptance test. The Installer shall correct all items and request a second day for verification of all punch list items by the A&E and Owner. During the second test, no additional punch list items shall be expected and only the items in the punch list will be tested.

F. If during the testing process, the A&E and/or Owner consider that the rate of failure is too high (more than five failures or non-compliance with specifications within a one hour testing duration), the test will be cancelled unilaterally by the A&E and/or Owner. The Installer shall correct all items and re-schedule the final acceptance test. The new test will start over from the beginning, and nothing previously tested will be accepted. The Installer shall not be entitled to additional compensation to test the system under these conditions.

G. Upon successful completion of the final acceptance test, the Installer of the system will receive a written notice by the A&E and/or Owner acknowledging the acceptance.

H. See individual specification sections for system specific requirements for testing.

3.5 TRAINING AND INSTRUCTION

A. Training for each technology system shall be provided as indicated in this specification and in the individual specification section for each system.

B. The following training guidelines shall be followed for all technology systems:

1. Training shall not be scheduled in a way that attendee or presenter shall be required to attend more than six hours of training per day.
2. Prior to starting all training, the training submittal shall be approved.
3. No training shall be scheduled prior to the system being completed and accepted by the A&E.
4. Training shall be conducted during normal business hours of the client, at a date and time of mutual convenience to the Owner and Installer. All training sessions need to be scheduled by the Installer at least two weeks in advance. The Owner shall be notified in writing by the Installer with the proposed dates for each session.
5. All different types of training shall be recorded and delivered to the Owner as part of the closeout information in digital format. All recordings shall be recorded in high quality electronic media and submitted to the Owner.
6. The Installer is responsible for completing the list of attendants for each session of training. All these sheets shall be submitted as part of the closeout information.

3.6 AS-BUILT DOCUMENTS

A. Production: During a project, the Contractor shall maintain record "As-Built drawings". One set shall always be maintained at the site. It shall be accurate, clear, and complete, showing the actual location of all equipment as installed. The "As-Built drawings" shall show all technology systems work installed complete to the present stage of progress. These drawings shall be available at any time for review by the A&E's field representatives.

B. Completion: At the completion of the work, transfer all changes marked in color onto the second set of drawings and submit to the A&E.

C. Final: Upon Installer's completion of the Engineer's final punch list, transfer all "As-Built" conditions and all requirements by the Engineer to a reproducible set of drawings. Submit full-size drawings and one set of CAD/Autodesk Revit© disks for review and acceptance.

D. Additional documents: At project completion, the Installer of the technology system shall provide, as part of the "As-Built" documents, updated tables, equipment schedules, configuration worksheets, and labeling system used. See individual system specification section for more details on these documents.

E. See individual specification sections for each system for additional requirements for "As-Built" documents.

3.7 CLOSEOUT DOCUMENTS

A. Closeout information shall be provided to BTS at the end of the project. The file shall be organized by each system and shall follow this organization:

1. Part 1 – Operation and Maintenance manuals. Operation and Maintenance manuals as issued by the manufacturer of each system's component. Such manuals shall include all maintenance procedures required to be done by the Owner. When required by each individual specification section, a short form operation guide, prepared by Installer for the system, shall be provided.
2. Part 2 – Inventory of Equipment installed. A detailed list of all relevant active equipment (equipment with electronic components with a market value over $200) installed in the project including the following information and presented in electronic format (Microsoft Excel):
    a. Make
    b. Model
    c. Serial number
    d. Room location
    e. Warranty period, including manufacturer's extended warranties

3. Part 3 – Proof Ownership, Delivery, and Acceptance.
   The following letters/documents shall be attached in this part:
   a. Acceptance letter signed by A&E for each of the technology systems installed.
   b. Proof of training by submitting sign in sheets for each training session.
   c. Signed transmittal for all training videos and training material.
   d. Signed transmittals for all spare parts and consumables delivered to the Owner.
   e. A list of all usernames and passwords for all software programs used by the technology systems and any equipment with password codes. All levels of passwords shall be provided, from the lowest hierarchy to the highest. Not to be sent via email or any unsecure method.
   f. Provide at least four copies of all physical keys to the different devices of the technology systems. Each key shall be individually tagged in a key ring. All keys shall be included and organized inside a key ring management enclosure.
   g. A list of all software modules and licenses delivered to the Owner. The list shall include part numbers, serial numbers, license certificate of authenticity, hardware key (dongles) numbers, and software version. This list shall have a clear signature, name, and date of the person that received this software by the Owner.
   h. A copy of all official equipment and software registrations with manufacturer.
4. Part 4 – As-Built Documents. All “As-Built” documents as indicated in this specification section

END OF SECTION 27 00 10

SECTION 27 05 26 – GROUNDING AND BONDING FOR TELECOMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 PURPOSE OF THIS DOCUMENT

A. The purpose of this specification section is to indicate to A&E and designers of low voltage infrastructure, working in construction or renovation projects for Pinellas County Government, the design requirements by BTS when it comes to such infrastructure. This document will be a starting point for completing a set of construction documents but **SHALL NOT** be used unedited as a bid document.

1.2 RELATED DOCUMENTS

A. The Engineer for this project shall provide the complete requirements for a telecommunications grounding system. The details for this system are defined in the Division 26 and/or the Division 28 specifications. It is the responsibility of the Engineer to make sure both sets of documents are consistent and provide no overlap or divergent information.

B. Supplemental: Refer to the specification sections identified below for additional requirements, which are supplemented by this section.

1. 27 00 10 Technology General Provisions
2. 27 05 28 Raceways for Technology
3. 27 10 00 Structured Cabling System
4. 26 05 26 Grounding and Bonding for Electrical Systems

C. General: The bonding approach required herein is intended to work in concert with the cabling topology as specified in Specification Section 27 10 00 Structured Cabling System and installed in accordance with Specification Section 27 05 28 Raceways for Technology.

D. Reference Standards:

1. TIA-607-C
2. TIA-568.0-D
3. TIA-606-C
4. UL 1863 Communication Circuit Accessories
5. UL-50 & UL-514
6. NFPA 70 - National Electric Code
7. IEEE Std. 1100-1992, Powering and Grounding Sensitive Electronic Equipment
8. BICSI TDMM, Telecommunications Distribution Method Manual

9. UL 1449

1.3 MATERIALS ALTERNATES AND SUBSTITUTIONS

A. General: Substitutions are allowed for all components of the systems under this specification section if all requirements for substitutions indicated in Specification Section 27 00 10 Technology General Provisions are followed.

1.4 SHOP DRAWINGS AND SUBMITTALS

A. See additional requirements for shop drawings and submittals in Specification Section 27 00 10 Technology General Provisions.

B. The Installer of the Telecommunications Grounding systems shall provide the following information in the shop drawings phase of the project:

1. Manufacturer's cut sheets for all proposed equipment as described in Part 1 section 1.7 of this specification. Cut sheets shall bear the printed logo or trademark of the manufacturer for each type of product being provided. Mark each copy of the data sheets for the specific product being provided with an identifying mark, arrow, or highlighting.
2. A spreadsheet indicating telecommunications ground bar information selection for each telecommunications room indicated in the design drawings, including the following information:
    a. Room name or number
    b. Quantity of ground bars
    c. Height of each ground bar
    d. Length of each ground bar
    e. Number of holes in each ground bar
    f. Label for each ground bar
3. A drawing indicating the following information:
    a. Location of all telecommunications ground bars and routing of all telecommunications grounding backbones.
    b. Wire size charts for all telecommunications grounding backbones in the project.
    c. All labels to be used in telecommunications backbone cables, bonding conductors, and telecommunications ground bars.
4. A detailed drawing layout of the Mesh Common Bonding Network (MCBN) for all spaces with raised floor in the project.

1.5 ABBREVIATIONS

See Appendix A - Abbreviations

PART 2 - PRODUCTS

2.1 TELECOMMUNICATIONS MAIN GROUNDING BUSBAR (TMGB)

A. General use: At least one TMGB shall be provided in the building MDF. The TMGB shall have the bond to the main grounding electrode in the building.

B. The TMGB serves as the dedicated extension of the building grounding electrode system for the telecommunications infrastructure. The TMGB shall be located and provided in the Main Telecommunication Room in each building. The TMGB must also be listed by a Nationally Recognized Testing Laboratory (NRTL).

C. The TMGB shall have the following specifications:

1. Material: Copper with a thin platted finish
2. Thickness: 1/4 inch
3. Width: No less than four inches
4. Length: The Installer of the grounding system shall estimate the length of the bar to have enough pre-drilled holes for all BCs in the room. The bar shall be no less than 14 inches long. The Installer shall follow the following criteria in estimating the amount of pre-drilled holes required in the TMGB:
    a. Two holes required for each TBB termination
    b. Two holes for each cabinet or rack row in the room
    c. Two holes for each protector block in the room
    d. Two holes for each layer of ladder tray above the rack
    e. Two holes for each set of conduit sleeves entering the room
    f. 20% of spare capacity shall be available after all terminations are done
    g. If quantity of holes exceeds the maximum available by a manufacturer, multiple bars shall be provided as to match the criteria indicated above
5. Pre-drilled holes: All pre-drilled holes shall have a diameter of 5/16 of an inch
6. Hole spacing: All pre-drilled holes shall have a minimum spacing matching the spacing of the holes in the long barrel ground lugs

D. The TMGB shall be installed on the wall with stand offs and isolators. Isolators shall be rated at 600V.

E. Approved manufacturers: See Division 27 approved material list.

2.2 TELECOMMUNICATIONS GROUNDING BUSBAR (TGB) FOR INTERIOR USE

A. Intended use: At least one TGB shall be provided in each telecom room, entrance facility, Data Center, or any space where backbone cables are terminated. For rooms bigger than 200 sq. ft., consideration shall be given for additional ground bars. For rooms with multiple rack rows, one TGB shall be provided for each row of racks. Different from the TMGB, the TGB is not bonded directly to the main grounding electrode.

B. The TGB serves as the dedicated extension of the building grounding electrode system for the telecommunications infrastructure. The TGB shall be located and provided in each telecommunication room (except the main telecommunication room) in each building and any other additional locations as indicated in the drawings. The TGB must also be listed by a NRTL.

C. The TMGB shall have the following specifications:

1. Material: Copper with a thin platted finish
2. Thickness: 1/4 inch
3. Width: No less than four inches
4. Length: The Installer of the grounding system shall estimate the length of the bar to have enough pre-drilled holes for all BCs in the room. The bar shall be no less than 12 inches long. The Installer shall follow the following criteria in estimating the amount of pre-drilled holes required in the TMGB:
    a. Two holes required for each TBB termination
    b. Two holes for each cabinet or rack row in the room
    c. Two holes for each protector block in the room
    d. Two holes for each layer of ladder tray above the rack
    e. Two holes for each set of conduit sleeves entering the room
    f. 20% of spare capacity shall be available after all terminations are done
    g. If quantity of holes exceeds the maximum available by a manufacturer, multiple bars shall be provided as to match the criteria indicated above
5. Pre-drilled holes: All pre-drilled holes shall have a diameter of 5/16 of an inch
6. Hole spacing: All pre-drilled holes shall have a minimum spacing matching the spacing of the holes in the long barrel ground lugs

D. The TMGB shall be installed in the wall with stand offs and isolators. Isolators shall be rated at 600V.

E. Approved manufacturers: See Division 27 approved material list.

2.3 TELECOMMUNICATIONS GROUNDING BUSBAR (TGB) FOR OUTDOOR USE

A. Intended use: Outdoor TGB shall be used to bond ground straps and other code required bonding conductors for cable going to a building roof for antennas or other services.

B. When TGB are located outdoors: All specs for indoor used TGB shall be followed except for the construction material. The TGB for outdoor use shall be made of galvanized steel.

2.4 FLEX CONDUCTOR, ONE-HOLE, LONG BARREL WITH WINDOW LUG

A. All BCs (different from TBB) shall be terminated in a flex conductor, one-hole, long barrel with window lug when a two-hole connector is not possible to be used because receiving equipment does not support the two holes. All lugs shall be selected to match the size of the conductor being used. Other types of terminations such as screw type connectors are not accepted.

B. The flex conductor, one-hole, long barrel with window lug shall have the following specification:

1. Finish: Thin plated
2. Cable types: Designed to work with Flexible, Extra-Flexible, and Code Stranded Copper Conductors
3. Stud hole size: 1/4 inch
4. Barrel type: Long barrel > one inch
5. Termination type: Crimp type
6. Angle: Straight or angled if installation space is limited
7. Listing: UL listed and tested to 35 KV and 90ºC

C. Approved manufacturers: See Division 27 approved material list.

2.5 FLEX CONDUCTOR, TWO HOLE, LONG BARREL WITH WINDOW LUG

A. Flex conductors, two-hole, long barrel with window shall be used with TBB and BCs to provide a good bond. All lugs shall be selected to match the size of the conductor being used. Other types of termination are not accepted.

B. The flex conductor, two-hole, long barrel with window lug shall have the following specification:

1. Finish: Thin plated
2. Cable types: Designed to work with Flexible, Extra-Flexible, and Code Stranded Copper Conductors
3. Stud hole size: 1/4 inch
4. Hole spacing: To match spacing of pre-drilled holes in ground bar or equipment.
5. Barrel length: Long barrel > one inch
6. Termination type: Crimp type
7. Angle: Straight or angled if installation space is limited
8. Listing: UL listed and tested to 35 KV and 90ºC

C. Flex conductors, two-hole, long barrel with window shall be used with BCs in the following cases:

1. Bonding two sections of pathways such as sections of tubular runways or cable trays
2. Bonding a BC or a TBB to a TGB or TMGB
3. Bonding to equipment that requires two holes for bonding

D. Approved Manufacturers: See Division 27 approved material list

2.6 HTAP CONNECTOR

A. When a Bonded Connector (BC) is required to be bonded to another BC of same or different size the only approved method of bonding is with HTAP style crimp connectors. Screw type connectors, wire nuts, or any other method are not acceptable. The specifications of the HTAP connectors are:

1. Finish: Thin plated
2. Cable types: Designed to work with Flexible, Extra-Flexible, and Code Stranded Copper Conductors
3. Tap grooves: Installer to select HTAP connector based on size of BCs and quantity of BCs to be bonded
4. Slots: The HTAP connector shall support the unit to the bonding conductors with nylon cable ties for initial support before crimping
5. Termination type: Crimp type
6. Listing: UL listed and tested to 600V

B. Approved manufacturers: See Division 27 approved material list.

2.7 TELECOMMUNICATIONS BONDING BACKBONE (TBB)

A. Telecommunications Bonding Backbones shall be provided as indicated in the design documents. TBBs shall be insulated copper stranded conductors with a wire gauge dictated by the length of the cable. The TBB shall be sized at 2 Kcmil per linear foot (LF) of conductor length up to a maximum of 3/0 AWG. The following table shall be used to estimate the size of the TBBs:

TBB length LM (FT)	**TBB Size (AWG)**
Less than 4 (13)	6
g5- 6 (14 – 20)	4
6 – 8 (21 – 26)	3
8– 10 (27 – 33)	2
10– 13 (34 – 41)	1
13 – 16 (42 – 52)	1/0
16 – 20 (53 – 66)	2/0
Greater than 20 (66)	3/0

B. Once a TBB has been sized with a particular gauge, any extensions of such backbone shall not be done with a wire gauge smaller than the previous run regardless of distance.

2.8 BONDING CONDUCTOR (BC)

A. Bonding conductors shall be used to bond equipment and raceways to the telecommunications grounding infrastructure. The specifications of the BC are:

1. Conductor Size: Use the chart above for TBB to estimate the size of the bonding conductor. BC shall be no smaller than an AWG-6
2. Material: Copper stranded conductors
3. Insulation: Use non-insulated conductors only under raised floor spaces. Insulation color shall be green with a yellow stripe

B. Prefabricated BCs or field made BCs are acceptable

C. Both ends of a BC shall be terminated in long barrel lugs

2.9 RAISED FLOOR BONDING CLAMP

A. Raised floor bonding clamps shall be used to bond BCs under the raised floor to raise floor pedestals. The specifications of the raised floor bonding clamp shall be:

1. Construction: Solid metal device
2. Bonding of BCs: The device used to bond the BCs shall be a split screw copper bolt sized to match the size of the BCs being bonded
3. Bonding of raised floor pedestals: The device shall include an adjustable clamp to bond the pedestal. The Installer of this system is responsible for selecting the size of the clamp to match the size and shape of the pedestal provided for this project
4. Listing: UL listed

B. Approved manufacturers: see Division 27 approved material list.

2.10 MESH COMMON BONDING NETWORK (MCBN)

A. A Mesh Common Bonding Network (MCBN) shall be provided under all raised floor spaces in the project. The MCBN is basically a grid of non-insulated BCs running under the raised floor. The MCBN shall include a loop around the perimeter of the raised floor. The details of the construction of the MCBN shall be:

1. Size of Conductors: Conductors shall be sized using the table provided in this specification to size the TBB, but conductors shall not be larger than 1/0 AWG.
2. Spacing of the Grid: The grid of conductors shall have a spacing no longer than 10 feet below each row of cabinets, racks, or consoles there shall be a conductor part of this grid.
3. Continuous Conductors: Each grid line of conductors shall be a continuous conductor without any splices.
4. Aligning: All grid lines shall be adjacent to the raised floor pedestals to be able to bond the pedestals.
5. Elevation: All conductors part of the MCBN shall not be resting or touching the floor slab. They should be mounted around half of the height of the raised floor pedestals
6. Bonding: Bonding shall be provided to the MCBM at the following locations:

    a. Each pedestal with one or more BCs adjacent to it, shall be bonded using a raised floor bonding clamp.

b. All metal equipment under the raised floor shall be bonded to the MCBN such as cable trays or conduits.
c. All ground bars above the raised floor and inside the same room shall be bonded to the MCBN with a BC of equal size as the largest conductor in the MCBN.

7. Listing: All bonding equipment used for the MCBN shall be UL 467 listed.

B. Racks, cabinets, and consoles above the raised floor shall be individually bonded to the MCBN with a non-insulated BC, if space below raised floor is being used for air handling. An insulated BC shall be used if the space below the raised floor is not being used for air handling.

2.11 LABELS FOR TELECOMMUNICATIONS GROUNDING INFRASTRUCTURE

A. Installer shall follow labeling materials indicated in Specification Section 27 00 10 Technology General Provisions.

PART 3 - EXECUTION

3.1 INSTALLATION PRACTICES

A. General: All installation requirements indicated in Specification Section 27 00 10 Technology General Provisions shall be followed.

B. Pinellas County BTS requires the following elements to be bonded in projects:

1. All tubular runway
2. All cable tray sections
3. All conduit sleeves within 12 inches of a cable tray section
4. All racks and cabinets
5. All surge suppressors
6. All armored fiber cables
7. All patch panels for shielded twisted pair cables
8. Bond to building steel inside the telecom room

C. Protection: The TBBs and BCs shall be installed and protected from physical and mechanical damage.

D. Galvanic continuity: The TBBs and BCs shall be continuous and routed in the shortest possible straight-line path.

E. Crimping: All lugs shall be crimped with the proper die for the size of lug being used.

F. Paint Removal: Paint shall be removed before attaching any BC to equipment with painted surface, such as ladder trays and racks, if no ground lug is available in the equipment.

G. Routing Of TBB: Telecommunications grounding back bone shall be run in a way to minimize their distance. The shorter the distance the most effective the grounding system can be.

H. Splicing: The TBBs and BCs shall be installed without splices. Where splices are necessary, the number of splices should be a minimum, they shall be accessible, and located within telecommunications spaces. Joined segments of a TBB or BC shall be connected using exothermic welding, irreversible compression-type connectors, or equivalent. All joints shall be adequately supported and protected from damage.

I. Bonding to Electrical Panels: The TGB or TMGB shall be as close to the electrical power panel as is practical and shall be installed to maintain clearances required by applicable electrical codes. The electrical power panel bus or the panel enclosure feeding telecommunications equipment racks/cabinets shall be bonded to the TGB or TMGB.

J. Bonding to Building Steel: All connectors used for bonding to the metal frame of a building shall be listed for the intended purpose.

K. Lug Screws: All connections from lugs to ground bars or grounding equipment shall be done with metal screws with nuts and compression washers. Connections made with metal self-tapping screws will not be allowed.

L. Bonding Protector Blocks: All primary or secondary building entrance protector blocks shall be bonded to the nearest TMGB or TGB with a BC. A minimum of 1 ft. separation shall be maintained between this insulated conductor and any DC power cables, switchboard cable, or high frequency cables, even when placed in rigid metal conduit or EMT.

M. Bonding Outside Plant Cables: When the outside plant cables in the Telecommunications Entrance Facility room incorporate a cable metallic shield (armor) isolation gap, the cable metallic shield on the building side of the gap shall be bonded to the TMGB or TGB or the rack/cabinet or the rack's vertical ground bar (if available).

N. Bonding Backbone Cables: Where backbone cables (fiber or copper) incorporate a shield (armor) or metallic member, this shield or metallic member shall be bonded to the TMGB or TGB or rack/cabinet or the rack's vertical ground bar (if available).

O. Bonding Horizontal Cables: When shielded horizontal cable is used and terminated in patch panels, each patch panel needs to be bonded to the telecommunications grounding system. A BC shall be used between each patch panel and the rack rails of the rack/cabinet or the rack's vertical ground bar (if available).

P. Intended Use of TBB or BC: The TBB or BC is not intended to serve as the only conductor providing a ground fault current return path. The intended function of the TBB or BC is to equalize potential differences between telecommunications systems.

Q. Installation of TBBs Inside Telecommunications Spaces: When TBBs are run inside telecommunications spaces, they shall be protected from damage by running them inside conduit. Conduit to protect TBBs inside telecommunications spaces can be made of PVC and shall be sized and supported as required by NEC.

R. Installation of TBBs Outside Telecommunications Spaces: When TBBs are run outside of telecommunications spaces they shall be protected from damage by running them inside conduit. Conduit to protect TBBs outside telecommunications spaces shall be EMT or RMC. To avoid an electromagnetic choke effect in this conductor, each end of the conduit used to protect the TBB shall be bonded to the TMGB or TGB at each end. Conduit used for protection of TBBs shall be sized and supported as required by NEC.

S. Rack/Cabinet Bonding: All racks/cabinets in the project shall be bonded to the nearest TMGB or TGB inside the room. All rows of racks/cabinets shall be bonded together by a single AWG-2 conductor coming from the nearest TMGB or TGB inside the room. This bonding conductor shall be insulated and run above the racks on the side of the cable tray system, going above the racks, supported by a hanger external to the cable tray. At each rack, a bonding jumper (AWG-6) shall be provided and terminated to the rack manufacturer's recommended lug for bonding the rack/cabinet. The bonding jumper shall be connected to the AWG-2 conductor by means of a HTAP connector, protected with heat shrink material. This ground bar shall be the termination point for the bonding jumper for each rack and shall also bond the manufacturer's approved grounding lug in the rack/cabinet to the ground bar.

T. Rack/Cabinet Bonding Outside of Telecom Rooms: Racks/cabinets outside of telecom rooms shall be bonded to the nearest electrical ground with a BC.

U. LABELING: All labeling systems for telecommunications grounding infrastructure shall follow the ANSI/TIA/EIA-606-C standard. At a minimum, the following elements shall be labeled in the telecommunications grounding system:

1. All TMGB or TGB, with a unique identifier located on the wall near the unit, not on the ground bar.

2. All TBBs in the project with a unique identifier at each termination point of each TBB. The label on one side of the cable shall indicate the termination location of the other side of the cable.
3. BC for rows of racks with a unique identifier at both ends of the cable.
4. BC for surge protectors with a unique identifier at both ends of the cable.

V. Additional Labeling: All BCs bonding rows of racks/cabinets and TBBs shall have an additional identification marker comprised of a yellow printed wrap around tag installed close to the bonding point strap to the cable jacket with a flame-retardant cable tie. This tag shall have the following wording in green letters: “IF THIS CONNECTOR OR CABLE IS LOOSE OR MUST BE REMOVED, PLEASE CALL THE BUILDING TELECOMMUNICATIONS MANAGER".

3.2 AS-BUILT DOCUMENTS AND CLOSEOUT INFORMATION

A. See Specification Section 27 00 10 Technology General Provisions for these requirements.

END OF SECTION 27 05 26

SECTION 27 05 28 – RACEWAYS FOR TECHNOLOGY

PART 1 - GENERAL

1.1 PURPOSE OF THIS DOCUMENT

A. The purpose of this specification section is to indicate to A&E and designers of low voltage infrastructure, working in construction or renovation projects for Pinellas County Government, the design requirements by BTS when it comes to such infrastructure. This document will be a starting point for completing a set of construction documents but **SHALL NOT** be used unedited as a bid document.

1.2 RELATED DOCUMENTS

A. Supplemental: Refer to the specification sections identified below for additional requirements, which are supplemented by this section.

1. 27 00 10 Technology General Provisions
2. 27 05 26 Grounding and Bonding for Telecommunications Systems

1.3 DESCRIPTION

A. General: Furnish and install complete with all accessories a Pathways and Spaces infrastructure for supporting the SCS and housing of technology equipment. The goal of the project is to provide a reliable architecture of the building that shall serve as a support for transport of data, voice telephony, security, and audio/visual cabling throughout the building from designated demarcation points to places located at various walls, floor, ceiling, column, room, and other locations as indicated on the contract drawings and described herein.

B. General: For pathways, the system shall utilize a combination of conduit, cable tray, and supports for vertical and horizontal cabling support. Pathways shall be provided and located as indicated by the drawings. Pathways shall terminate in rooms or closets using approved fasteners. Termination hardware and bushings shall be reamed to eliminate sharp edges. All Pathways shall be identified at all locations.

C. All Installers should anticipate that all products and installation procedures shall comply with the ANSI/TIA-569-D requirements at a minimum.

D. General: Installation of the raceways for communications shall be a complete system including all supports and hangers as required per contract documents and manufacturer's installation guidelines.

E. Support: All items shall be supported from the structural portion of the building. Supports and hangers shall be of a type approved by Underwriters' Laboratories. Wire shall not be used as support. Boxes and conduits shall not be supported or fastened to ceiling suspension wires or ceiling channels. Do not install any devices supported by ceiling tiles.

F. Installation: The Installer shall layout and provide his work in advance of the laying of floors or walls, and shall provide all sleeves that may be required for openings through floors, walls, etc. Where plans call for a conduit to be run exposed, provide all inserts and clamps for the supporting of the conduit.

1.4 INSTALLER QUALIFICATIONS

A. General: The Installer selected for the Project must be a BICSI certified Installer certified by the manufacturer of the product. The Installer must adhere to the engineering, installation, and testing procedures, and utilize the authorized manufacturer components and distribution channels in provisioning the Project.

B. General: The Installer directly responsible for this work shall be a " Pathways and Spaces for Structured Cabling System Installer" (PS-SCS); who is, and who has been, regularly engaged in providing and installing commercial and industrial pathways in spaces for telecommunications wiring systems of this type and size for at least the previous five years. Any sub-Installer who will assist the PS-SCS Installer in performance of this work shall have the same training and certification as the PS-SCS Installer.

C. Certification: The Installer's Project Manager shall possess a current and in good standing BICSI Registered Communications Distribution Designer (RCDD) certificate. All shop drawings submitted by the Installer shall bear the RCDDs seal.

D. Experience: The Installer shall be experienced in all aspects of this work and shall be required to demonstrate direct experience with recent systems of similar type and size. The Installer shall own and maintain tools and equipment necessary for successful installation and have personnel who are adequately trained in the use of such tools and equipment.

1.5 MATERIALS ALTERNATES AND SUBSTITUTIONS

A. General: Substitutions are allowed for all components of the systems under this specification section when all requirements for substitutions indicated in Specification Section 27 00 10 Technology General Provisions are followed.

1.6 SHOP DRAWINGS AND SUBMITTALS

A. See additional requirements for shop drawings and submittals in Specification Section 27 00 10 Technology General Provisions.

B. General: The PS-SCS Installer shall provide the following information no later than 30 days after receipt of contract award:

1. Proof of Installer's qualifications per paragraph 1.03 in Specification Section 27 00 10 Technology General Provisions.
2. Cut sheets of all products to be used for the project, highlighting the precise product to be used in each case, when multiple devices are indicated in the cut sheet. At a minimum the following devices shall be submitted with this specification section:
    a. Supporting devices (J-Hooks) if allowed in the project. See Part 3 of this specification.
    b. Cable tray system with accessories
    c. Runway cable tray system with accessories
    d. Plywood
    e. Through wall/floor firestop system
    f. Innerduct
    g. Detectable tape
    h. Communications vaults
    i. Conduit waterfalls
    j. Firestop system (for small penetrations)
3. Drawings indicating precise location and type of all support for cable tray or ladder tray systems in all areas where they will be used.
4. For all communication vaults, drawings shall be prepared to indicate conduit penetrations on each side of each vault. Vaults shall be labeled to indicate their correct location in the site plan.
5. Pre-cast communication vaults shall be submitted with load calculations signed and sealed by a Professional Engineer.
6. For any directional boring runs, the Installer shall provide a drawing indicating all underground locate surveys and the proposed routing of the conduit as well as the proposed depth.

1.7 WORK EXTERNAL TO THE BUILDING

A. General: Any work external to the confines of the building as shown on the drawings shall be governed by provisions of this specification.

PART 2 - PRODUCTS

2.1 TELECOMMUNICATIONS OUTLET CONDUIT

A. All conduits as indicated in Master Specifications Division 26

B. For new construction or projects utilizing Cat 6A cabling, a minimum of 1" conduits must be installed for telecommunications outlet box locations

2.2 TELECOMMUNICATIONS OUTLET BOX

A. Telecommunication outlet electrical boxes shall be used to make terminations to limited energy systems described in Division 27 and Division 28 specifications. Telecommunications outlet boxes shall have the following specifications:

1. Material: Steel, 0.6858mm. thickness (minimum) with galvanized zinc coating, 0.013mm. (minimum) thickness on both sides of bracket
2. Construction: Cleanly punched knockouts, welded at 8 points (minimum) with softened edges (no sharp edges)
3. Size (HxW): 4-11/16 x 4 inch to 4-11/16 x 2-1/8 inch
4. Depth: 2-1/8 inch
5. Knockout dimension: At least one inch
6. Listing: UL or ETL

B. Telecommunications outlet electrical boxes shall be provided with the appropriate one gang, or two gang rings selected for the proper thickness of the drywall in all areas. Standard telecommunications outlets shall use one gang ring, but design documents might indicate the use of two gang rings in selected areas.

C. For new construction or projects utilizing Cat 6A cabling, the telecommunications outlet boxes must be two gang to allow for proper bend radius.

D. Knockouts in telecommunications outlet boxes shall not be field punched.

E. Basis of design: Raco, Steel City, Randal Industries Inc.

2.3 WIREWAYS

A. General use: Wireways are to be used in the following cases:

1. As a long pull box for conduits less than two inches
2. To store cable slack above wall mounted panel equipment such as access control panels

B. General: Wireway shall be sized as shown on drawings, NEMA 1, lay-in type. Wireway sides and bottom shall contain no knockouts unless shown otherwise on the drawings. The Installer shall punch holes required. The cover shall be hinge type with quarter turn fasteners to hold cover shut. Covers and bodies shall be 16-gauge steel. Wireway shall be as manufactured by Hoffman Engineering Company, Square "D" or Steel City.

2.4 SUPPORTING DEVICES

A. Hangers: Hangers shall be made of durable materials suitable for the application involved. Where excessive corrosive conditions are encountered, hanger assemblies shall be protected after fabrication by galvanizing, or approved suitable preservation methods.

B. Non-continuous cable supports (J-Hooks) shall provide a bearing surface of sufficient width to comply with required bend radii of high-performance cables; UL Listed.

C. Non-continuous cable supports shall have flared edges to prevent damage while installing cables.

D. Non-continuous cable supports sized 1 5/16 of an inch and larger shall have a cable retainer strap to provide containment of cables within the hanger. The cable retainer strap shall be removable, reusable, and suitable for use in air handling spaces and must be of metallic material. Nylon and plastic cable supports are not acceptable.

E. Non-continuous cable supports shall have an electro-galvanized or G60 finish and shall be rated for indoor use in non-corrosive environments.

F. Stainless Steel non-continuous cable supports are intended for indoor and outdoor use in non-corrosive environments or where only mildly corrosive conditions apply.

G. Anchoring: Insert anchors shall be installed on concrete or brick construction, with hex head machine screws. Recessed head screws shall be used in wood construction. An electric or hand drill shall be used for drilling holes for all inserts in concrete or similar construction. Installed inserts and brick, shall be near center of brick, not near edge or in joint. Drilled and tapped, and round head machine screws shall be used where steel members occur. All screws, bolts, washers, etc., used for supporting conduit or outlets shall be fabricated from rust-resisting metal or accepted substitution. Gunpowder or lead set anchors are not permitted.

H. Accessories: Non-continuous support systems shall be provided with adequate mounting accessories depending on the location where the support will be installed, such as beam clips, flange clips, C, and Z purlin clips. Nylon and plastic supports are not acceptable.

I. Accepted manufacturers: Erico or Panduit.

2.5 POWER POLES

A. General Use: Power poles shall be used in retrofit jobs to feed power and telecommunications outlets to open office work areas when the cubicles are not close to a wall. Power poles shall be limited for new construction.

B. Power Pole Types: There are two types of use for the power poles in a project, a pass-thru and a terminated power pole. A pass-thru power pole is the one used solely as a raceway, so that power and low voltage cables can come down from the ceiling into the power pole and out a grommet (or a flex conduit, for power) into a modular furniture track. No terminations are done at the actual power pole. A terminated power pole shall be used as a termination device for a device (i.e., large printer) or furniture (without a modular furniture track). In such cases, the power termination shall be a NEMA 5-20 duplex receptacle, and the data terminations shall be a standard telecommunications outlet. The Project Engineer shall clearly indicate the power pole type to be used in the project. Feeding modular furniture from a terminated power pole with long patch cords is not an accepted method of construction.

C. The Project Engineer shall estimate the size of the power pole used based on the number of cables to be used on each case. The size selection calculation shall be used based on CAT6A cables, even if the power pole is to be used in a leased site.

D. A single power pole with a divider shall be used for power and data. Separate power poles are not required.

E. Approved manufacturers: See Division 27 approved material list.

2.6 CABLE TRAY AND FITTINGS (BASKET TYPE)

A. General use: Basket tray shall be used in hallways and other interior spaces to collect telecommunications wiring going back to the telecom room. They shall not be used in outdoor areas nor inside the telecom room, data centers, or equipment rooms.

B. General Description: Basket type cable tray system is to be constructed of welded steel wire mesh with continuous safety edge wire lip. The provided mesh system permits for continuous ventilation of cables and maximum heat dissipation.

C. Materials: Carbon Steel Cable management system to be manufactured from high strength minimum 6-gauge steel wires. Wire to be welded and bent prior to surface treatment.

D. Finishes: Electro-plated zinc Galvanizing. Electrodeposited zinc coating applied to an average thickness of 0.7 mils to 0.8 mils.

E. Cable Tray: Dimensions are as shown on drawings.

F. Fittings: Cable tray fittings to be field manufactured from straight sections through use of hardware and instructions recommended by manufacturer. Provide drop-off, 90° kits and tees as required using manufacturer fabricated products and installation guidelines.

G. Installation: Cable tray system to be installed using splice connectors, and support components per recommendation of manufacturer.

H. Loading Cable tray system to be installed and supported per NEMA VE-2 and manufacturer's suggested span load criteria.

I. The cable tray system shall be UL listed and classified as a continuous bonded tray system providing a continuous grounding path. Cable tray system is required to be tested for grounding adequacy per NFPA 70B, Chapter 18 with a maximum allowable resistance of 1 ohm (Ω).

J. Approved Manufacturers: See Division 27 approved material list.

2.7 TUBULAR RUNWAY CABLE TRAY AND FITTINGS

A. General use: Tubular runway shall only be used inside the telecom rooms, data centers, or equipment rooms.

B. Materials: ASIM A36 steel bar.

C. Finish: Baked powder painted surface treatment using polyester coating.

D. Finish color: To match equipment cabinet finish color. See Specification Section 27 10 00 Technology General Provisions.

E. Cable management: Tray width as shown on drawings.

F. Fittings: Cable management fittings and hardware recommended by manufacturer. Provide drop-off, 90°, and tees as required for the equipment served and support of the cable. Provide at least one large radius drop off for each rack/cabinet in the project.

G. Installation: Cable management system to be installed using support components as recommended by the manufacturer.

H. Loading: Cable management system to be installed and supported per manufacturer's suggested span load criteria.

I. Approved Manufacturers: See Division 27 approved material list.

2.8 PLYWOOD BOARDS IN TELECOMMUNICATION ROOMS

A. General use: Backboards shall be installed in each TR, MDF, IDF and the MTR on walls to a height of 8' AFF.

B. Acceptable options for plywood boards are:

1. 3/4-inch AC Grade fire rated plywood painted with two coats of fire-retardant paint on front sides and on the edges.
2. Pre-manufactured plywood system for telecommunications such as Ready Spec by Pathways and Spaces Inc.

C. Other specifications:

1. All imperfections and voids shall be filled, sealed, and sanded prior to being primed and painted.
2. Fire retardant coating shall be tested to UL723, "Test for surface burning characteristics of building materials."
3. Paint color shall be grey, white, or blue.
4. Fire retardant plywood shall be clearly labeled with the name of the Backboard Manufacturer, UL Classification of the Fire-Retardant Coating, NFPA 255 Coating Flame Spread Index Class, and the APA Grade of the plywood.
5. Plywood shall be installed with best side out.

2.9 THROUGH WALL/FLOOR FITTING FIRE STOP SYSTEM

A. General use: Through wall/floor fittings shall be used in the following cases:

1. At all four-inch conduit stub ups (from floor below).
2. In such case a cable tray needs to pass through a fire-rated partition. The cable tray shall be stopped before the partition with four-inch conduit sleeves through wall/floor fittings installed and the cable tray shall continue to the other side of the wall.

B. General: These devices covered under this specification are firestop devices for use in through-penetration firestop systems, which are used to maintain the fire rating of the wall or floor, in addition to routing and protecting power and/or communication cables.

C. Classification and use: The firestop device for use in through-penetration firestop systems shall have been examined and tested by Underwriters Laboratories Inc. to UL1479 (ASTM E 814) and bear the U.S. and Canadian UL Classification Mark. The device shall be classified for use in one-, two-, three-, and four-hour rated gypsum, concrete, and block walls and provide a maximum L rating of 3.3 cfm. The device shall be classified for use in one-, two-, and three-hour rated concrete floors having a minimum 4 1/2 inch (114mm) thick reinforced lightweight or normal weight (100-150 pcf) (1600-2400 kg/m3). The devices shall also be tested by Underwriters Laboratories Inc. to UL2043 and determined to be suitable for use in air handling spaces.

D. Materials:

1. Box: The fire stop device box shall be constructed of 16 gage G90 steel.
2. Intumescent block: The fire stop device intumescent block shall be constructed of a graphite base material with expansion starting at 375º F and an unrestrained expansion between 6 to 12 times. The intumescent block shall be held securely by the box to prevent tampering and damage during installation.
3. Adjustable doors: The fire stop device shall have doors or other systems which can be adjusted to prevent materials from penetrating the device if the device is empty or completely full. The doors shall be constructed of 16 gage G90 steel with no. 10-32 screws used to adjust opening size.
4. Heat shield: For retrofit applications where an existing in-wall conduit extends out from the wall more than 7/8 inch [22mm], a UL listed Heat Shield must be used to maintain UL Fire Classification. The firestop device is then installed onto the heat shield.

5. Split conduit and wall plate: For retrofit applications where no conduit is installed in the wall to protect existing cables, a split conduit assembly shall be used to protect cables. After installing the split conduit within the wall, a wall plate shall be installed to cover any irregularly shaped hole cut in the wall. The firestop device is then installed onto the conduit.

E. Sizes: the fire stop device shall be available for two inch and four inch trade size EMT conduit.

F. Finish: The fire stop device shall be available in safety yellow or orange powder coat, custom colors, and an unpainted galvanized finish.

G. Design selection: See Division 27 approved material list.

2.10 INNERDUCT (REGULAR)

A. General use: Innerduct shall be used inside conduits two inches or larger, installed underground, or in a cable tray system to protect fiber optic backbone cables. Armored cable may be substituted.

B. Flexible raceway systems (also referenced as regular innerduct or innerduct): The innerduct type shall be selected according to the environment where it will be installed. Only use HDPE innerduct outdoors, and plenum or riser rated innerduct indoors. The Installer is responsible for determining the proper selection of innerduct when used in air handling spaces. If at the time of bidding, the Installer is not sure what kind of environment is present in the project, the Installer shall price plenum rated materials.

C. For plenum rated applications, the specifications of the innerduct shall be:

1. Material: White or orange Kynar PVDF Resin, a fluoropolymer compound
2. Listing: Innerduct shall be listed to UL 2024, listing shall be printed on the product
3. Marking: Footage shall be sequentially marked
4. Configuration: Corrugated type
5. Pull line: Built in 900 lb. rated tape
6. Size: Shall be available in 3/4 inch through two inch diameters

D. For riser rated applications, the specifications of the innerduct shall be:

1. Material: Orange polyvinyl chloride (PVC)
2. Listing: Innerduct shall be listed to UL 2024, listing shall be printed on the product
3. Marking: Footage shall be sequentially marked
4. Configuration: Corrugated type
5. Pull line: Built in 900 lb. rated tape
6. Size: Shall be available in 3/4 inch through two inch diameters

For outdoor applications, the specifications of the innerduct shall be:

7. Material: High Density Polyethylene (HDPE)
8. Listing: None
9. Marking: Footage shall be sequentially marked
10. Configuration: Corrugated type
11. Pull line: Built in 1,800 lb. rated tape
12. Size: Shall be available in 3/4 inch through two inch diameters

E. All innerducts shall be provided with couplings and accessories suitable for the environment where they will be installed.

F. Design selection: See Division 27 approved material list.

2.11 INNERDUCT (FABRIC TYPE)

A. General use: Innerduct made of fabric material may be used when available raceways are very limited and the use of regular innerduct is not possible due to available space in the raceway system. Innerduct must be used inside conduits two inches or larger and must include fabric type innerduct.

B. High capacity innerduct made of fabric shall be used inside telecommunication raceways to facilitate the pulling of telecommunication wires in those raceways. The fabric type innerduct (also referenced as textile innerduct) shall have the following specifications:

1. Material: White Polyester and Nylon resin polymer
2. Standard Outdoor Textile Innerduct: Micro (33mm), two inch, three inch, and four inch single or multi-cell polyester/nylon textile innerduct containing 1250lb polyester flat woven pull tape
3. Indoor Textile Innerduct (Riser-listed): Micro (33mm), two inch, three inch, and four inch single or multi-cell nylon textile innerduct containing 1250lb polyester flat woven pull tape which meets UL2024A for flame propagation and smoke density values for general applications

4. Plenum-Listed Textile Innerduct: Micro (33mm), two inch and three inch single or multi-cell nylon textile innerduct containing 200lb nylon-resin flat woven pull tape which meets UL2024A for flame propagation and smoke density values for use in air handling spaces

C. The Installer is responsible for determining the proper selecting of the innerduct when used in air handling spaces. If at the time of bidding the Installer is not sure what kind of environment is present in the project, the Installer shall price plenum rated materials.

D. Design selection: See Division 27 approved material list.

2.12 DETECTABLE TAPE

A. General use: A detectable tape shall be installed above all underground conduit at a minimum depth of 18 inches.

B. General: The detectable warning tapes shall be constructed with a solid aluminum foil core with a minimum thickness of 5 mils and three inches wide. The detectable warning shall have printed diagonal warning stripes conformed to APWA color recommendations and bold, black legends to identify what type of utility line is buried below. All detectable tapes used for this shall be labeled “fiber optics buried below”.

C. Design selection: See Division 27 approved material list.

2.13 COMMUNICATIONS VAULT (POLYMER CONCRETE)

A. General use: Polymer concrete communication vaults shall only be installed in green areas away from regular traffic areas or sidewalks.

B. In ground communication boxes also referenced in this document as communications vaults (polymer concrete) shall have the minimum specifications:
   1. Construction Material: Precast Polymer Concrete
   2. Listing: UL listed enclosure, tested to ANSI/SCTE 77
   3. Box vertical design load: 22,500 lbs.
   4. Box vertical test load: 33,750 lbs.
   5. Box lateral design load: 800 lbs./sq. ft.
   6. Box lateral test load: 1,200 lbs./sq. ft.
   7. Box dimensions: To be determined by Engineer depending on quantity of conduits to terminate in the communications vault
   8. Box bottom: open bottom

9. Holes for conduit:
    - Holes for conduit shall be cut at the factory and shall not cover more than 25% of the side of the enclosure
    - All sides of the box shall have holes for conduits, even though conduits might not be shown for all sides in the floor plans
    - No less than two holes for standard four-inch conduit shall be at all sides. All unused holes shall be plug with plastic caps
10. Cover ANSI TIER: 22
11. Cover logo: “Pinellas County”
12. Cover screws: Two tamper-resistant penta head screws
13. Cover accessories: Two - seven inch long cover hooks made of electroplated steel
14. In unsecured areas, keyed security bolts must be used. Example: McGard manhole security bolts

C. Design selection: Hubell Quazite PG style box with HH series cover and accessories or approved equal. Approved equals shall comply with all specifications listed above including construction material.

D. All communication vaults shall be provided with the following accessories:

1. Embedded lifters made of galvanized steel
2. All communications vaults with a concrete lid and ring shall be provided with a grade ring or riser made of concrete to bring the cover up to grade level
3. Embedded pulling irons made or carbon steel galvanized
4. Install cable supports such as j-hooks on vault walls
5. Pea gravel/fill ratio (The ideal depth of gravel varies upon application. A minimum of two-four inches of gravel is a workable baseline. Multiplying the area to be covered by the desired depth yields the volume of gravel you will need)

2.14 COMMUNICATIONS VAULT (PRECAST CONCRETE)

A. General use: Precast concrete communication vaults shall be used in all areas where they could be exposed to vehicular traffic, such as roadways, parking lots or sidewalks.

B. In ground communication boxes also referenced to in this document as communication vaults (precast concrete) shall have the minimum specifications:

1. Construction Material: Concrete 5000 psi at 28 days
2. Rebar: ASTM A 615 grade 60 rebar
3. Mesh: Welded wire fabric ASTM A185 grade 65
4. Size: To be determined by A&E depending on quantity of conduits to terminate in the communications vault
5. Design: Comply with local building code for reinforced concrete

6. Loads:

    - Dead load - concrete 150 PCF
    - Earth cover – 120 PCF

    Lateral Earth pressure on walls:

    - Equivalent fluid pressure above water table + 36 PSF per ft, of depth
    - Equivalent pressure below water table + 81.4 PSF per ft. of depth

7. Live load: AASHTO HS20-44. 32,000 lbs. rear axle loading

C. The cover and frame for the communications vault shall have the following specifications:

1. Style: Hatch type: galvanized cover
2. Cover design (for hatch type or galvanized cover): Hot dip galvanized after fabrication built to an H20 rating for non-roadway applications with dual doors
3. Cover design (for concrete lid with ring): 30-inch diameter cast or ductile iron, built to an H20 rating up to 150 KIO
4. Lettering: Covers shall be label as “Pinellas County”
5. In unsecured areas, keyed security bolts must be used. Example: McGard manhole security bolts

D. All communications vaults shall be provided with the following accessories:

1. Embedded lifters made of galvanized steel
2. All communications vaults:
    - With a concrete lid and ring shall be provided with a grade ring or riser made of concrete to bring the cover up to grade level
    - Pre-cast concrete grade rings and cones shall comply with ASTM C 478, except that the wall thickness shall be six inches minimum
    - Provide interlocking keyways on rings and cones
    - Provide cones with cast in place inserts for the vault frame
3. Embedded pulling irons made or carbon steel galvanized
4. Install cable supports such as j-hooks on vault walls
5. Pea gravel

E. Precast vault construction shall be in the form of monolithic walls or horizontal wall sections. Do not use panel walls.

F. Minimum wall thickness shall be six inches. Design knockout wall panels to accommodate loading pressures defined above.

G. Design and construct vaults to be watertight when subjected to groundwater over the entire height of the vault.

H. Provide openings in precast vaults for piping and access. Provide cast in place inserts in the roof slab and end walls at the locations as shown on the drawings. No field coring of openings is allowed.

I. When communication vaults are made of different sections, they shall be sealed and bonded with a double layer of plastic sealing compound and made watertight. Plastic sealing compound shall comply with Federal Specification SS-S-00210. Fill with mortar all recesses, lifting inserts, or other cavities not filled with plastic sealing compound. Mortar shall comply with ASTM C 387, Type S.

2.15 CONDUIT WATERFALLS

A. General use: All four inch EMT conduit terminations with communication cable entering/exiting the conduit from a cable tray (or tubular runway) system and the vertical separation between raceways is larger than seven inches shall be fitted with a device to control the bend radius of the communication cable to a minimum of a four inch radius. The device to control the bend radius shall be called a conduit waterfall and must comply with all National Electrical Code requirements and TIA/EIA Standards. In addition, the product must be RoHS compliant to meet environmental requirements, UL 94V-0 approved to reduce the spread of flame, and approved by UL for use in air handling spaces. The device to provide bend radius control must support a static load of 40 lbs. (177.9 N) and have a fastening device that allows for incremental adjustments to conform to variances in conduit diameters.

B. Basis of design: Panduit CWF 400 or approved equal.

2.16 FIRE STOP SYSTEMS (FOR SMALL PENETRATIONS)

A. General use: Fire stop system based on caulk shall be used in the following cases:

1. When stubbing into a telecom room, where the wall is rated but the conduit is less than two inches.
2. When conduit sleeves smaller than two inches are used to run low voltage cables through a fire rated partition.

B. General: Fire stop system shall be selected by the PS-SCS Installer as to comply with the following requirements:

1. Selected system shall be UL listed for the condition on which it will be installed. These conditions include wall/slab type (masonry, drywall, etc.), hour rating, and accessibility type.

C. Acceptable systems: See Division 27 approved material list.

2.17 EXPANSION FITTINGS

A. General use: Provide expansion fittings in each conduit run wherever it crosses an expansion joint. Install the fitting on one side of the joint with its sliding sleeve end flush with joint, and with a length of bonding jumper in expansion equal to at least three times the normal width of joints.

B. Location: Provide expansion fittings in each conduit run which is mechanically attached to separate structures to relieve strain caused by shift on one structure in relation to the other.

C. Length: Provide expansion fittings in straight conduit runs above ground which are more than one hundred feet in length.

PART 3 - EXECUTION

3.1 INSTALLATION PRACTICES

A. See additional requirements indicated in part 3 of Specification Section 27 00 10 Technology General Provisions.

3.2 TELECOM ROOM DESIGN: Requirements by BTS for telecom rooms shall be:

A. Size: Telecom rooms (IDF & MDF) shall be no less than 12’ by 15’, with enough space for at least three racks. If the room requires housing cabinets with equipment like servers, security racks, or Audio-visual racks, the size of the room might need to be increased to accommodate such equipment. Telecom rooms shall not be shared spaces with electrical equipment such as transformers, and HVAC equipment not serving the telecom room. Telecom rooms should not be adjacent to large mechanical or elevator rooms. Electrical panels are acceptable if they are only serving outlets inside the Telecom room. All Telecom rooms must adhere to current ADA specifications for access and mobility including but not limited to:
   1. MDF
   2. IDF
   3. TSER
   4. Data center rooms
   5. Other - Security or Audio-Visual equipment rooms, etc.

B. Access: Access to telecom room shall not be through electrical rooms or through an enclosed office space. Access shall be through a hallway or a common space in the building.

C. Location: Telecom rooms shall be located centered in the area they are serving to maximize the coverage of the room. When telecom rooms are located far to a side of the building, the chances of having to add a second room, increase. Telecom room shall be on the same floor as the areas being served. Telecom rooms shall not be planned directly below any restrooms or kitchens.

D. Architectural Elements: All telecom rooms shall have the following finishes:

1. All walls shall be from slab to deck/roof above. If the room will hold any DAS equipment for life safety, all walls shall be two-hour rated. If no DAS equipment will be installed inside the room, the walls do not require a fire rating.
2. All floors shall have anti-static VCT flooring. Sealed concrete finish is not acceptable.
3. Ceiling is not required inside the telecom rooms unless the structure above must be sprayed with fire protection. In such case, a ceiling is required and shall be mounted as high as possible to make sure all tubular runways and conduit stubs inside the room are below the ceiling.
4. When possible, door shall open out. Doors to telecom rooms shall have card access. If the building will not have card access, the door shall have a cypher lock to provide access.
5. Telecom room shall not have floor drains.
6. Telecom room shall not have windows.
7. Plywood boards shall be installed in all walls of the telecom room.
8. Walls and plywood must be painted with fire rated paint.

E. Cooling: Cooling shall be provided for all telecom rooms through dedicated equipment. Feeds from existing duct work from office spaces to provide cooling to telecom rooms is not acceptable. The cooling load shall be estimated per equipment load and growth by the Engineer but in all cases, the load shall be no less than one ton of cooling per rack in the room. The standard room layout shall include three racks. Data centers and other larger equipment room shall be designed with larger cooling loads.

F. Redundancy: Telecom rooms do not require redundant cooling equipment. Data centers and other larger equipment rooms require redundant cooling equipment. In all cases, temperature alarms must be provided inside all telecom rooms, connected to the building automation system, monitored by building manager.

G. Location of Cooling Equipment: Smaller Direct Expansion (DX) air conditioning equipment will be located above the door to the telecom room. Drainpipes for the DX equipment will

be run outside of the telecom room. If the room is cooled through VAV or air handlers, such equipment shall be located outside of the telecom room and air shall be ducted in and out of the room. VAVs or air handlers above racks are not acceptable.

H. Fire Protection: If local code requires, all rooms in the building must have fire sprinklers. Fire sprinkler heads must not be located above the racks or equipment and must be located between the racks and the walls. Standard telecom rooms do not require a clean agent fire suppression system. Data Centers and other large equipment rooms will require clean agent fire suppression. Telecom rooms with DAS equipment also requires clean agent fire suppression. All fire protection must adhere to local codes and standards.

I. Fire Alarm Relays and Fire Alarm Monitoring: Fire alarm relays might be required next to access control panels if electromagnetic locks are being used as the main locking device for access-controlled doors. Fire alarm monitoring modules are required for monitoring DAS equipment head end or distribution equipment, when mounted in telecom rooms.

J. Lighting: All telecom rooms shall have lighting to accomplish at least 50 ft. cd in all areas. Light fixtures shall be located both in front and behind the racks, never directly above the racks. Maintain industry standards for separation of high and low voltage systems.

K. Power Receptacles: Telecom rooms shall be designed with three types of power outlets as follows:

1. Convenience outlets for connecting power tools or temporary equipment shall be installed at each wall (one per wall) at 18 inches A.F.F. These outlets do not need to be on generators or dedicated circuits. They shall be terminated in a duplex NEMA 5-20 receptacle.
2. Wall power for wall mounted equipment shall be a dedicated circuit mounted at 48 inches A.F.F on generator backup power. For paging, DAS and CATV equipment, power shall be terminated in NEMA 5-20 quad receptacles. For access control panels, the power termination shall be coordinated by the A&E with the equipment selection, it could be a junction box (hard wired) or a quad receptacle NEMA 5-20.
3. Rack power each rack shall be provided with at least one power outlet on dedicated circuits, mounted in between racks close to the floor and plugged into the generator and UPS power if available in the building. The type of termination plug shall be coordinated with the UPS or PDU indicated in Specification Section 271000 Technology General Provisions. These receptacles shall be simplex receptacles and could be an L14-30 or similar plug. Do not assume they will be a NEMA 5-20 receptacle. When rooms have equipment cabinets, power receptacles could be different from wiring racks. In such cases, all power receptacles shall be coordinated with BTS.

L. Other MEP Infrastructure: The following infrastructure shall not pass through the telecom room:

- Power feeders serving panels not located inside the telecom room
- Drainpipes or rainwater leaders
- Water mains for fire suppression, potable water
- Chilled water pipes
- Hydraulic fluid lines for elevators

M. Rack Layout: Racks and cabinet shall be lined in rows, side by side along the length of the room, with no less than three feet of clearance from the front of the rack to the wall and from the back of the rack to the wall. A rack row, including vertical manager, shall start no closer than six inches from the side wall. Refer to Appendix E, diagram 21, page 187.

N. Conduit Stub Ups: When telecom rooms have conduit stub ups, they shall be located as close to the wall as possible. Any stub ups from below grade or floor below shall extend no less than 12 inches above the finish floor. The amount of conduit stubs shall be calculated by the A&E to not use more than 50% of day one capacity.

O. Tubular Runway: Tubular runway cable tray shall run above racks and along all walls in the room, with the exception of the door if the tubular runway will be lower than the door. Tubular runway shall be mounted six inches above the racks and shall be no less than 12 inches in width. If the telecom room will hold more than 250 cable drops, the tubular runway shall be expanded to 18 inches in width or two layers of 12-inch tubular runway shall be provided. At all conduit stub ups, a section of vertical tubular runway shall be installed to strap the cables in route to the horizontal tubular runway. If the room has conduit stubs higher than two inches above the racks, a section of vertical runway shall be installed below the conduit support the cables and relief tension.

3.3 INDOOR CONDUITS BELOW GRADE AND ABOVE GRADE

A. Bend Radius: Conduits shall utilize long radius sweeps at all 90-degree transitions. The inside radius of a bend in conduit shall be at least six times the internal diameter. When the conduit size is greater than two inches, the inside radius shall be at least ten times the internal diameter of the conduit. For fiber optic cable, the inside radius of a bend shall always be at least ten times the internal diameter of the conduit.

B. Maximum Distance Between J Boxes: For indoor installation, no section of conduit shall be longer than one hundred feet or contain more than two 90-degree bends between pull points or pull boxes.

C. Labeling: All indoor conduits shall be labeled at both ends when these conduit runs are continuous between two rooms and going through multiple walls or slabs. Labeling materials shall be as indicated in Specification Section 27 00 10 Technology General Provisions. Conduit sleeves two inches or larger penetrating just one wall is not required to be labeled.

D. Pull Strings: All conduits for technology systems shall be installed with pull strings. Pull strings shall be nylon and shall be impervious to moisture. Pull strings installed in one inch and smaller conduits shall have a tensile strength of not less than 30 lbs. Pull strings installed in conduits larger than one inch shall have a tensile strength not less than 200 lbs.

3.4 UNDERGROUND TELECOMMUNICATIONS DUCT LINES

A. Description: Underground duct lines shall be of individual conduits. The conduit shall be of plastic, PVC Schedule 40. The conduit used to bring telecom service into a building shall not be smaller than four inches in diameter, inside.

B. Concrete Encasing: This is not generally required for telecom conduits. In cases where telecom lines are carrying sensitive services, such as emergency call (911) circuits, they may be required.

C. Duct Lines: Shall have a continuous slope downward toward communication vaults and away from buildings with a pitch of not less than 0.125 inches per ft. Changes in direction of runs exceeding a total of ten degrees either vertical or horizontal shall be accomplished by long sweep bends having a minimum radius of curvature of twenty-five feet, except that manufactured bends may be made up on one or more curved or straightened sections or combinations thereof. Manufactured bends shall have a minimum radius of 48 inches.

D. Distance: The maximum distance between vaults (manholes) shall not be longer than five hundred feet or contain more than two 90-degree bends between pull points or pull boxes are required.

E. Conduits:

1. Shall terminate in end-bells where duct lines enter manholes or communications vaults.
2. Provide four to six inch reducers as required.
3. Separators shall be of pre-cast concrete, high impact polystyrene, steel, or any combination of these.
4. The joints of the conduits shall be staggered by rows to provide a duct line having the maximum strength.

5. During construction, partially completed duct lines shall be protected from the entrance of debris, such as mud, sand, and dirt by means of suitable conduit plugs.
6. As the duct line is completed, a testing mandrel not less than 13 inches long with a diameter a 1/4 inch less than the size of the stiff bristles shall be drawn through until the conduit is clear of all particles of earth, sand, or gravel; conduit plug shall then be immediately installed.
7. Plastic conduit, fittings and joints should not be stored in the sun or weather, heated spaces, or unevenly supported during storage. Use and installation shall be in accordance with the National Electrical Code requirements for the installation of non-metallic rigid conduit. Plastic conduit shall be protected against the direct rays of the sun prior to installation. Conduit shall be Carlon Type EB, Queen City Plastics, or accepted substitution. Conduit shall be UL listed and conform to NEMA Standard TC6 1972.
8. Above ground stub-ups must be rigid.
9. All ends must have bushings.

F. Trenches for Duct Banks: Shall be completely dry before setting conduits or pouring concrete. Well pointing as required shall be provided, if necessary, to keep trench dry.

G. Excavation: Backfilling shall be in layers not more than eight inches deep and shall be thoroughly tamped. The first layer shall be earth or sand, free from particles that would be retained on a 1/4-inch sieve. The succeeding layers shall be excavated material having stones no larger than that which would pass through a four-inch ring. The backfill shall be level with adjacent surface, except that in sodded or paved areas, a space equal to the thickness of the sod or paving shall be left. See Appendix D - TG106 Premises Cable Conduit Fill Quick Reference.

H. Finish: The surface disturbed during the installation of duct shall be restored to its original elevation and condition if not refinished in conjunction with site work.

I. Plugging: All unused conduit openings shall be plugged or capped with a suitable device designed for the purpose; caulking compound shall not be used for plugging conduit openings.

J. Stubs: Spare conduit stubs shall be capped and marked in the field and accurately dimensioned on the as-built drawings.

K. Spacers: All conduit runs underground or stubbed above floor shall be separated with plastic interlocking spacers manufactured specifically for this purpose or shall be strapped to Kindorf channel supported by conduit driven into the ground or tied to steel.

L. Minimum Burial Depth: All underground raceways (with exception of raceways installed under floor slab) shall be installed in accordance with Section 300.5(I) of the NEC except

that the minimum cover for any conduit or duct bank shall be two feet, unless otherwise indicated. See Appendix D

M. Directional Boring: For all applications requiring directional boring the following installation practices shall be followed:

1. The Installer shall select the directional boring equipment based on the length of the pulls, soil conditions, pipe size, and pipe quantities.
2. When multiple pipes are run, each pipe must have permanent identification markings at each end.
3. Any pipe run less than 1,500 feet, shall be run as a single pull without splices.
4. Any splices done to HDPE pipes shall be done with manufacturer's approved methods.

3.5 INSTALLATION OF COMMUNICATIONS VAULTS

A. Excavating and Backfilling for Vaults**:** Provide six-inch minimum thickness 3/4-inch crushed rock over the full width of the vault base and extend 12 inches beyond the edges of the vault. After repairing the waterproofing, backfill and compact around the vault with structural backfill material. Excavated material may be used for structural backfill, provided it conforms to the standard specifications for structural backfill material.

B. Installing Vaults and Risers: Set each concrete vault section or riser plumb on a double layer bed of sealant at least 1/2-inch-thick to make a watertight joint with the preceding unit. Point the inside joint and wipe off the excess sealant.

C. Waterproofing: Waterproofing shall be factory applied to all exterior surfaces of vaults and risers. This includes the bottom of the vault to be coated as an exterior surface. Apply two coats at a rate of 65 sq. ft. per gallon per coat. Prior to backfilling, field apply waterproofing material on joints and damaged surfaces. Protect coating from damage during backfilling and compacting.

3.6 CUTTING AND PATCHING

A. Core Drilling: The Installer shall be responsible for all core drilling as required for work under this section, but in no case shall the Installer cut into or weld onto any structural element of the project without the written approval of the A&E. Any post tension slabs or slabs with embedded electrical raceways shall be X-rayed prior to coring by the Installer.

B. Cutting and Patching: All cutting, rough patching, and finish patching shall be provided as specified in the contract documents. All cutting and patching shall be performed in a neat and professional manner.

C. Openings and Sleeves: Locate all openings required for work performed under this section. Provide sleeves, guards, or other accepted methods to allow passage of items installed under this section.

D. Roof Penetration: All roof penetration for raceways part of technology systems shall be approved by A&E prior to execution of work. All roof penetrations shall be as accepted by the roof manufacturer.

3.7 IDENTIFICATION OF BOXES

A. Tags: During installation of pull strings, all pull strings shall be marked with waterproof vinyl tags indicating where the opposite end may be found.

3.8 BLANK PLATES

A. Plates: Unless otherwise noted all unused outlet boxes shall receive blank plates matching the finish of plates for electrical devices in the same room.

3.9 RACEWAY INSTALLATION

A. Support: All raceways shall be run in a neat and professional manner properly supported in accordance with the latest edition of the NEC code and BICSI guidelines. Supporting conduit and boxes with wire is not acceptable. Exposed raceways, where allowed, shall be supported with clamp fasteners with toggle bolt on hollow walls with no lead expansion shields on masonry. All conduits shall be securely fastened in place with at least one support per eight-foot section. Support within one foot of changes in direction. All required hangers, supports, and fastenings shall be provided at each elbow and at no more than one foot from the end of each straight run terminating at a box or cabinet. The use of perforated iron for supporting conduits shall not be permitted. The required strength of the supporting equipment and size and type of anchors shall be based on the combined weight of conduit, hanger, and cables. Horizontal and vertical conduit runs may be supported by one-hole malleable straps, clamp-backs, or other accepted devices with suitable bolts, expansion shields (where needed), or beam-clamps for mounting to building structure or special brackets.

B. Hanger Installation: Where two or more conduits one inch or larger run parallel, trapeze hangers may be used consisting of concrete inserts, threaded solid rods, washers, nuts, and galvanized "L" angle iron, or Unistrut cross members. These conduits shall be individually fastened to the cross member of every other trapeze hanger with galvanized cast one-hole straps, clamp backs, bolted with proper size cadmium machine bolts, washers, and nuts. If adjustable trapeze hangers are used to support groups of parallel conduits, U-bolt type clamps shall be used at the end of a conduit run and at each elbow. J-bolts, or approved clamps, shall be installed on each third intermediate trapeze hanger to fasten each conduit.

C. Non-Continuous Cable Supports Installation: J-hooks shall be installed only as recommended by manufacturer not exceeding the load ratings of the device. Install non-continuous cable supports in spans no longer than four feet. Whenever there are changes in elevation additional supports shall be required to avoid stress on cable or sharp bends.

D. Fire Stopping: For four-inch sleeves, the PS-SCS Installer shall provide through wall/floor fittings, firestop system, and other smaller sleeves or wall penetrations through fire rated partitions. The PS-SCS Installer can use the same type of firestop system, or a fire stop system for small penetrations in compliance with products described in part two of this specification.

E. Penetrations in Fire Rated Partitions: Installation of electrical boxes or equipment backboxes in fire rated walls and smoke barriers shall follow the following requirements:
   1. Electrical boxes and or technology system backboxes can be installed in one or two hour rated walls when all requirements indicated in the proper Building Code, National Electrical Code, and nationally recognized testing laboratories are met.
   2. As a summary, some of the requirements indicated by the codes listed above are:
      a. Boxes shall be metallic or listed for that purpose
      b. The area of the boxes shall not exceed 16 square inches, provided the aggregate are of the openings through the membrane does not exceed 100 square inches in any 100 sq. ft. of wall area
      c. The spacing between the wall membrane and the box shall not exceed 1/8 of an inch
      d. Boxes on opposite sides of the walls shall be separated by no less than 24 inches, or boxes shall be covered by listed putty pads, or a listed material and method used
   3. Electrical boxes or technology system backboxes shall not be installed in a 3- or 4-hour fire rated walls.

F. Routing: Conduits shall run parallel to building walls wherever possible, exposed, or concealed as specified, and shall be grouped. Crisscrossing of conduits shall be minimized.

G. Protection During Construction: All raceway runs, whether terminated in boxes or not, shall be capped during construction until wires are pulled in and covers are in place. No conductors shall be pulled into raceways until the raceway system is clean and complete.

H. Protective Bushings: All un-terminated conduits shall have an insulated protective bushing to avoid cable damage at the edge of the conduit.

I. Avoiding EMI: To avoid EMI for Telecommunications cabling and/or conduit containing cabling, all raceways shall provide clearances a minimum of four feet from motors or transformers; one foot from conduit and cables used for electrical-power distribution; and five inches from fluorescent lighting. Raceways shall cross perpendicular to fluorescent lighting, electrical-power cables, and conduits. The Installer shall not place any raceways alongside power lines.

J. Coordination: All raceways shall be kept clear of mechanical equipment and plumbing fixtures to facilitate future repair or replacement of said fixtures without disturbing wiring. Except where it is necessary for control purposes, all raceways shall be kept away from items producing heat.

K. Masonry Installation: All raceway runs in masonry shall be installed at the same time as the masonry so that no face cutting is required, except to accommodate boxes.

L. Use of Conduit in Different Areas: When low voltage cable technology systems must be run above ground in a space without an accessible ceiling, both interior and exterior, all cable runs shall be encased in conduit continuing the raceway to the nearest accessible ceiling in the direction of the telecom closet or grouping the raceways into a single larger diameter conduit with the same or larger cross-sectional area than the sum of all the conduits coming into it. The use of J-Hooks to support low voltage cables in areas with no ceiling or a hard ceiling shall not be allowed. This type of condition is often not indicated in the drawings. Design drawings do not show conduits smaller than two inches. Per BTS standards, it shall be provided as stated herein.

M. Use of Conduit for Different Systems: The following paragraphs indicate the design intent for all technology systems raceways:

1. For all systems under Division 27: Conduit stub up from the outlet to the nearest accessible ceiling, non-continuous support system to the nearest cable tray system or telecom room.
2. Non-continuous support systems (J-Hooks) are allowed in projects as a horizontal support system for cables above ceilings.
3. Conduits feeding gas pump islands must be explosion-proof and meet municipal code.

3.10 CABLE TRAY INSTALLATION

A. Inspection: Examine area for clearances to allow proper installation of the tray according to the routing indicated on the drawings. Check existing building steel and other supporting structures to establish the type of tray hangers to be used at the proper spans.

B. Installation Criteria: Installation shall be in accordance with equipment manufacturer's instructions with recognized industry practices to ensure that cable tray equipment complies with requirements of NEC and applicable portions of NFPA 70B. Reference NEMA-VE2 for general cable tray installation guidelines

C. Support: Cable tray support shall be by means of welded angle brackets to structural components. Brackets shall be as manufactured by the cable tray manufacturer. Complete straight section of cable tray shall have at least one support at 1/4 of the length of the section. Additional supports are required at tray ends, offsets, bends, and changes of elevation.

D. Grounding: All conduits terminating within 12 inches of a cable tray shall be bonded with a ground in accordance with the National Electric Code.

E. Coordination: When applicable the preference is to install horizontal cable trays above water and steam piping. Coordinate installation of tray with other trades for clearances, to avoid conflicts. A minimum of 12-inch access headroom shall be provided and maintained above the cable tray system or cable runway. A minimum of six-inch access headroom shall be provided and maintained at both sides (one side of the tray is supported at the wall). Care shall be taken to ensure that other building components (e.g., air conditioning ducts, pipes, structural elements) do not restrict access. The cable tray must be installed with at least three inches of clear vertical space above the ceiling tiles and support channels (T-bars) to ensure accessibility. When crossing other building components with the cable tray or runway the above specified clearances shall be maintained.

3.11 RUNWAY CABLE TRAY SYSTEM INSTALLATION

A. General: Runway cable tray system shall be installed following manufacturer’s recommendations for installation.

B. Support Locations: Supports shall be provided as recommended by the manufacturer, but as a minimum support shall be located as follows:

1. Before each 90-degree turn
2. No continuous section shall have more than three feet of span without a support
3. At each two-post rack or four-post rack
4. At each change in elevation

C. Support Type: When runway cable tray is to be installed against the wall, the only support type to be used is a wall bracket supporting from the bottom of the tray. For sections of runway cable tray to be installed over racks, the preferred support system is to the racks themselves. Trapeze style support brackets shall only be used when no other method of support is possible. Center hung support systems are not permitted.

D. Vertical Runways: Runway cable tray systems shall be installed vertically and continuously in all telecommunications rooms for the project from sleeves coming from the ground (or floor below) to the sleeves going to the floor above, whether indicated in the drawings or not. The runway installed shall have the same width as the total width of the sleeves coming into the telecommunications room, although multiple sections installed together are acceptable. If the sleeves from the floor below to the floor above do not line up in a straight line, two vertical sections are acceptable, one to the horizontal runway cable tray and one from the horizontal runway cable tray to the sleeves above. Runway cable trays installed vertically shall have supports to the floor, wall, and slab above.

E. Cable Dropout: At each rack or cabinet that has a runway cable tray system running on top of it, a cable dropout shall be installed to protect the bend radii of the cable. This dropout accessory shall have a bend radius of no less than four inches.

F. Bonding: Any two continuous sections of runway cable tray system shall be bonded together with a #1 bonding jumper (600A) 15 inches long. All bonding jumpers shall be made of steel with yellow, zinc-dichromate finish. All fasteners shall be made of steel with zinc-plated finish

G. Protective End Caps: All end sections of runway cable tray sections shall be protected with plastic protective end caps.

3.12 INSTALLATION OF INNERDUCT

A. Protect products from the effects of moisture, UV exposure, corrosion, and physical damage during construction.

B. When inner duct is laid on a cable tray, it shall be strapped to cable tray with nylon ty-wraps at periodic intervals of no less than four feet.

C. When multiple inner ducts are in a single conduit, and innerduct are of the same size, they shall be different colors for identification or have different color electrical tape wrapped on the ends to identify them at the end of each conduit.

3.13 AS-BUILT DOCUMENTS AND CLOSEOUT INFORMATION

A. See Specification Section 27 00 10 Technology General Provisions (Section 3.7) for as-built documents and closeout information on these requirements.

END OF SECTION 27 05 28

SECTION 27 10 00 – STRUCTURED CABLING SYSTEM

PART 1 - GENERAL

1.1 PURPOSE OF THIS DOCUMENT

A. The purpose of this specification section is to indicate to A&E and designers of low voltage infrastructure, working in construction or renovation projects for Pinellas County Government, the design requirements by BTS when it comes to such infrastructure. This document will be a starting point for completing a set of construction documents but **SHALL NOT** be used unedited as a bid document.

1.2 SCOPE OF WORK

A. General Scope: The Project Engineer (A&E) shall provide a complete design of the Structured Cabling system (SCS) and the Contractor shall provide a complete system including all raceways, wiring, termination, testing, warranty, and as-built documents as indicated in this specification. The design and construction will have oversight from BTS, but the Project Engineer shall also provide oversight on the work done by the Contractor or Installer. All design drawings and project specifications shall be provided by the Project Engineer. Additionally, the Project Engineer shall provide BTS with a list of all wiring counts in the project, per telecom room, for BTS to estimate the amount of active equipment required to be provided for the project. This list shall be provided at all design deliverables, not just at the end of the design.

B. System Scope: Furnish, install, test, and certify complete with all accessories, an ANSI/TIA 568C SCS with a minimum 25-year performance channel warranty for the entire system from the manufacturers and a minimum one year warranty for materials and labor from the SCS Installer for all components not covered under the manufacturer's 25-year warranty. The goal of the project is to provide an enhanced SCS that shall serve as a vehicle for the transport of voice telephony, data, audio, video, security, and low voltage devices for building controls and management, throughout the building, and from building to building from designated demarcation points to outlets located at various desks, workstations, and other locations as indicated in the contract drawings.

C. Coordination with Other Trades: It is the responsibility of the Installer of the SCS to verify and advise the Installer of the raceway infrastructure (conduit, boxes, cable tray, in ground boxes, etc.) for this system, on raceway routing to minimize the wiring distances to the telecommunication room. When J-Hooks are acceptable for use in structured cabling system, all J-Hooks and supports for these devices shall be in the scope of work of the SCS Installer.

D. Demolition and Temporary Work: During execution of the work, all required relocation, demolition, temporary connections, rerouting, etc., of existing cabling, equipment, and systems in the existing building areas where the work is required, shall be performed by the SCS Installer as indicated on the drawings, or as required by job conditions, and as determined by the Architect in the field, to facilitate the installation of the new systems. The Owner shall require continuous operation of the existing systems while demolition, relocation work, or new tie-ins are performed.

E. Additional Scope: Refer to responsibility matrix indicated in Specification Section 27 00 10 Technology General Provisions for detail on who is providing each part of the scope.

F. Cable types: For leased or lease-to-own facilities used by Pinellas County, the SCS to be used shall be Category 6 cables and single mode or multimode fiber optics, including renovations. For Pinellas County owned facilities, the SCS shall be Category 6A and single mode fiber including renovations and new construction. These specifications cover both cases. The project engineer shall select the correct paragraphs to be used on each specific project.

G. Specific Part Numbers: These specifications cover general structured cabling elements and their performance-based specifications. Please contact BTS for specific part numbers.

1.3 RELATED DOCUMENTS

A. Supplemental: Refer to the specification sections identified below for additional requirements, which are supplemented by this section:

1. 27 00 10 Technology General Provisions
2. 27 05 28 Raceways for Technology
3. 27 05 26 Grounding and Bonding for Communication Systems

B. Standards: All work related to the SCS shall adhere to the following industry codes and standards latest edition:
1. ANSI/TIA-568.0-D “Generic Telecommunications Cabling for Customer Premises” with addendums and errata
2. ANSI/TIA-568.1-D, “Commercial Building Telecommunications Cabling Standard” with addendums and errata
3. ANSI/TIA-568-C.2, “Balanced Twisted- Pair Cabling Components Standard” with addendums and errata
4. ANSI/TIA-568.3-D, “Optical Fiber Cabling Component Standard” with addendums and errata
5. ANSI/TIA-569-D, “Telecommunications Pathways and Spaces” with addendums and errata

6. ANSI/TIA-606-C, “Administration Standard for Telecommunications Infrastructure” with addendum and errata
7. ANSI/TIA-607-C, “Generic Telecommunications Bonding and Grounding (earthing) for Customer Premises” with addendum and errata
8. ANSI/NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings
9. ANSI/TIA 758-B, “Customer-Owned Outside Plant Telecommunications Infrastructure Standard” with addendum and errata
10. ANSI/TIA 862-B, “Structured Cabling Infrastructure Standard for Intelligent Building Systems” with addendum and errata
11. ANSI/TIA-1152-A, “Requirements for Field Test Instruments and Measurement for Balanced Twisted Pair Cabling” with addendum and errata.
12. ANSI/TIA-526-7-A, “Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant”
13. ANSI/TIA-526-14-C, “Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant”
14. TIA-598-C, Optical Fiber Cable color coding
15. IEC/TR3 61000-5-2 - Ed. 1.0 and amendments. “Electromagnetic compatibility (EMC) - Part 5: Installation and mitigation guidelines - Section 2: Earthing and cabling”
16. ANSI/TIA-942-B, “Telecommunications Infrastructure Standard for Data Centers” with addendum and errata
17. ANSI/BICSI 002-2014, Data Center Design and Implementation Best Practices
18. ANSI/NFPA 70 “National Electrical Code”, CSA C22.1.
19. BICSI Telecommunications Distribution Methods Manual (TDMM)
20. BICSI Telecommunications Cabling Installation Manual (TCIM)
21. BICSI Customer Owned Outside Plant Manual (COOPM)
22. Local County/City Codes, Ordinances and Regulations
23. Underwriters Laboratories (UL)
24. FCC - Federal Communications Commission
25. ADA Requirements
26. Occupational Safety and Health Regulations (OSHA)
27. National Fire Protection Association (NFPA)
28. ANSI/TIA-1179, Healthcare Facility Telecommunications Infrastructure Standards
29. Florida Statutes and Administrative Rules
30. Manufacturers Product Cabling Catalogs
31. Manufacturers Training Manuals (Design and Installation)

C. General: Installation practices for SCS as describe herein take precedence over any other section in the construction documents set.

1.4 STRUCTURED CABLING SYSTEM INSTALLER QUALIFICATIONS

A. General: The Installer selected for the project must be certified by the manufacturer of the products for no less than one year, adhere to the engineering, installation, and testing procedures, and utilize the authorized manufacturers components and distribution channels in provisioning the Project.

B. General: The Installer directly responsible for this work shall be a Structured Cabling System (SCS) Installer who is, and who has been, regularly engaged in the providing and installation of commercial and industrial telecommunications wiring systems of this type and size for at least the immediate past five years. Any other company working for the SCS Installer of this system shall have the same training and certification as the SCS Installer.

C. Certification: The SCS Installer's Project Manager shall possess a current and in Good Standings BICSI Registered Communications Distribution Designer (RCDD®) certificate. All shop drawings submitted by the SCS Installer shall bear the RCDD's stamp.

D. The SCS Installer shall have a (BICSI) RCDD on Staff. Third party RCDDs will not be accepted.

E. The Installer team leader assigned for the project shall be BICSI registered Level II Installer or proven and qualified equal.

F. Experience: The SCS Installer shall be experienced in all aspects of this work and shall be required to demonstrate direct experience on recent systems of similar type and size. The SCS Installer shall own and maintain tools and equipment necessary for successful installation and testing of SCS and have personnel who are adequately trained in the use of such tools and equipment. The Owner or Engineer may elect to request submittal of additional financial, operational, and administrative information of the SCS Installer to demonstrate the required experience.

G. Legrand/Ortronics certification for no less than one year.

H. The SCS Installer shall possess a State of Florida Low Voltage License.

I. The SCS Installer shall maintain a permanent office within 70 miles of the project site, capable of servicing low voltage installations.

1.5 MATERIALS ALTERNATES AND SUBSTITUTIONS

A. SCS Installer shall follow all requirements for material alternates and substitutions indicated in Specification Section 27 00 10 Technology General Provisions. If an alternate or substitution is submitted BTS must be notified in writing and provide approval.

1.6 SHOP DRAWINGS AND SUBMITTALS.

A. See additional requirements for shop drawings and submittals in Specification Section 27 00 10 Technology General Provisions.

B. Proposal Submittals: The SCS Installer shall submit the following information with the proposal to execute the work:

1. A list of five recently completed projects of similar type and size with contact names and telephone numbers.
2. A list of test equipment proposed for use in verifying the integrity of the installed SCS. Test equipment list shall include manufacturer part numbers, serial numbers, and a copy of the last calibration report done by the manufacturer of the equipment of the unit, indicating the date when the calibration was performed. Calibrations shall not be older than one year. Test equipment includes cable certifiers, OTDRs, fiber splicers, etc.
3. A technical resume of experience for the Installer's Engineer/RCDD and on-site foreman who will be assigned to the project, including RCDD license number and certificate.
4. Similar documentation for any company working for the SCS Installers who will assist in the performance of this work.
5. A copy of a current and valid Low voltage License for the State of Florida.
6. A copy of the certification of authorized distribution for Legrand/Ortronics.
7. Location of office from which installation and warranty work will be performed.

C. Construction Submittals: Once all proposal submittals have been received and approved by the A&E of the project, the SCS Installer shall provide all construction submittals. Construction submittals are composed of the following items.

1. Manufacturer cut sheets for all proposed equipment as described in Part 2 of this specification section. Cut sheets shall bear the printed logo or trademark of the manufacturer for each type of product being provided. Mark each copy of the cut sheets for the specific product being provided with an identifying mark, arrow, or highlighting.
2. Faceplate/jack color selection. Must adhere to approved material list.
3. Detail explanation of the labeling scheme to be used for all components of the system. This explanation shall include examples of all types of labels to be used, such as labels for cables, patch panels, outlet jacks, etc.
4. AutoCAD® or Revit drawings in sheets matching the size of the design documents with the following information:
    a. Floor plans with all outlets in the project. All outlets must be labeled to be used during identification and tagging process described in this specification section.

b. Enlarged telecommunication rooms with all equipment components and rack layouts for each room. All racks shall have the label to be used during identification and tagging process described in this specification section.
c. Drawings that indicate rack elevations for all cabinets or racks in the project, identifying the precise quantity of patch panels, fiber distribution centers and wire managers and accurate RU heights based on equipment selection. All equipment shall have the label to be used during the identification and tagging process described in this specification section.
d. A spreadsheet indicating all patch cords (fiber and copper) to be provided in the project. The spreadsheet shall indicate the quantity, color of the jacket, cable type, length, and connector termination on each side.

D. Construction submittals received before proposal submittals are received or approved will be rejected.

1.7 ABBREVIATIONS

A. General: The following abbreviations are used in this specification section:
1. A&E - Architect and Engineer. The Architect is the legal entity that holds a contract for the design the project. The Engineer is the consulting engineer firm or engineer of record for the project who prepared this specification.
2. APC - Angle physical contact connector. Reference to the polish style of the ferrule in fiber optic connectors.
3. Array connector - a multi-strand fiber connector user for high density applications, such as the MPO connector.
4. BICSI - Building Industry Consultant Services International
5. CCTV - Closed Circuit Television system (surveillance video system)
6. FCC - Federal Communications Commission
7. FTP - Foiled Twisted Pair. One foiled screen around each cable pair
8. IDC - Insulation Displacement Connector
9. NEC - National Electrical Code®
10. NEMA - National Electrical Manufacturers Association
11. OM1 - ISO 11801 designation for multimode 62.5/125µm glass fiber optics
12. OM2 - ISO 11801 designation for multimode 50/125µm glass fiber optics
13. OM3 - ISO 11801 designation for multimode laser optimized 50/125µm glass fiber optics
14. OM4 - TIA designation for multimode laser optimized 50/125µm glass fiber optics in compliance with TIA-492-AAAD
15. OS1 - ISO 11801 designation for single mode 9/125µm glass fiber optics.
16. OS2 - ISO 11801 designation for single mode 9/125µm glass fiber optic with performance criteria identical to ITU-T G652
17. OTDR - Optical Time Domain Reflectometer

18. RU - Rack Units. Height dimension for rack mounted equipment. 1 RU equivalent to 1.75 inches
19. SCS - Structured Cabling System
20. ScTP - Screened Twisted Pair. One foiled screen around all cable pairs
21. TIA - Telecommunications Industry Association
22. TR - Telecommunications Room
23. UPC - Ultra Physical Contact Connector. Reference to the polish style of the ferrule in fiber optic connectors.
24. UTP - Unshielded Twisted Pair
25. UV - Ultraviolet
26. VAC - Volts Alternating Current

PART 2 - PRODUCTS

2.1 MODULAR SCS JACKS

A. Structured cabling system outlets indicated in design drawings are composed of modular SCS jacks, mounted in a faceplate on an electrical box. Modular SCS jacks shall be 8-pin modules (RJ-45) that meet or exceed the following electrical and mechanical specifications:

1. Electrical Specifications:
    a. Insulation resistance: 500 MΩ minimum.
    b. Dielectrics withstand voltage 1,000 VAC RMS, 60 Hz minimum, contact-to-contact and 1,500 VAC RMS, 60 Hz minimum from any contact to exposed conductive surface
    c. Contact resistance: 20 M Ω maximum
    d. Current rating: 1.5 A at 68 º F (20 º C) per IEC publication 512-3, Test 5b
    e. ISO 9001 Certified Manufacturer
    f. UL verified for EIA/TIA electrical performance
    g. Comply with FCC Part 68
    h. Cable Termination: IDC type universal T568A or T568B.
2. Mechanical Performance:
    a. Plug Insertion Life: 750 insertions
    b. Contact Force: 3.5 oz (99.2 g) minimum using FCC-Approved modular plug
    c. Plug Retention Force: 30 lb. (133 N) minimum between modular plug and jack
    d. Temperature Range: -40º to 150ºF (-40 º to 66 º C)

B. Design selection: modular SCS jacks shall be selected according to the following criteria:

1. Performance requirement: CAT6A
2. Style: Rear loading
3. Mounting Orientation: Straight mounting
4. Color: To match faceplate
5. Dust cover required: No
6. Shielding: Use shielded modular jacks only with ScTP cable

C. Approved manufacturer: See Division 27 approved material list.

2.2 OTHER MODULAR JACKS

A. Whenever indicated in the design drawings, SCS outlets could have terminations for other media types like fiber optic cables, coaxial cables, or audio cables. Whenever those type of media are identified in the drawings, the following specifications shall be met for modular jacks mounted in SCS outlets:

1. Style, mounting orientation, and color: Match design selection for modular SCS jacks.
2. Broadband distribution system connector: Use modular jack with F connector bulkhead rated at 75Ω.
3. Fiber optic connectors: Use modular jack with adapter plate for LC.
4. For line level audio signals: Use modular jack with RCA connector bulkhead. Use different color-coded insulators for different audio channels.

B. Approved Manufacturer: See Division 27 approved material list.

2.3 FACEPLATES

A. Faceplates shall be used for all flush mounted telecommunication outlets to house modular jacks. Faceplates shall have the following specifications:

1. Construction Material: High impact thermo Plastic.
2. Size: Only use single gang faceplates unless specifically noted in the design drawings.
3. Capacity of Modular Jacks per Faceplate: Faceplate shall be selected to accommodate the number of cables in each telecommunication outlet. No less than one unused opening shall be present on each faceplate.
4. Color: Submit color to A&E and BTS for approval.
5. Labels: Faceplate shall have two recesses for labels, top and bottom, and shall have transparent label snap-on covers.
6. Faceplate Style: Direct modular plug rear loading style.

B. Approved Manufacturer: See Division 27 approved material list.

2.4 FACEPLATES WITH SUPPORT STUDS

A. Telecommunication Outlets Indicated in the Design Drawings: Wall mounted telephone outlets shall be composed of one modular SCS jack and one faceplate with support studs mounted on an electric box. Faceplates with support studs shall have the following specifications:

1. Construction Material: Stainless Steel.
2. Size: Use single gang faceplate with two support studs.
3. Capacity of Modular Jacks per Faceplate: One.
4. Faceplate style: Direct modular plug rear loading style.

B. Approved manufacturers: See Division 27 approved material list.

2.5 SURFACE MOUNTED BOXES

A. Telecommunication outlets indicated in the design drawings: Surface mounted outlets shall be composed of modular jacks mounted in a surface mounted box inside an electrical enclosure. Surface mounted boxes shall have the following specifications:

1. Construction Material: High impact thermo Plastic.
2. Capacity of Modular Jacks per Surface Mounted Box: Size of surface mounted box shall be selected as to accommodate the number of cables in the surface mounted telecommunication outlet. No more than one unused opening shall be present on each box.
3. Color: Fog White.
4. Labels: Surface mounted boxes shall have at least one recess for labels and shall have transparent label snap on covers.

B. Approved Manufacturers: See Division 27 approved material list.

2.6 MOUNTING FRAMES

A. All telecommunication outlets shall be properly mounted in the electrical raceway system provided for the outlet. The SCS Installer shall select the proper mounting frame and/or bezel to mount the modular plugs in the raceway system. Raceway systems include furniture systems, floor boxes, poke-thrus, power poles, surface raceways system, etc.

B. Whenever design drawings indicate a telecommunication outlet to be mounted in a furniture system, the SCS Installer shall select the proper mounting frame to hold the modular jacks in the furniture system selected by the Owner. Color of the mounting frames shall match the color of the furniture system.

C. If Owner provided furniture system does not have a raceway system for telecommunication, and design drawings indicate outlet to be mounted in the furniture system, SCS Installer shall provide a plastic surface mounted box that allows the mounting of the modular plugs in a standard telecommunication faceplate.

D. SCS Installer shall provide all mounting frames and bezels to mount modular jacks inside floor boxes or poke-throughs.

E. All un-used ports in mounting frames shall be covered with blank inserts.

F. Approved Manufacturers: See Division 27 approved material list.

2.7 HORIZONTAL 4-PAIR CABLE

A. General: Horizontal 4-pair cables shall be extended between the telecommunications outlet location and its associated equipment inside the TR. The cable shall consist of 4-pair cable solid copper conductors, certified to the specified performance standard. All horizontal 4-pair cables shall be terminated in modular jacks and patch panels with IDC type connectors and shall have the following specifications:

1. Cable Gauge: Minimum 23 AWG
2. Performance Standard: TIA/EIA CAT6A
3. Cable Type: UTP
4. Performance Characterized to 600 MHz
5. Time Delay Skew: Maximum 45 ns/100m
6. Input Impedance (1-100MHz): 100Ω
7. Cable Diameter: ≤ 0.295 inch

B. Cable jacket colors for 4-pair horizontal cables shall be selected according to the following preferred criteria:

1. Voice or Data Cables: Yellow and/or appropriately identified.
2. Wireless Access Points: White or Yellow, and/or appropriately labeled.
3. Security Systems and Other: Coordinate with the A&E and BTS.

C. Performance Verification: All performance of horizontal 4-pair cable shall be verified by a Nationally Recognized Testing Laboratory (NRTL) for EIA/TIA electrical performance and comply with FCC Part 68.

D. Jacket: Cable jacket for inside premise cables shall comply with Article 800 NEC for correct use in the environment in which they will be used. If at time of bid the SCS Installer does not know the environment, in which cables will be used, the SCS Installer shall assume plenum rated is required for the project. At a minimum all cables shall have a flame retardant PVC jacket riser rated.

E. OSP Jackets: All horizontal 4-pair cable runs in conduits below the floor slab shall have a water-resistant flooding compound and a jacket made of UV resistant polyethylene. Cables with PVC jackets are not acceptable for this application.

F. Jacket Marking: All horizontal 4-pair cables shall have at least two types of markings imprinted in the jacket, transmission performance marking and NEC rating for environment to be used.

G. Approved Manufacturer: See Division 27 approved material list.

2.8 PATCH PANELS FOR HORIZONTAL CABLING

A. All 4-pair horizontal cables shall be terminated in rack mounted patch panels located in the telecommunication room racks. These patch panels shall have the following specifications:

1. Connector Type: 8-position modular plug (RJ-45)
2. Cable Termination: IDC type universal T568A or T568B
3. Performance Requirement: CAT6A
4. Maximum Connectors per Path Panel Allowed: 48
5. Patch Panel Type: Factory preloaded panels
6. Patch Panel Shape: Angled
7. Permanent Marking: All connectors shall be labeled in sequential numbers
8. Field Labels: Patch panels shall have a space for field labels covered with transparent protectors
9. Shielding: use shielded patch panels only with ScTP cable

B. Approved manufacturers: See Division 27 approved material list.

2.9 HORIZONTAL WIRE MANAGERS

A. Horizontal wire managers shall be mounted in racks to route cables from patch panels to vertical wire managers and to equipment. Horizontal wire managers should be used when flat patch panels are installed and have the following specifications:

1. Style: Finger duct style with hinged cover
2. Sides: Front of rack front and back of rack
3. Minimum height: Two RU

B. Approved manufacturers: See Division 27 approved material list.

2.10 CROSS OVER WIRE MANAGERS

A. Cross over wire managers shall be used to route patch cables from the right vertical wire manager to the left vertical wire manager or between racks. Cross over wire managers shall have the following specification:

1. Style: Six port finger spacing with a cover
2. Sides: Front of rack
3. Minimum Height: Four RU

B. Approved Manufacturers: See Division 27 approved material list.

2.11 FOUR PAIR PATCH CORDS

A. Four pair patch cords are required at the work area side and at the patch panel side to complete the connectivity path to the equipment. All 4-pair patch cords shall be factory tested and shall have molded boots to the cable jacket. Field made patch cords are not acceptable. Four pair patch cords shall have the following specifications:

1. Connectors: 8-pin modular plugs at both ends
2. Conductors: 4-pair stranded conductors
3. Wire gauge: For the telecom room side: AWG-28
   For the work area side: AWG23/AWG24
4. Wiring map: See section 3 of this specification
5. Performance requirement: To match horizontal 4-pair cable performance
6. Cable type: UTP

B. Approved Manufacturers: See Division 27 approved material list.

C. SINGLE STRAND FIBER OPTICS CONNECTORS

D. All fiber optic cables (horizontal or backbone cables) shall be terminated on fiber optic connectors at both ends of the cable with either single strand fiber optic connectors or array connectors. Single strand fiber optic connector shall be compliant with industry standard ANSI/TIA-568-C.3 and the applicable TIA/EIA Fiber Optic Connector Intermateability Standard (FOCIS) document, TIA/EIA 604 series. Single strand fiber optic connectors shall have the following specification:

1. Physical Contact Type: Use UPC type connector for all applications except for applications of Broadband TV distribution systems or DAS systems. For those applications use APC type connectors
2. Connector Type: LC
3. Security Level: Non-keyed connector
4. Pairing Style: Simplex
5. Acceptable Connector Attachment Types:
    a. Splice on connectors. Fusion spliced connectors with factory polished finish.
    b. Fusion-spliced pigtails with factory polished connectors
6. Fiber Type: SCS Installer shall select the connector according to the fiber type where connector will be installed. As an example, use OM1 connectors only in OM1 fiber optic cables
7. Fusion Spliced Pig Tails: When using fusion spliced pig tails the SCS Installer shall make sure the fiber type of the pig tail and the actual cable have the same optical characteristics, such as back scatter, core diameter, etc.
8. Ferrule Construction: Use ceramic ferrule connectors only, plastic ferrules are not acceptable

E. All single strand fiber optic connectors shall include boots to protect the fiber optic cable. The SCS Installer shall select the boot according to the fiber optic type selected. As an example, use 900µm boots in 900µm coated fiber, use 250µm boots on 250µm coated fiber and use 2mm boots on 2mm jacketed fiber. All boots shall be color coded to identify the type of fiber connector used. Boots shall be beige for OM1 fiber, black for OM2, aqua for OM3 and OM4. Green for APC. OM5 is lime green. OS1 is blue.

F. Single strand multimode fiber optic connectors shall have the following performance requirements:

1. The maximum insertion loss shall be 0.75 dB (maximum) when installed in accordance with the manufacturer's recommended procedure and tested in accordance with FOTP-171.
2. Connector reflectance shall be less than or equal to -26 dB when installed in accordance with the manufacturer's recommended procedure.
3. Connectors shall sustain a minimum of 500 mating cycles without violating specifications.

4. Connectors shall have an optical axial pull strength of 2.2 N (0.5lbf) at 90º angle, with a maximum 0.5dB increase in attenuation for both tests when tested in accordance with ANSI/EIA/TIA-455-6B.

G. Single strand single mode fiber optic connectors shall have the following performance requirements:

1. Maximum insertion loss shall be 0.75 dB per each mated connector pair when installed in accordance with the manufacturer's recommended procedure and tested in accordance with FOTP-171.
2. Connector reflectance shall be less than or equal to -40 dB (UPC) when installed in accordance with the manufacturer's recommended procedure.
3. Connectors shall sustain a minimum of 500 mating cycles without violating specifications.
4. Connectors shall have an optical axial pull strength of 2.2 N (0.5lbf) at 90º angle, with a maximum 0.5 dB increase in attenuation for both tests when tested in accordance with ANSI/EIA/TIA-455-6B.
5. Connectors shall meet the following performance criteria:

Test	**Procedure**	**Maximum Attenuation Change (dB)**
Cable Retention	FOTP-6	0.2 dB
Durability	FOTP-21	0.2 dB
Impact	FOTP-2	0.2 dB
Thermal Shock	FOTP-3	0.2 dB
Humidity	FOTP-5	0.2 dB

H. Approved Manufacturers: See Division 27 approved material list.

2.12 FIBER OPTICS SPLICES

A. When fiber splicing is required in the project because of the use of pigtails or field splicing, only fusion splicing will be acceptable.

B. All fiber splices shall be terminated with heat shrink sleeves and organized in splice trays. Splice tray sizes shall be selected to match the quantity of fiber strands in the cable bundles. Splice trays shall be organized in Fiber Optics Distribution Centers when inside a telecom room or in outdoor rated splice enclosures when done outdoors.

C. Fusion splice equipment to be used in this project shall have the following specifications:

1. Alignment System: Automatic Core Detection system (ACD). V-groove splicers are not allowed.
2. Typical Splice Loss for Single Mode Fibers: 0.02 dB
3. Splice Loss Result: Estimated (ACD)
4. Unit shall have a fast heat shrink oven, maintenance free electrodes, built in cleaver and graphical user interface to display alignment condition.
5. Cleaver Blade Type: Diamond.

2.13 INSIDE PREMISE FIBER OPTICS HORIZONTAL CABLES

A. Telecommunications outlets could have fiber optic terminations. Whenever design drawings indicate fiber optic terminations, inside premise fiber optic horizontal cables shall be used. The following are the specifications for fiber optic horizontal cables:

1. Strand Count: Two strands.
2. Fiber Type: OS1/OS2 as indicated in design drawings.
3. Fiber Coating: 900µm coating color coded.
4. Fiber Protection: Aramid yarn.
5. Jacket Type: 2.9mm flame-retardant PVC jacket zip-cord type.
6. Color Jacket: Jacket shall be orange for OM1 or OM2 fiber, aqua for OM3 or OM4 fiber and yellow for OS1 or OS2 fiber.

B. Jacket: Cable jackets for fiber optic cables shall comply with Article 770 NEC for correct use in the environment in which they will be used. If, at time of bid, the SCS Installer does not know the environment in which cables will be used, the SCS Installer shall assume plenum rated is required for the project. At a minimum, all cables shall have a flame retardant PVC jacket riser rated. Rating shall be printed in the cable jacket.

C. OSP Jackets: All fiber optic horizontal cables run in conduits below the floor slab shall have a water-resistant flooding compound and a jacket made of UV resistant polyethylene. Cables with PVC jackets are not acceptable with this application.

Approved Manufacturers: See Division 27 approved material list.

2.14 INSIDE PREMISE FIBER OPTICS BACKBONE CABLES

A. Whenever design drawings indicate fiber optics backbone cables to be run inside premises, the following specification shall be followed for those cables:

1. Strand Count: As indicated in design drawings
2. Fiber Type: As indicated in design drawings
3. Fiber Coating: 900µm coating color coded. 250µm coating is acceptable for loose buffer cables but they shall be protected with break-out kits with color coded 900µm buffers at both ends of the cable
4. Fiber Protection: Aramid yarn around all strands for cables under 24 strands, and aramid yarn and jacket around each subunit (6 or 12 strands) for cables above 24 strands
5. Interlock Requirement: Interlock dielectric armor is required
6. Jacket Type: Flame-retardant PVC jacket or materials with superior performance
7. Color Jacket: Jacket shall be orange for OM1 or OM2 fiber, aqua for OM3 or OM4 fiber and yellow for OS1 or OS2 fiber
8. Fiber Termination: Fibers shall be field terminated
9. Buffer Type: Tight buffer
10. Center Strength Member Material: Dielectric material

B. Jacket: Cable jackets for fiber optic cables shall comply with Article 770 NEC for correct use in the environment. If, at the time of the bid, the SCS Installer does not know the environment, in which cables will be used, the SCS Installer shall assume plenum rated is required for the project. At a minimum all cables shall have a flame retardant riser rated jacket. Rating shall be printed in the cable jacket.

C. Approved Manufacturers: See Division 27 approved material list.

2.15 FIBER OPTIC DISTRIBUTION CENTERS

A. All fiber optic cables shall be terminated in fiber optic distribution centers. Inside premises horizontal fiber optic cables shall be terminated in one side (telecommunication room side) in a fiber optics distribution center (FODC). Backbone fiber optic distribution centers shall be terminated at both ends in a FODC. FODC are composed of an enclosure and snap on adapters. These are the specifications of the enclosures for the FODC:

1. Mounting: Use rack mounted FODC enclosures in all rooms where racks are available or any type of rack rails. Use wall mounted FODC enclosures only when racks are not available like in outdoor enclosures, or other spaces different than telecom rooms.
2. Size: SCS Installer shall size the FODC based on the amount of fiber strands to be terminated in the FODC.

3. Whenever fiber splices are indicated in the design drawings next to an FODC, enclosures shall be selected by the SCS Installer to have spaces to hold splice trays. FODCs under these conditions shall be able to hold the amount of splice trays required for the fiber count indicated in the drawings.

B. These are the specifications of the snap on adapters for the FODC:

1. Style: Plate style
2. Connector type: LC to match fiber types of fiber optic cables
3. Maximum fiber strands allowed per adapter: 24
4. Security level: Non-keyed connector keyed connector
5. Pairing style: Duplex

C. Approved Manufacturers: See Division 27 approved material list.

2.16 FIBER OPTICS PATCH CORDS

A. Fiber optic patch cords shall be required for connections from active equipment to FODCs and/or to telecommunication outlets. Fiber optic patch cords shall be required at both ends of fiber optics backbone cables or horizontal fiber optic cables. Direct connection of backbone cables or horizontal fiber optic cables to active equipment shall not be allowed.

B. Fiber optic patch cords shall be all factory tested. Field made fiber optic patch cords are not acceptable. The specifications of the fiber optic patch cords shall be:

1. Strand Count: Two strands.
2. Fiber Type: Match fiber type of backbone cable or horizontal cable.
3. Fiber Connector in FODC or Outlet Side: Match connector for each adapter
4. Fiber Connector in Active Equipment Side: The SCS Installer shall coordinate with supplier of equipment the type of connector required in this side.
5. Fiber Protection: Aramid yarn
6. Jacket Type: 2.9mm flame-retardant PVC jacket zip-cord type.
7. Color Jacket: Jacket shall be orange for OM1 or OM2 fiber, aqua for OM3 or OM4 fiber and yellow for OS1 or OS2 fiber.

C. Approved Manufacturers: See Division 27 approved material list.

2.17 INSIDE PREMISE MULTIPAIR BACKBONE CABLES

A. Whenever indicated in the drawings multipair backbone cables to be run inside premises and above grade shall have the following specification:

1. Pair Count: As indicated in the design drawings.

2. Conductor: AWG 24 solid bare copper conductor.
3. Input impedance: 100 Ω.
4. Conductor Insulation: Color coded thermo plastic.
5. Performance Requirement: UL verified to ANSI/TIA-568-C Category 3 backbone cable or greater.

B. Jacket: Cable jacket for inside premise multipair backbone cables shall comply with Article 800 NEC for correct use in the environment in which they will be used. If at the time of the bid, the SCS Installer does not know the environment in which cables will be used, the SCS Installer shall assume plenum rated is required for the project. At a minimum all cables shall have a flame retardant PVC jacket riser rated.

C. Jacket Marking: All inside premise multipair backbone cables shall have at least two types of markings imprinted in the jacket, transmission performance marking and NEC rating for environment to be used.

D. Approved Manufacturers: See Division 27 approved material list.

2.18 TERMINATION OF MULTIPAIR BACKBONE CABLES

A. Backbone multipair backbone cables for inside premises or outside plant shall be terminated in termination blocks or patch panels. See design drawings for specific types on each case.

B. TSER – service provider terminations. TSER will be a hub-and-spoke design feeding each IDF/MDF.

C. Whenever indicated in the design drawings, multipair backbone cables shall be terminated in patch panels. Patch panels for this purpose shall have the following specifications:

1. Connector Type: 8-position modular plug (RJ-45).
2. Connector Wiring Map: One pair per connector pins 4 and 5 (blue pair).
3. Cable Termination Type: IDC type connector.
4. Performance Requirement: CAT3.
5. Maximum Connectors per Path Panel Allowed: 96.
6. Permanent Marking: All connectors shall be labeled in sequential numbers.
7. Field Labels: Patch panels shall have a space for field labels covered with transparent protectors.
8. Shielding: Unshielded.

D. Whenever indicated in the design drawings, multipair backbone cables shall be terminated in rack mounted termination blocks. Termination blocks for this purpose shall have the following specifications:

1. Preference is to have backbone cables terminate onto Cat 5E patch panels, one pair per port, when installing in racks.

E. Whenever indicated in the design drawings, wall-terminated multipair backbone cables shall be wall mounted termination blocks. Termination blocks for this purpose shall have the following specifications:

1. Connector Type: 66 style connectors
2. Cable Termination Type: IDC type connector
3. Performance Requirement: CAT3
4. Pair Counts: Use only 300 pair blocks in quantities as required for backbone cables.
5. Wire Managers: All termination blocks shall have a wire manager installed at both sides of the blocks and between blocks.
6. Clip Types: Use 66 style bridge clips.
7. Field Labels: Termination blocks shall have a space for field labels covered with transparent protectors.
8. Mounting: Termination block shall be mounted with legs on the wall.
9. We would prefer to use 66 blocks and backboards.

F. Approved Manufacturers: See Division 27 approved material list.

2.19 PATCH CORDS FOR MULTIPAIR BACKBONE CABLES

A. Patch cords shall be used to connect horizontal wiring to termination blocks for multipair backbone cables. Depending on the type of termination for backbone cables, the patch cord shall be selected.

B. When multipair backbone cables are terminated in patch panels, patch cords for these patch panels shall have the same specification as the 4-pair patch cord cables described above.

C. When multipair backbone cables are terminated in wall mounted or rack mounted termination blocks, patch cords shall have a patch plug connector in one end and an 8-pin modular plug (RJ-45) in the other end. The SCS Installer shall coordinate with the phone system Installer and determine if one pair or two pairs are required for each phone. Patch cords shall have one or two pairs according to the equipment selection. Patch plugs shall only be one or two pairs accordingly. Patch plug selection shall match the manufacturer and family of products of the termination blocks.

2.20 TWO POST RACKS

A. Whenever indicated in the design drawings, two post racks shall be provided as shown. Two post racks shall be made of aluminum or welded steel frames and shall have a powder coat finish. Two post racks shall have the following specifications:

1. Height: Equipment cabinet shall provide a usable height between 44 and 45 RU.
2. Channel Depth: Six inch, ten inch, 16 inch, or 24 inch – dependent on design build, use 24 inch for planning and bids.
3. Rack Rails Type: Standards EIA 19 inch located in the front and back of rack. Rack rails shall have RU marked and labeled.
4. Rack Screw Type: #12-24 threaded rack rails. Screws shall be provided for all openings in rack rails and shall be made of steel.
5. Weight Capacity: UL listed for 1000 lb. or more.

B. Two post racks shall be provided with the following accessories:

1. Cable runway mounting brackets to support cable runway installed above racks.
2. Isolation pads.
3. Grounding kit.
4. Ground bar: All cabinets shall be provided with a copper vertical ground bar covering the complete length of the rack rails. The ground bar shall be 1/8 inch thick and one inch wide with threated holes 1032 mounted to the cabinet using nylon insulation washers.
5. End panels to support vertical wire managers at both ends of each rack row.

C. Front vertical wire managers shall be provided in between all racks and at both ends of rack rows covering from top to bottom of each rack. The specifications of those wire managers shall be:

1. Style: Metal cage with dual hinged door cover.
2. Sides: Single sided wire manager.
3. Capacity: Usable cross-sectional area shall be minimum of 48 sq. inches in between racks and at the end of the racks.

4. Accessories: Whenever cable manager supports the use of spools inside the unit, spools shall be provided at all locations in the unit.
5. Generally, use ten inch vertical wire managers at the ends of rack rows and ten inch verticals between the racks, unless otherwise stipulated by BTS.

D. Approved Manufacturers: See Division 27 approved material list.

2.21 POWER DISTRIBUTION UNITS (PDU)

A. All equipment cabinets or racks in the project shall be provided with two PDUs. PDU selection shall be dictated by power requirements. The following specifications are required for all types of PDUs:

1. All units shall have monitoring through an IP Ethernet line, unless specifically indicated in the description of each PDU. The monitoring shall include the following parameters:
   a. Current and voltage for each phase available in the unit
   b. Peak Voltage, peak current, and power factor for each phase available in the unit
2. Switched capacity per each circuit or per outlet not required.
3. All units shall have an LCD display to show all monitoring settings with scrolling capabilities.
4. All PDUs and power transfer shall be the same brand and monitored with the same DCIM software.
5. No less than two ports for environmental sensors such as temperature. Two temperature sensors shall be provided with each cabinet. If the unit does not have the possibility of monitoring the temperature sensors, a separate unit just for the sensors will be acceptable.
6. Threshold remote alarms through e-mail, SNMP traps or XML.
7. No need for external software, all features shall be available through web browsing if external software monitoring is available.
8. Color coding for PDUs. Units shall be color coded. Half the PDUs on each rack shall be one color and the other half another color. There will be two types of colors used: black and blue. The color coding of the PDUs shall include the connector assembly bar and the input cord (close to the plug). Refer to design drawings for quantities of each.
9. All devices shall have a continuous operating temperature range of 50 to 113 DEGF.
10. Surge suppression is not required for any device.
11. S, M, L, XL

B. For equipment cabinets (two per cabinet):

1. Power Strip Capacity: 120/208V 30A
2. Quantity of Power Outlets: No less than 30
3. Power Outlet Configuration: Two C19 @ 208V, twelve C13 @208V and sixteen NEMA 5-20R.
4. Strip Power Cord Plug: NEMA L14-30.
5. Breaker: Built in thermal breaker with guard protection. Capacity to match power strip capacity.
6. Monitoring: digital display included with readings of amperage and voltage.
7. Surge Suppression: included and built in.
8. Listing: UL listed.
9. Mounting: Vertically mounted, not occupying any rack space, with mounting accessories. The installation of the power strip shall not prevent the removal or installation of equipment in the rack.

C. Approved Manufacturers: See Division 27 approved material list.

2.22 RACK MOUNTED UNINTERUPTED POWER SUPPLY (UPS)

A. All equipment cabinets or racks in the project shall be provided with one uninterrupted power supply (UPS). UPS selection per rack shall be as indicated in design drawings. The following descriptions apply to each type of UPS:

B. UPS units labeled in drawings as “208V UPS” shall have the following specifications:

1. Output Power Capacity: 4200 W/6000 VA
2. Output Voltage: 120V and 208V, using a transformer.
3. Efficiency at Full Load: 95%
4. Output Voltage Distortion: Less than 5% at full load.
5. Output Frequency: (sync to mains) 57 - 63 Hz for 60 Hz nominal.
6. Topology: Double Conversion online.
7. Waveform Type: Sine wave.
8. Output Connections: (4) NEMA 5-20R, (1) NEMA L14-30R and (1) L6-30
9. Nominal Input Voltage: 120/208V
10. Input Frequency: 50/60 Hz +/- 5 Hz (auto sensing).
11. Input Connections: NEMA L14-30
12. Battery Type: Maintenance-free sealed Lead-Acid battery with suspended electrolyte, leak-proof.
13. Run Time: 9 minutes at full load.
14. Communications: RJ-45 10 Base-T Ethernet for web/ SNMP/ Telnet management included.
15. Surge Energy Rating: 1020 Joules

16. Filtering Full Time Multi-pole Noise Filtering: 0.3% IEEE surge let-through: zero clamping response time: meets UL 1449.
17. Rack Height: No bigger than 7U, including transformer.
18. Regulatory Approvals: CSA, FCC Part 15 Class A, UL 1778.

C. Approved manufacturers: See Division 27 approved material list.

2.23 MOUNTS FOR WIRELESS ACCESS POINTS.

A. General: Mounts for wireless access points shall be provided at all locations where WAP outlets are located. The A&E shall select the proper mount for each case, based on the architecture of the space and the WAP selection by BTS. Although many conditions might be possible in a building, there are 4 basic mount types:

1. Accessible ceiling mount: For areas with regular acoustic tiles (2’ x 2’ or 4’ x 2’) a WAP mount with the following specifications shall be used:
    a. Grid mount
    b. Recessed tile mount
    c. Secured tile mount
    d. The mount shall replace a complete 2’ x 2’ tile and shall have a backbox to hold the WAP
    e. The unit shall have a locking, interchangeable door specifically selected for the WAP by BTS
    f. Enclosure shall be UL listed for plenum use
    g. Unit shall have a firestop grommet for insertion into back-box, large enough for two CAT6A cables
    h. Enclosure shall be designed to hold 25 lbs. of weight
    i. Construction: 20 ga. Galvanized steel back-box, 18 ga. White, powder coated steel flange and door
    j. Enclosure shall be installed with secondary supports from structure above
    k. Approved manufacturers: See Division 27 approved material list.
2. Hard Ceilings: For areas with hard ceilings, the WAPS shall be mounted inside enclosures composed of a backbox and trim kit. The units shall have the following specifications:
    a. Basic
    b. Decorative
    c. The unit shall have a locking, interchangeable trip for the WAP selected by BTS
    d. Enclosure shall be UL listed for plenum use
    e. Unit shall have a firestop grommet for insertion into back-box, large enough for two CAT6A cables
    f. Enclosure shall be designed to hold 25 lbs. of weight

g. Construction: 20 ga. Galvanized steel back-box, 20 ga. White, powder coated steel trim. Solid backbox fills opening behind WAP, creating a fire and smoke barrier
h. Approved manufacturers: See Division 27 approved material list.

3. Wall Mounted: For open ceiling spaces or ceilings higher than 12', WAPS shall be wall mounted with an angle bracket with the following specifications:
   a. Wedge shaped right-angle mounting bracket with cover for securing WAPs on wall. The mount shall be designed to mount the AP in the horizontal orientation
   b. Unit shall have one-inch knockouts in the side for conduit connections
   c. Unit shall cover the telecommunications outlet
   d. Construction: 20 ga. Powder-coated steel
   e. Approved manufacturers: See Division 27 approved material list.
4. Outdoor Enclosures: For mounting outdoors use a mount with the following specifications:
   a. Design: Rugged polycarbonate AP enclosure designed for surface mounting AP indoors or outdoors
   b. Unit shall be capable of being wall or pole mounted
   c. Enclosure shall be design as a NEAM 4X and IP 66 with UV stabilized exposure for sun light
   d. Unit shall have a cover with screws and gasket
   e. Approved manufacturers: See Division 27 approved material list.

2.24 CABLE FASTENERS

A. Velcro must be used to provide a neat and organized installation. Use 0.75 inch width or greater.

B. To support and organize all horizontal cabling, to include inside premise backbone cables, only the following types of cable ties shall be used:

1. Hook and loop style, re-usable with Velcro no smaller than 0.5 inch width.
2. Pre-perforated rolls of re-usable ties with Velcro no smaller than 0.5 inch width.
3. Straps of other soft materials with cinch rings that allow for re-use of the cable ties in widths no smaller than 0.85 inches.

C. Nylon based cable ties (re-usable or not) can only be used to support and organize the following types of cables:

1. Outside plant fiber and copper backbone cables.
2. Inside premise fiber optic backbone cables with interlock armors.
3. Grounding conductors.

D. Nylon based cable ties shall never be used to support or organize any type of horizontal cables or inside premise fiber optic backbone cable without armor.

E. All cable ties to be used in outdoor environments shall be made of weather resistant Acetal. Outdoor cable ties used for aerial cable lacing shall follow Telcordia TR-TSY-000789 standard.

F. All cable ties shall be selected in lengths as to properly secure the bundle of cable being supported.

G. All cable ties to be used in air handling spaces, such as above ceiling and under raised floor areas, shall be UL listed for the use in those environments.

H. Approved Manufacturers: See Division 27 approved material list.

2.25 IDENTIFICATION AND LABELING TAGS

A. SCS Installer shall follow labeling materials indicated in Specification Section 27 00 10 Technology General Provisions.

PART 3 - EXECUTION

3.1 TELECOMMUNICATIONS OUTLET DESIGN

A. General: The A&E shall work with the end users in selecting the locations and cable counts for telecommunications outlets. As a starting point for conversations, the following quantities shall be followed for outlet and cable counts, for different work areas.

Standard work area, defined as an area of approximately 100 sq. ft. located in an o pen office environment with modular furniture:

- Quantity: One outlet with two cables/jacks, mounted in modular furniture, power pole or wall outlet at 18 inches AFF.
- One quad or two duplex 120 VAC power outlets by desk.

Closed office (less than 100 sq. ft.). A closed office with only one desk:

- One outlet with two cables/jacks, wall mounted at 18 inches AFF.
- One quad or two duplex 120 VAC power outlets by desk.

Closed office (greater than 100 sq. ft.) for more than one staff. Multiple desks located in the room:

- One outlet with two cables/jacks, wall mounted, by each desk at 18 inches AFF.
- One quad or two duplex 120 VAC power outlets by each desk.

Closed office (greater than 100 sq. ft.) for one staff. Large office for a single person with an auxiliary table. Director level office:

- Three outlets: one by desk, one by auxiliary table and one in an opposite wall of the desk. Outlets by the desk and auxiliary table will have 2 cables/jacks and no cables in the outlet opposite to the desk. All outlets wall mounted at 18 inches AFF.
- One quad or two duplex 120 VAC power outlets by desk and at the opposite wall of the desk. One duplex outlet by the auxiliary table.

Print area/work room. Space designated by a large printer, and other office devices:

- One outlet with two cables/jack by large printer (floor standing). 220 VAC power next to it at 18 inches AFF.
- Two outlets with two cables/jacks distributed along the working surface, 6 inches above working surface splash. One quad or two duplex 120 VAC power outlets by each telecommunications outlet.

Work area for customer service location with requirement for credit card transactions. Cashier's, Clerk's work area.

- One outlet with four cables/jacks per location wall mounted at 18 inches AFF.
- One quad and one duplex or three duplex 120 VAC power outlets by each telecommunications outlet.

Conference Rooms:

- General: At least one floor box/poke thru in the table, with a minimum of four data/cable for a conference phone system, plus the capacity to have cables for audio/visual presentation. Typically, there is no need for hard wired data connections for staff using the room. Do not locate telecommunications outlets along the walls in the room for general use, only for displays and equipment located in the perimeter of the room. (For new construction where floor boxes are to be installed) locate floor boxes close to the conference table legs, not necessarily in the center of the room. Coordinate with Owner/architect for precise location.
- Huddle Areas and Small Conference Rooms: One single data jack and one coax at TV height, dual data jack at standard height.

- Medium Conference Room: One floor box with two data jacks and power, ceiling projector, one data jack, and duplex power, TV one single data jack and one coax at TV height.
- Large Conference Rooms (≥12 seats): No less than two floor boxes at opposite end of the table. Provide 120 VAC duplex power outlets with USB charges in all walls in conference rooms and at each floor box. Additional power and telecommunications might be required for Audio/visual equipment in the room. Example: podiums, AV cabinets. See Specification Section 27 41 00 Audio/Visual Systems.

Break Rooms:

- One wall mounted telephone outlet (48" AFF) close to the door. Separated at least 12" from any other outlets/switches.
- One telecommunications outlet by each group of vending machines. One cable/jack per vending machine.
- Power outlet, as required by breakroom/kitchen equipment. Also provide power outlets with USB chargers in the wall, close to break room tables.

Wireless Access Points

- Wireless access shall be provided to cover the complete building.
- Each WAP location shall have a telecommunications outlet surface mounted with two cables/jacks in a biscuit style box, mounted above the ceiling close to the WAP mounting enclosure.
- Cable terminations in plugs for direct attach connections to devices are not acceptable.
- For areas with ceiling higher than 12', WAPs shall be wall mounted in a 45-degree mounting bracket. In such case, use a biscuit style box inside the outlet box or the wall mounted enclosure.
- There is no need for power outlets for WAPs in building indoors. They might be required for outdoor WAPs when located far away from telecom rooms.

Mechanical/Electrical/Telecom rooms:

- There is no need for wall mounted phones inside these rooms. Only telecommunications outlets for equipment that requires such lines, like Building Automation Head end, Fire Alarms panels and Lighting control panels. Quantity of cables/jacks shall be no less than two per outlet but needs to be coordinated with MEP designers.
- Outlet termination shall be a surface mounted biscuit box inside a 6" X6"X4' electrical box.
- Power outlets as dictated by Electrical Engineer.

Elevators, Escalators, and Moving Walkways:

- One outlet with two cables/jacks for elevators, one cable/jack for other devices.

Access Control Panels Outside of Telecom Rooms:

- Outlet termination shall be a surface mounted biscuit box inside a 6" X6"X4' electrical box. Location shall be carefully coordinated with equipment vendor
- Power outlets as dictated by Electrical Engineer.

Flat Panel Displays or Individual Offices. Displays to be used for Commercial TV, *not part of an AV System*:

- One outlet box with a flush mounted faceplate with one cable/jacks for future IPTV and one coaxial (F type) jack.
- One duplex 120 VAC power outlets by each telecommunications outlet.
- Outlet locations shall be coordinated with architect and display mount selection. In many cases mounting the outlets at the centerline of the display will conflict with display mount.

Flat Panel Displays Part of an Audio/Visual system. Like Conference Rooms, Training Rooms, Combinable Rooms, and Other Assembly Type of Rooms:

- A larger box for power and low voltage terminations, like the Wiremold Evolution Wall backbox.
- Two duplex 120 VAC power outlets inside outlet box.
- Outlet location shall be coordinated with architect and display mount selection. In many cases mounting the outlet displays in the middle will conflict with display mount.

Ceiling Mounted Projectors:

- Cables/jacks and termination style shall be dictated by Audio/visual designer. Do not locate a ceiling mounted telecommunications outlet unless is requested by Audio/visual designer.

Surveillance Cameras:

- Each camera shall be provided with one telecommunications outlet with one cable/jack for each camera. Mount outlet in a surface mounted biscuit jack. Install outlet above the ceiling or inside outlet box for wall mounted applications. Do not use standard flush mounted faceplates for data terminations for cameras.
- Cable terminations in plugs for direct attach connections to devices are not acceptable

- There is no need for power outlets for cameras in building indoors. They might be required for outdoor cameras when located far away from telecom rooms.

3.2 INSTALLATION PRACTICES

A. General: All installation requirements indicated in Specification Section 27 00 10 Technology General Provisions shall be followed.

B. Workmanship: All work shall be completed by the SCS Installer in a neat and professional manner. The use of all BICSI standards and recommendations for installation shall be followed as the benchmark for workmanship.

C. Cable Lengths: It is the SCS Installer's responsibility to plan the cable routing in the cable tray and other raceways to minimize all cable runs to stay under the 90-meter length limitation for Horizontal Cabling except for UTP cables to outlets for Wireless Access Points for which the distance limitation is 80 meters. All Horizontal cable shall be placed without diagonal runs. (i.e., parallel to walls and ceiling grid) unless otherwise specifically indicated on the drawings.

D. Wire Mapping: All terminations of 4-pair horizontal cabling in this project and terminations of all 4-pair patch cords shall be per T568B standard.

E. Fiber Optics Termination Polarity: All fiber optic cables (horizontal or backbone) terminated in duplex style adapter panels shall be connected in a cross-over polarity configuration. As an example, if fibers one and two are terminated in one end in positions A and B respectively in one side of the cable, the same strands shall be terminated in B and A positions in the other side of the cable.

F. Location of Horizontal Terminations: In a multi-story facility with telecommunication rooms on every floor, all horizontal drops, whether terminated in the wall or in floor boxes shall be terminated in the same floor telecommunications room as the location of the final outlet.

G. Cable Bundles: In suspended ceilings and raised floor areas, if cable trays or conduits are shown on the contract drawings, the SCS Installer shall bundle, in bundles of 40 or less, horizontal wiring with Velcro. The cable bundling shall be supported via "CLIC" fasteners in TR's and non-plenum areas and J-Hooks in ceiling spaces. The SCS Installer shall adhere to the manufacturers' requirements for bending radius and pulling tension of all cables.

H. CLIC Fasteners: Horizontal cables shall be suspended by "CLIC" fasteners with cable inserts in TRs on the plywood area where ladder tray or rack management is not available per the design documents. Listings: "CLIC" fasteners shall be in accordance with NEC and BICSI standards. Above the plywood area J-Hooks or D-rings should be used.

I. Fire Stop Protection: Sealing of openings between floors, through rated fire and smoke walls, existing or created by the SCS Installer for cable pass through shall be the responsibility of the SCS Installer. Sealing material and application of this material shall be accomplished in such a manner, which is acceptable to the local fire and building authorities having jurisdiction over this work. Creation of such openings as are necessary for cable passage between locations as shown on the drawings shall be the responsibility of the SCS Installer's work. Any openings created by or for the SCS Installer and left unused shall also be sealed as part of this work. Penetration rating shall equal structure rating.

J. New Materials: All components, wiring and materials to be used for the installation of the SCS shall be new and free of defects. Used components, wiring and materials shall only be used when specifically indicated in the design drawings.

K. Damage: The SCS Installer shall be responsible for any damage to any surfaces or work disrupted because of their work. Repair of surfaces including painting and ceiling tile replacement shall be included as part of this contract.

L. Avoiding EMI: To avoid EMI, all pathways shall provide clearances of at least four feet from motors or transformers; one foot from conduit and cables used for electrical-power distribution; and five inches from fluorescent lighting. Pathways shall cross perpendicular to fluorescent lighting and electrical-power cables and conduits. The SCS Installer shall not place any distribution cabling alongside power lines, or share the same conduit, channel, or sleeve with electrical apparatus.

M. Work External to the Building: Any work external to the confines of this building as shown on the drawings shall be governed by the provisions of this specification.

N. Demolition: Any task part of the installation of the SCS requiring relocation, rerouting and/or demolition shall be done according to the following requirements:

1. Coordination: Prior to any deactivation and relocation or demolition work, arrange a conference with the Architect and the Owner's representative in the field to inspect each of the items to be deactivated, removed, or relocated. Care shall be taken to protect all equipment designated to be relocated and reused or to remain in operation and be integrated with the new systems.

2. Provisions: All deactivation, relocation, and temporary tie-ins shall be provided by the SCS Installer. All demolition, removal, and the legal disposal of demolished materials of system designated to be demolished shall be provided by the SCS Installer.
3. All Existing Voice/Data cables and connecting hardware not to be used after the new installation is complete and within the areas where work is required as part of this project shall be removed by the SCS Installer. All existing cables to be left for future use if indicated by the Owner shall be tagged for that purpose.
4. Owners Salvage: The Owner reserves the right to inspect the material scheduled for removal and salvage any items he deems usable as spare parts.
5. Phasing: The SCS Installer shall perform all work in phases as directed by the Architect to suit the project progress schedule, as well as the completion date of the project.

O. Blank Inserts and Panels: All telecommunications outlets with faceplates or mounting frames with unused terminations shall be plugged with blank inserts or panels. Blank inserts shall match the color of the faceplate or mounting frame. No more than one blank module shall be required for each faceplate. All unused ports in the FODC enclosures for adapter panels shall be filled with blank adapter panels.

P. Patch Panel and FODC Separation: Horizontal cables shall be terminated in separate patch panels according to the use of the cable. Each series of patch panels or FODC for a specific use shall have at least 20% spare capacity of ports. Patch panels of the same use shall be mounted consecutive in the equipment cabinets or racks. The following separation for patch panels and FODCs shall be provided:

1. Cables for any other specialty systems like security systems or others shall all be terminated in separate patch panels from any other cables.
2. Horizontal fiber optic cables shall be terminated in separate FODC from fiber optics backbone cables.
3. Single mode fiber optic backbone cables shall be terminated in separate FODC from multimode fiber optic backbone cables.

Q. Supports for Rear of Patch Panels: All patch panels for horizontal cables shall be provided with a rear support bar to hold the cable and to provide strain relief. At a minimum one rear support bars shall be provided for each two rows of 24 connectors.

R. Horizontal Wire Managers: Horizontal wire managers shall be provided typically on retro fit projects following these criteria:

1. At least one above and below each straight (flat) patch panel.
2. At least one above and below any network switches.
3. At least one below any rack mounted termination block.

S. Cross Over Wire Managers: Cross over wire managers shall always be used with angled or curved patch panels. One cross over wire manager shall always be installed in the middle of each rack at the same height on every rack.

T. Patch Cord Quantity, Color and Lengths: Copper and fiber optics patch cords shall be provided per following chart. All percentage calculations shall be rounded off to the nearest integer number.

TYPE	QTY	COLOR JACKET	LENGTH
4-pair at work area outlet	One for 90% of all 4-pair horizontal cables in the project	Match horizontal cable color jacket	30% 7', 50% 10' and 20% 14'. SCS Installer shall field verify these percentages to provide more accuracy.
4-pair at WAP location	One for 100% of all 4-pair horizontal cables for WAPS in the project + 10% spare	Match horizontal cable color jacket	The SCS Installer shall field verify all lengths to match location of WAPS selected by Owner or wireless survey.
4-pair at Surveillance camera	One for 100% of all 4-pair horizontal cables for cameras in the project +10%	Match horizontal cable color jacket	The SCS Installer shall field verify all lengths to match location of cameras.
4-pair at patch panel side (excluding surveillance cameras and WAPs)	One for 90% of all 4-pair horizontal cables in the project	Match horizontal cable color jacket	40% 7', 40% 10', 20% 14'. SCS Installer shall field verify these percentages to provide more accuracy.
4-pair at patch panel side (surveillance cameras and WAPs)	One for 100% of all 4-pair horizontal cables in the project +10%	Match horizontal cable color jacket	For pricing purposes use: 40% 7', 40% 10', 20% 14'. SCS Installer shall field verify these percentages to provide more accuracy.

(Patch Cord Table continued on next page)

TYPE	QTY	COLOR JACKET	LENGTH
2-strand fiber optics at work area outlet	One for 100% of all 2-strand horizontal fiber cables in the project + 10% spare	Per fiber type	50% 8’ and 50% 10’
2-strand fiber optics at FODC.	One for 100% of all horizontal 2-strand fiber cables and one for 83% of all fiber strands of backbone cables in the project. For example, a 24-strand cable shall require 20-2-strand patch cords or 10 for each side of the cable	Per fiber type	20% 6’, 60% 10’, 20% 14’ SCS Installer shall field verify these percentages to provide more accuracy.
One or two pair for copper backbone cross connects	One for 90% of all backbone copper pairs installed in the project.	Gray	For pricing purposes use: 80% 2M, 20% 3M. SCS Installer shall field verify these percentages to provide more accuracy.

U. Cable Slack: Cable slack shall be provided for all cables in the project following this guideline:

1. At each work area outlets, all horizontal cables shall have 3’ of slack above ceiling.
2. At the telecom room side all horizontal cables shall have at least 6’ neatly organized on the wall using a figure 8 configuration or a non-loop shaped arrangement with Velcro straps.
3. Backbone cables at termination points shall have at least 15’ of slack neatly organized on the wall using a standard loop and Velcro straps.
4. Outside plant backbone cables run through in-ground pull boxes greater than 24 inches X 24 inch shall include one service loop inside the box.

V. Bend Radius: Installation of Fiber Optic Cables shall be in accordance with ANSI/TIA-568C guidelines and cable manufacturer specifications. Bend radius parameters shall be followed for load and no-load conditions. Cable installation and terminations that do not comply shall be replaced by the SCS Installer. If no recommendation is specified by cable manufacturer, at least the following criteria shall be met:

1. The bend radius for intrabuilding 2 and 4-fiber horizontal optical fiber cable shall not be less than one in under no-load conditions. When under a maximum tensile load of 222 N (50lbf), the bend radius shall not be less than two inches.
2. The bend radius for intrabuilding optical fiber backbone with fiber counts above four shall not be less than ten times the cable outside diameter under no-load conditions and no less than 15 times the cable outside diameter when the cable is under tensile load.
3. The bend radius for interbuilding optical fiber backbone shall not be less than ten times the cable outside diameter under no-load conditions and no less than 20 times the cable outside diameter when the cable is under tensile load up to the rating of the cable, usually 2670 N (600lbf).

W. Innerduct: Innerduct shall be provided from end to end of a raceway system under the following conditions:

1. Inside underground conduits as indicated in design drawings.
2. For horizontal fiber optic cable or inside premise fiber optics backbone cables without interlocking armor when routed through cable trays, ladder trays or vertical conduit sleeves. This requirement is usually not indicated in the drawings but indicated only in this specification.
3. For backbone fiber optic cable in vertical risers.

X. SCS Protection During Construction: The SCS Installer shall protect all SCS materials from damage during construction. Racks shall be covered with fabric or plastic after mounting to prevent dust, debris and other foreign materials having contact with SCS devices. The SCS Installer shall protect, at all times, all fiber optic and copper cables from damage during installation. All cables shall maintain the physical integrity as manufactured for testing and delivery to the Owner. All damaged cables shall be replaced at no additional cost to the Owner.

Y. Cable Bonding: Shielded cables or cables with metal strength or protection members (like interlocking armor) shall be bonded to the telecommunications grounding system as indicated in Specification Section 27 05 26 Grounding and Bonding for Communication Systems.

Z. Rack Installation: All racks shall be installed leveled and plumbed. Four post racks and two post racks shall be anchored to the floor and shall be installed with isolation pads. Equipment cabinets shall be leveled using the leveling feet unless design drawings specifically indicate to leave them on the casters.

AA. Rack Bonding: All equipment cabinets and racks shall be bonded to the telecommunication grounding system as indicated in Specification Section 27 05 26 Grounding and Bonding for Communication Systems.

3.3 IDENTIFICATION AND TAGGING

A. General: Identification and tagging of SCS components shall be executed by the SCS Installer. At a minimum, identification and tagging shall be provided for the following components of the system:

1. All horizontal and backbone cables at both ends of the cable in the cable jacket. Labels on each side shall be different indicating the location of the other side of the cable.
2. All faceplates indicating all jacks terminated in the faceplate.
3. All patch panels.
4. All racks.
5. All termination blocks.
6. All telecommunication rooms and outdoor enclosures.
7. All interbuilding backbone cables inside in ground pull boxes outside of the building shall have a visible label in each box they pass through.

B. The SCS Installer shall follow the Owner provided identification system. If Owner does not have any preference or standard the SCS Installer shall provide a system for approval of the A&E and the Owner as indicated in the submittal paragraph of this specification. The identification system shall follow the TIA/EIA 606-B standard.

3.4 TESTING OF COPPER CABLING

A. General: Horizontal and backbone cabling shall be verified in accordance with ANSI/TIA/EIA-568-C, Cabling Transmission Performance and Test Requirements.

B. For all 4-pair copper cabling terminated for the use of building systems or systems provided under the contract, such as surveillance cameras, emergency phones, elevator phones, WAPs, Access control panels, and building automation equipment the required test shall be a permanent link style test. A permanent link test is defined as a test that does not include the patch cords to be used in the project.

C. For all 4-pair copper terminated for the use in work areas such as computers and phones, the test method selected for all 4-pair copper cabling is a permanent link style test. Permanent link test is defined as a test that does not include the patch cords to be used in the project.

D. General: In the event the A&E elects to be present during the tests, provide notification to the Engineer two weeks prior to testing.

E. General: The Installer's RCDD shall sign off on all copper and fiber optic cable test results, indicating that he/she was responsible for all cable testing procedures and that all cables

were tested in compliance with the contract documents and met or exceeded the requirements stated herein.

F. Testing Equipment: Tester shall be as manufactured by Agilent, Fluke, IDEAL or Wavetek. Tester shall be 100% Level III(e) compliant with ANSI/EIA/TIA 568C specifications for testing of the CAT6A cabling. No tester will be approved without meeting these requirements.

G. Each jack in each outlet shall be tested at a minimum to the manufacturer's performance of the cable to verify the integrity of all conductors and the correctness of the termination sequence. Testing shall be performed between work-areas and the equipment rack patch panel. Prior to testing UTP runs, the tester shall be calibrated per manufacturer guidelines. The correct cable Nominal Velocity of Propagation (NVP) shall be entered into tester to assure proper length and attenuation readings.

H. Documentation of cable testing shall be required. The SCS Installer shall provide the results of all cable tests in electronic format (final results in PDF format and raw data). Each test page shall be separated by standard page break (one test per page). The test results shall include sweep tests, continuity, polarity checks, wire map, Attenuation, NEXT, PSNEXT, FEXT, PSFEXT, ELFEXT, PSELFEXT, ACR, Return Loss, Delay Skew, and the installed length. Cables not complying with the EIA/TIA 568C tests results shall be identified to the A&E for corrective action which may include replacement at no additional expense to the Owner. All identification names of the cables used in the test shall match the labeling system approved for the project and the corresponding shop drawings.

I. Any Fail, Fail*, Pass* or WARNING test result yields a Fail for the channel or permanent link under test. To achieve an overall Pass condition, the result for each individual test parameter must be passed. All test results shall come from a tester with the permanently enabled marginal reporting feature.

J. Test results shall show and comply with the margin claimed by the manufacturers over CAT6A permanent link specifications on all transmission parameters across the entire frequency range as shown on the manufacturer's cut sheets.

K. General: Copper multipair backbone cabling shall be tested for length, continuity, polarity checks, and wire map. The SCS Installer shall provide the results of all Copper Riser cable tests in electronic format. The use of pigtails or special harness could be required to properly test these cables.

L. Trained technicians who have successfully attended an appropriate training program and have obtained a certificate as proof thereof shall execute the tests.

M. All 4-pair patch cords shall be factory tested only.

3.5 TESTING OF FIBER OPTICS CABLING

A. General: Horizontal and backbone cabling shall be verified in accordance with ANSI/TIA/EIA-568-C and the addendum for fiber optic testing.

B. General: In the event the Engineer elects to be present during the tests, provide notification to the engineer two weeks prior to testing.

C. Cleanliness: All fiber optic connectors shall be cleaned properly before any testing and after testing. Proof of cleanliness shall be required during the acceptance test for the SCS by the A&E. SCS Installer shall have available during this test a 200X microscope or a video probe to demonstrate the cleanliness of the randomly selected connectors by the A&E.

D. End to End Attenuation Test: The SCS Installer shall perform end-to-end attenuation testing for each multimode fiber at 850 nm and 1300 nm from both directions 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 both directions for each terminated fiber span in accordance with TIA/EIA-526-7 (OFSTP 7). A one jumper reference shall be used for all testing. 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. When calculating the link loss budget for spans greater than 90 meters use the values listed below. End to end attenuation shall be done with a Level II meter using a meter and light source equipment (also known as main and remote unit)

ATTENUATION DUE TO	FIBER TYPE	MAX. ATTENUATION
Terminating connectors. Field terminated options	All fiber types	0.75 dB per connector
Terminating connectors. Field terminated options	All fiber types	No more than 0.2 dB additional to total dB loss measured at the factory in report sent by cable manufacturer.
Splices	All fiber types	0.3 dB per splice
Distances	OM1 (850nm/1300)	3.4 dB /1.0 dB per Km.
Distance	OM2, OM3 and OM4 (850nm/1300)	3.0 dB /1.0 dB per Km.
Distance	OS1 and OS2 (1310 nm/1383 nm/1550 nm)	0.65 dB /0.65 dB/ 0.5 dB per Km.

E. OTDR Test: Additional end to end attenuation test, all fiber optic cables shall be tested with Level III OTDR equipment for the following conditions:

1. Each known event (connector/splice) insertion loss at both windows for each fiber type (850/1300 nm for multimode and 1310/1550 nm for single mode). All events shall pass maximum allowed insertion loss for the event type as indicated in table above.
2. Reflective events (connections) shall not exceed:
    a. 0.75 dB in optical loss when bi-directionally averaged
    b. -35 dB Reflectance for multi-mode connections
    c. -40 dB reflectance for UPC single-mode connections
    d. -55 dB reflectance for APC single-mode connections
3. Non-reflective events (splices) shall not exceed 0.3 dB.
4. Estimated distance for multiple strands of the same cable shall not vary more than 1% between strands.
5. Cable signatures in the form of traces along the complete distance of the cable. Unexplained cable reflections shown in the OTDR shall require the Installer to submit a letter explaining such events and pictures of cable conditions in the locations where the unexplained events are located to demonstrate cable has not been kinked or damaged during installation.

F. OTDR Test conditions: All OTDR testing shall be performed with the following conditions:

1. Use a launch cable and a tail cable in accordance with fiber type being tested and requirements indicated by OTDR equipment manufacturer.
2. Launch and tail cables shall be products sold by testing equipment manufacturer and not field made cables.
3. Launch and tail cables shall be selected according to the type of connector being tested such as APC or UPC type connectors.
4. Use launch compensation mode during the test to subtract the effects of the launch and tail cables.
5. Test from one direction unless the presence of “gainers” are spotted during the test. In such case the Installer shall test in both directions and adjust the test equipment to average measurements from both directions.
6. The SCS Installer shall verify the backscatter coefficient used in the test to make sure it matches the coefficient of the cable being tested.

G. OTDR Testing Equipment used on this project shall have the specifications indicated in this following table:

SPECIFICATION	MULTIMODE	SINGLE MODE
Wavelengths	850 nm ±10 nm. 1300 nm +35 / -15 nm.	1310 nm ±25 nm. 1550 nm ±30 nm.
Event Dead Zone. Measured at 1.5 dB below non-saturating reflection peak with the shortest pulse width. Reflection peak < -40 dB for mm and < -50 dB for sm.	850 nm: 0.5m typical 1300 nm: 0.7m typical	1310 nm: 0.6m typical 1550 nm: 0.6m typical
Attenuation Dead Zone. Measured at ± 0.5 dB deviation from backscatter with the shortest pulse width. Reflection peak < -40 dB for mm. and < -50 dB for sm.	850 nm: 2.2 m typical 1300 nm: 4.5m typical	1310 nm: 3.6m typical 1550 nm: 3.7m typical
Pulse Widths (nominal)	850 nm: 3, 5, 20, 40, 200 ns. 1300 nm: 3, 5, 20, 40, 200, 1000 ns.	3, 10, 30, 100, 300, 1000, 3000, 10000, 20000 ns
Loss Threshold Setting	0.01 dB to 1.5 dB Adjustable in 0.01 dB increments	0.01 dB to 1.5 dB Adjustable in 0.01 dB increments

H. The Test Report for each fiber strand shall include the following information:

1. Calculated Loss Budget for each optical fiber link (see attenuation table above).
2. Cable/strand ID matching shop drawings labeling system.
3. Name of technicians who performed the test.
4. Date and time the test was performed.
5. Measurement direction (from/to).
6. Jumper reference set up date/time and attenuation value.
7. Equipment model and serial number used and calibration date.
8. End to End Attenuation Loss Data for each optical fiber link.
9. OTDR Traces, one page per strand. Expand chart to cover most of the page.
10. Each event loss data and test limits used, including test limit file date used.

I. For fiber optic cables with factory terminated connectors or pre-terminated pigtails, the SCS Installer shall also provide the test results performed at the factory for fiber optic cables with factory terminated connectors to compare with the field test done by the SCS Installer. No significant variation between the factory test results and the field test results shall be encountered.

3.6 SYSTEMS WARRANTY AND SERVICE

A. SCS Installer shall follow all warranty and service requirements indicated in Specification Section 27 00 10 Technology General Provisions.

B. Warranty: The SCS shall be required to be under the manufacturer's warranty program for a complete channel configuration including cable, jacks, patch cords, and patch panels and include cabling specifically approved for the channel configuration with the manufacturer's components. Manufactures shall provide the warranty worst-case performance data for the installed cabling system, and the performance data indicated in the warranty documents/certificate.

C. A 25-year warranty available for the Structured Cabling System (fiber optics and copper infrastructure) shall be provided for an end-to-end channel model installation which covers applications assurance, cable, connecting hardware, and the labor cost for the repair or replacement thereof.

D. Additional features of the warranty shall include:

1. That the SCS installed system complies with the margin claimed by the manufacturer above the category 6A channel specifications on all transmission parameters across the entire frequency range of 1-600 MHz as shown on the manufacturers catalogs and literature.

3.7 ENGINEER'S FINAL ACCEPTANCE TEST

A. SCS Installer shall follow all requirements for final acceptance indicated in Specification Section 27 00 10 Technology General Provisions to be approved by both BTS and/or the Project Architect.

B. The Engineer's final acceptance test will not include testing of structured cabling components but could include verification of cleanliness of fiber optic connectors.

3.8 TRAINING AND INSTRUCTION

A. Training shall only be done after all testing, and identification processes have been completed and passed as indicated in this specification. Any training done prior to final acceptance will not be accounted for the formal training requested and the SCS Installer shall re-do all training after the final acceptance test is passed, at no additional cost to the Owner.

B. SCS Installer shall follow all training requirements indicated in Specification Section 27 00 10 Technology General Provisions.

C. The training for the SCS shall include the following topics:

1. Detail explanation of the identification system.
2. A walkthrough of all spaces and locations where terminations have been done in the project.

3.9 AS-BUILT DOCUMENTS AND PROJECT CLOSEOUT

A. The SCS shall follow all requirements for as-built and closeout documents indicated in Specification Section 27 00 10 Technology General Provisions.

B. The following are additional requirements supplementing the information provided in Specification Section 27 00 10 Technology General Provisions:

1. Provide the Warranty certificate issued by the manufacturer of the SCS infrastructure.
2. The Installer's RCDD shall affix his/her stamp to the as-built drawings, indicating that he/she has reviewed and approved the drawings as being complete, accurate, and representative of the system as actually installed.

3. As-built drawings inside each telecom room. The SCS Installer shall plot all as-built drawings and locate them inside each of the telecom rooms in the project. Each telecom room shall have the as-built drawings of the areas being served from that room. Each drawing shall be placed inside a clear vinyl document protector the size of the actual design drawing and affixed to a wall/plywood in the telecom room. The document protector shall be re-usable and shall allow the Owner to replace the drawings as changes are done to the SCS infrastructure in the future. Without this information, substantial use of the system will not be provided to the Installer.
4. The SCS Installer shall provide an Excel software spreadsheet that defines the telecommunications outlet number, location, number of voices, data, and special jacks. This database shall also provide the outlet patch panel connection to the riser/inter-floor cable, equipment, and telephone company demarcation circuit pairs as part of the as-built documentation.
5. Electronic copies of all test results (copper and fiber). Electronic copies shall include raw data files and PDF files with results. PDF files shall be organized the following way:
    a. All copper cables for cables terminating in one telecom room in a single PDF file with the name equal to the label used in the shop drawings for the telecom room where the cables are terminated.
    b. All attenuation and OTDR test for all strands of a single cable shall be in one PDF file with the name corresponding to the Cable ID used in the shop drawings.

END OF SECTION 27 10 00

SECTION 27 20 00 – VOICE/DATA COMMUNICATIONS EQUIPMENT

PART 1 - GENERAL

1.1 PURPOSE OF THIS DOCUMENT

A. The purpose of this specification section is to indicate to A&E and designers of low voltage infrastructure, working in construction or renovation projects for Pinellas County Government, the design requirements by BTS when it comes to such infrastructure. This document will be a starting point for completing a set of construction documents but **SHALL NOT** be used unedited as a bid document.

1.2 PINELLAS COUNTY WIRED DATA NETWORKS

A. Facilities where Pinellas County employees work could have a presence of one of more of the following networks:

1. BTS Network: This network services County employees (users) and the general public in most facilities under the control of the BCC. See Specification Section 27 00 10 Technology General Provisions for a detailed explanation of all users. This network services:
   a. Desktop computers
   b. Printers
   c. VoIP devices
   d. Surveillance cameras
   e. Access control system
   f. Building Automation system
   g. Audio/Visual systems
   h. Public Wi-Fi
   i. Private Wi-Fi for users.

   This network also provides WAN access and VPN for employees and vendors with legitimate needs to remote into this network.

2. PCSO Network: This network services only Pinellas County Sheriff's Office (PCSO) employees. This network does not service the public and it can be found only in facilities or areas under the control of PCSO. This network services:
    a. Desktop computers
    b. Printers
    c. Surveillance cameras
    d. Access control system
    e. Audio/Visual systems
    f. Private Wi-Fi for users.

3. Traffic Management, Utilities

4. Isolated Networks: In some facilities there are isolated purpose networks such as a closed loop security network or building automation network. Such networks typically do not cross more than one site and are under the specific control of a user group.

1.3 PINELLAS COUNTY WIRED VOICE COMMUNINCATIONS

A. All Pinellas County Employees with a work area in any of the facilities under the control of the BCC have an extension in an Enterprise Voice Communication system controlled and operated by BTS. This is a VoIP system.

B. PCSO does not use a separate voice communication system. They also use the same system owned and operated by BTS.

1.4 PINELLAS COUNTY WIFI NETWORKS

A. General: Wi-Fi in most facilities is operated by BTS or PCSO. Public, free Wi-Fi is offered in all facilities within public and/or customer service areas.

B. Design: Careful placement of WAPs during the project is key to a good Wi-Fi service in a building. The process of selecting WAP locations shall be a 3-stage process as described below:

1. Predictive analysis: The first step of this process is to create a Predictive analysis software for the project. This task shall be done by the A&E using any of the commercially available Wi-Fi predictive software. The idea is to produce heat maps with the floor plan of the facility at all currently available Wi-Fi standards, such as 802.11a, 802-11b, 802-11g, 802-11n and 802.11ac. Not all building surfaces need to be modeled correctly. Some examples of predictive software are:

a. AirMagnet survey by NetScout Systems
b. Ekahau Site Survey by Ekahau
c. iBwave WiFi by iBwave solutions
d. TamoGraph Site Survey by TamoSoft
e. Prime Infrastructure 3.0 Wireless Planning Tool by Cisco

2. Wireless survey: Once the building is enclosed.

3. Final adjustment

C. Specific SSID: Any user requiring Wi-Fi for any specific application will need to contact BTS for requirements on getting a specific SSID.

1.5 PINELLAS COUNTY RADIOS

A. There are two groups in Pinellas County that own and operate radios. One is Pinellas County Fire and Rescue, the other is the Pinellas County Sheriff's Office.

B. For all issues related to DAS system for life safety in new construction, A&E needs to contact Director of Radio and Technology with the Department of Safety & Emergency Services for understanding the frequencies and types of systems installed.

1.6 USER COMPUTERS, PRINTERS AND OFFICE ELECTRONIC EQUIPMENT

A. Depends on each project. In case there is no permitted down time.

B. For most cases, computers and phones associated with standard work areas for Pinellas County employees are not part of a construction project scope. Each employee, when hired, will be assigned by the County a workspace that is inclusive of such devices. Nevertheless, in many projects, there are devices and services that will need to be part of the project such as:

1. Computers for common areas such as conference rooms or check in kiosk
2. Phones or conference phones in areas of common use, such as MEP rooms, conference rooms, courtrooms, etc.
3. Printers for common use
4. Computers for building systems such as security and building automation
5. Cost of moving such equipment from one location to the new location

C. For all equipment that needs to be part of the project, the A&E shall prepare a list with quantities for all devices needed. The A&E shall work with the users of the project to understand their needs when it comes to such systems and establish specifications for each device based upon those needs. These specifications shall be provided to BTS for approval. BTS shall provide all software and hardware requirements for those devices to make sure they can be incorporated into existing maintenance and support programs.

D. For most cases, printers in common areas are leased by each individual user group. Such lease agreements do not represent a cost to a construction project, they are part of operational cost for each department. The A&E shall work with the users understanding if printers for common areas will be leased or purchased. If they are purchased, then they could be part of the project cost.

PART 2 - PRODUCTS

2.1 ACTIVE VOICE/NETWORK EQUIPMENT

A. For all active voice/data network equipment to be purchased for any given project, specifications on such equipment will be provided and approved by BTS.

PART 3 - EXECUTION

3.1 PURCHASING OF VOICE/DATA COMMUNICATIONS EQUIPMENT.

A. All purchasing of voice/data communications equipment shall be approved through BTS.

3.2 REQUEST OF IP ADDRESSES FOR BTS NETWORK

A. All requests of IP addresses for building systems shall be done through BTS in a specific format. See Appendix C.

3.3 REQUEST FOR VOICE COMMUNICATIONS VoIP NUMBERS

A. All request of VoIP phones and numbers for building systems or users shall be done through BTS.

3.4 REQUEST FOR CENTRAL OFFICE B1 CIRCUITS

A. All request of B1 circuits and numbers for building systems shall be done through BTS.

3.5 REQUEST FOR VPN ACCESS

A. All request for VPN access for supporting building systems shall be done through BTS.

END OF SECTION 27 20 00

SECTION 27 41 00 – AUDIO/VISUAL SYSTEMS

PART 1 - GENERAL

1.1 PURPOSE OF THIS DOCUMENT

A. The purpose of this specification section is to indicate to A&E and designers of low voltage infrastructure, working in construction or renovation projects for Pinellas County Government, the design requirements by BTS when it comes to such infrastructure. This document will be a starting point for completing a set of construction documents but **SHALL NOT** be used unedited as a bid document.

1.2 SCOPE OF WORK (SOW)

A. Audio/Visual Systems (AVS) are important to the operations of many users within Pinellas County facilities. As such, these systems need to be addressed during the design of any new or renovated facilities. Here are the typical responsibilities for AVS:

1. Design: The design of the AVS shall be done by the A&E of the project, following recommended practices by BTS.
2. Project requirements: The specific project requirements for the design of an AVS shall be provided by the building end users and IT groups. Those requirements shall be collected and incorporated in the system design by the A&E.
3. Network: All components of an AVS that have Ethernet network connections must be authorized and approved by BTS. The use of isolated system specific networks is not allowed by BTS. See Specification Section 27 20 00 Voice/Data Communications Equipment for detailed forms to be used by Installer to obtain IP addresses from BTS for any system. There is a specific form to be used to request an IP address.
4. Personal computers (PCs): Dedicated PCs for the use in AVS shall be programmed with all the software requirements for operating system, antivirus, and remote access as any other PC in the County.
5. Budgeting/Funding: Funding sources for Audio/Visual systems shall be discussed during design. BTS does not provide funding for Audio/Visual systems. In most cases funding for AVS is included into the project budget. Budget should be completed before bid process.
6. Installation: The installation of the AVS system will be included in the SOW of a project for the GC or the CM. BTS does not install AVS.
7. Maintenance: BTS strongly suggests building users to discuss maintenance and technology refresh for AVS. Maintenance for AVS is provided by a third-party vendor not by BTS. User groups have different funding sources and multiple funding sources could be established.

B. The project scope shall clarify the following:

1. List the scope of work and responsibility matrix.
2. List all the room(s) in the project that will have Audio/Visual systems.
3. List of all provided and recommended consumables for the AVS.
4. List of all recommended spare parts of the AVS.

1.3 RELATED DOCUMENTS

A. General: The General Requirements, Conditions of the Contract, Specifications, Drawings, Addendums, Contract Modifications (the Contract Documents), and definitions of legal entity (such as Contract, Installer, Engineer, Owner, etc.) shall apply to the work of this specification section.

B. Supplemental: Refer to the specification sections identified below for additional requirements, which are supplemented by this section:

1. 27 00 10 Technology General Provisions
2. 27 05 28 Raceways for Technology
3. 27 10 00 Structured Cabling System
4. 27 05 26 Grounding and Bonding for Communication Systems

1.4 INSTALLER QUALIFICATIONS

A. General: The qualifications and requirements herein apply to the specific technology identified by this specification section. Refer to the specification sections identified in Part 1.3 “Related Documents”, for additional requirements, which are supplemented by this section.

B. Installer Qualifications: The Installer directly responsible for the work described in this specification section is also referenced as the AVS Installer. The Installer shall be a licensed and registered Contractor who is, and who has been, regularly engaged in providing the installation of audiovisual systems of similar size and complexity for at least the immediate past five years.

C. Project manager requirements: The project manager for each company participating in the installation of the AVS shall be a Certified Technology Specialist (CTS) by Avixa, Inc. Proof of current certification shall be provided with the submittal.

D. Programmer-Installer: The AVS Installer must have a factory-trained Programmer/Installer, for the provided project products, in full-time employment, as part of their staff. The AVS Installer needs to provide a certificate of completion of training for the staff that will be taking part in the execution of this project.

E. Qualification Documentation: The Installer shall provide the following documentation with their bid package, as evidence that the requirements for the Installer qualifications have been satisfied:

1. A list of not less than five references for jobs of similar size and complexity including:
   a. Project Names
   b. Locations
   c. Contact Names
   d. Contact Telephone Numbers
2. Location (specific street address) of the office from which this installation and warranty work will be performed. It is preferred that the Installer has established and maintains a permanent office within 100 miles of the project site.
3. Copies of Manufacturer certification certificates. It is required that the Installer possess the following certifications, at a minimum:
   a. Control System certified dealer, Installer, and Programmer
   b. List all that apply
4. Copies of Licensure certificates.
5. Copies of Insurance and Bonding certificates.
6. The Installer shall commit to a response time to system problems, during the warranty period, as required by the system end users. [NOTE TO DESIGNERS OR CONSULTANTS] This information shall be collected before the AV specifications are sent to an Installer for pricing.

1.5 MATERIALS ALTERNATES AND SUBSTITUTIONS

A. General: See details for alternates and substitutions in Specification Section 27 00 10 Technology General Provisions.

1.6 SHOP DRAWINGS AND SUBMITTALS

A. The AVS Installer shall follow all requirements for shop drawings indicated in Specification Section 27 00 10 Technology General Provisions.

B. Project Start Submittals: A maximum of 60 days after the AVS Installer receives a notice to proceed with the project, but no sooner than a year before substantial completion, the following information shall be submitted:

1. Cut sheets with all specifications of every device, cables, and connectors to be used in the project.
2. One-line diagrams with all devices included in the systems. Each system in a different sheet.
3. User interface and faceplate color submittal. The AVS Installer shall prepare a separate submittal with the shape and color of all user interface plates to be approved by the Architect of the project or the Owner.

C. Construction Submittals: During the construction process the AVS Installer shall submit various documents for approval prior to continuing with the installation process. Here is some of the information the AVS Installer needs to submit:

1. Before starting the programming process, the AVS Installer shall provide the following information:
    a. A schematic presentation of the layout of all the user interfaces in the project. The AVS Installer needs to get approval of this submittal before starting any programming. These layouts shall include all graphics with all button sizes, shapes, colors, and wording to be used in all user interfaces. All keypads shall include working for engraving in the buttons.
    b. Completely fill out Network Configuration Template. See Appendix C.
    c. Rack elevations of all AV equipment for all rooms in the project.
    d. Conduit rough-in requirements of all wall and ceiling mounted devices for all equipment part of the AVS system.
    e. Detailed layout of the DSP filters to be used in each DSP processor.
    f. Any installation and rigging details for loudspeaker systems or other heavy equipment part of the AV system.
    g. Any design changes whether originated by the Owner, Designer or by the AVS Installer as a VE suggestion are required to follow the same submittal process as described previously for all equipment involved on the change.

1.7 PROJECT SPECIFIC SOURCE CODE OWNERSHIP

A. Definition of project specific source code: Project specific source code includes all source code created to generate an executable file intended to run any equipment used in the installation of the AVS. Examples of project specific source code include source code used to generate executable files for control processors, DSP processors, and touch panels. Project specific source code does not include source code used to create programming tools and compilers or source code used to generate operating systems or application programs running in PC based workstations.

B. Ownership: Any project specific source code used in this project shall remain the exclusive property of the Owner. By accepting the contract to perform the work included in this project, the AVS Installer or designer and any other companies working creating project specific code during this project relinquish the right of Ownership of this source code and waive any licensing fees or royalties for the use of source code by the Owner or any company authorized by the Owner to perform changes in the source code after the project is substantially completed for an undefined period of time.

PART 2 - PRODUCTS

2.1 ROOM CONFIGURATIONS

A. General: The following descriptions provide common examples of room configurations. Although these are not mandated to be used for a project, they can be used as basis of design for any County project:

B. HUDDLE ROOM

1. A huddle room is defined as a meeting space for up to a maximum of five people.
2. This type of room shall have the following capabilities:
    a. Display system for appropriate room size with ability to view presentations easily
    b. Sound for AV programs will be through standard speakers in the flat panel display
    c. Voice conference shall happen in this room through a conference phone
    d. County IT groups to decide how soft codec videoconference will take place
    e. AV presentation shall be possible from the table, through wireless presentation device or a hard-wired connection (HDMI) on the table
    f. Control shall be done through an IR remote control or with a control system with a tabletop touch screen, as an upgrade
    g. Room scheduling is highly recommended. Solutions that interface directly with Outlook are preferred

3. The A&E shall coordinate conduit rough in as well as coordination with furniture vendor for proper table pop-up devices.
4. This type of room might not require a floor box or a poke through if the table is touching one of the walls.

C. SMALL/MEDIUM CONFERENCE ROOM

1. A small conference room is defined as a meeting space for up to 12 people.
2. This type of room shall have the following capabilities:
    a. Display system for appropriate room size with ability to view presentations easily
    b. Sound for AV programs will be through standard speakers in the flat panel display or a sound bar as an enhancement
    c. Voice conference shall happen in this room through a conference phone.
    d. Soft codec videoconference will happen in this room through a permanent PC in the room and a USB camera located behind the display
    e. AV presentation shall be possible from the table, through wireless presentation device or a hard-wired connection (HDMI) on the table
    f. Control shall be done through a control system with a tabletop touch screen
    g. Room scheduling is highly recommended. Solutions that interface directly with Outlook are preferred

3. The A&E shall coordinate conduit rough in as well as coordination with furniture vendor for proper table pop-up devices.
4. This type of room requires at least one floor box or a poke through under the table. Power outlets are required on the table and around the room. Data jacks are only required for permanent devices in the room.
5. AV equipment could be in a credenza rack in a corner of the room.

D. LARGE CONFERENCE ROOM

1. A large conference room is defined as a meeting space for up to 24 people.
2. This type of room shall have the following capabilities:
    a. Dual display system depending on room size. Both devices shall be located on the same wall as opposed to opposite walls. This will keep the focus in one direction
    b. Sound for AV programs will be through ceiling speakers, or suspended speakers
    c. Voice conference shall happen in this room through a voice conference system with ceiling microphones and an audio DSP system. Mix minus configuration is highly recommended

d. Soft codec videoconference will happen in this room through a permanent PC in the room and a USB camera located behind the display. Hard codecs might be required in these rooms
e. AV presentation shall be possible from the table, through wireless presentation device or a hard-wired connection (HDMI) on the table, at two different locations
f. Control shall be done through a control system with a tabletop touch screen
g. Room scheduling is highly recommended. Solutions that interface directly with Outlook are preferred

3. The A&E shall coordinate conduit rough in as well as coordination with furniture vendor for proper table pop-up devices.
4. This type of room requires at least two floor box or a poke through under the table. Power outlets are required on the table and around the room. Data jacks are only required for permanent devices in the room.
5. AV equipment could be in a credenza rack in a corner of the room.

E. TRAINING/CLASSROOM ROOM

1. General: It is very important to determine early on if the classroom will be used for computer-based training or just standard lecture classrooms. Any room that requires computer-based training, will require power and hard-wired data connectivity.
2. This type of room shall have the following capabilities:
   a. At least one large display device. Most likely a projector and screen. A flat panel display can be used if the size of the display falls into the 1/5 of the distance rule to the LFV. A second display device can be located if needed
   b. Sound for AV programs will be through ceiling speakers, or suspended speakers
   c. A podium mic with the ability to have a wireless microphone shall be included in the room
   d. A connection on the wall for connecting a portable ADA audio transmitter shall be in these rooms
   e. Voice conference shall happen in this room through a voice conference system with ceiling microphones and an audio DSP system. Mix minus configuration is highly recommended
   f. This type of room typically is not used for videoconference if needed the location of cameras and microphones shall be carefully planned.
   g. AV presentation shall be possible from the table, through wireless presentation device or a hard-wired connection (HDMI) on a podium location
   h. Control shall be done through a control system with a wall mounted touch screen

i. If classroom capture is required, equipment shall be planned for. This has a significant impact in the cost of the equipment and the functionality of the room, so it shall be added only if absolutely required for the project
j. Room scheduling is highly recommended. Solutions that interface directly with Outlook are preferred

3. The A&E shall coordinate conduit rough in as well as coordination with furniture vendors for proper podium furniture.
4. This type of room requires a floor box or a poke through under the podium. Power outlets are required on the table and around the room.
5. This type of room tends to be a flexible room, therefore evaluation of the equipment selection with all the room configuration types is highly recommended to make sure the AV equipment can be used properly in the various room configurations.
6. AV equipment could be in a credenza rack in a corner of the room, under a section of millwork, or in a room nearby, on a wall mounted rack. If mounted under a section of millwork, the millwork shall allow for 24 inches deep clear inside to hold all AV equipment.

F. COURTROOMS

1. Courtrooms are a very specific type of Audio/Visual rooms. These rooms shall be designed in conjunction with the input of the Technical Staff at the Administrative Office of the Courts (AOC). The contact information for is below:

Court Technology Office
Sixth Judicial Circuit
324 S. Ft. Harrison Ave.
Clearwater, Fl. 33756

2. These rooms typically have the following elements:
   a. Two display devices
   b. Microphones in multiple locations
   c. An audio DSP system to have multiple features, like voice conference, pink noise, audio streams for recording, ADA capabilities, etc.
3. Locations of floor boxes/or poke throughs must be carefully coordinated with furniture and all other devices.
4. Room layouts will vary depending on the courtroom type (unified family, delinquency, civil, first appearance, etc.).

G. EMERGENCY OPERATIONS CENTERS

1. Emergency operations center are highly complex AV rooms. These rooms must be designed in conjunction with Emergency Management or the County organization that will be using the room. Some of the AV equipment located in this room includes:
    a. Flat panel display, projectors, and video-walls with multiple input sources
    b. Complex audio systems based on DSPs, with multiple microphones, filters, and audio capabilities
    c. Ceiling speakers and the ability to broadcast multiple audio sources to multiple locations
    d. Multiple connection points for hard wires presentation
    e. Connections to broadcast equipment and broadcast quality cameras
    f. These rooms will need connection for multiple PCs or Laptops
    g. These rooms will need connections for Audio and video conference through hard codecs
2. Significant Owner inputs and documented decisions are required for these rooms.

H. MEDIA/PRESS/PIO ROOMS

1. Several County facilities have media/press rooms and PIO rooms. These rooms shall have the ability to change functions. The A&E shall carefully describe the use of each of those rooms. Specific questions that need to be asked during the planning process of those rooms are:
    a. Where exactly would the media briefings take place and how many people participate in the briefing?
    b. Would the briefing be captured with equipment provided by the media, or would it be captured by County equipment to avoid too much equipment inside the room?
    c. A media distribution system might be required to take AV signals from the location of the briefing back to a location where the media trucks can pick it up.
    d. How is the media going to get to the room?
    e. PIO offices shall have the ability to watch all local TV channels simultaneously and the ability to listen to any channel at any time.

I. OTHER SPACES

1. There are many other room types besides what has been described in this document. The recommendation is to have significant dialog with the end users understanding the needs of the room from the AV perspective. It is highly recommended the A&E establish early on an Audio/Visual program and a budget to discuss with users to finalize the equipment to be used in those rooms.

2.2 OVERHEAD PROJECTORS

A. General: Overhead projectors shall be carefully selected for the application where they will be used. The recommended specifications for projectors are:

1. Native aspect ratio of the projector shall match the aspect ratio of the projection screen.
2. Light source for projectors under 9,000 lumens shall be a laser lamp.
3. Light output of the projector shall be carefully selected by designer to create a good contrast ratio between dark and light colors given the size of the screen used.
4. Use only commercial grade projectors with a three-year warranty. Consumer grade projectors with extended warranties are not acceptable.
5. Projectors shall have control capabilities through RS-232 or EDI control.

B. Accessories: This projector shall be supplied with a corresponding lens to achieve the throw distance based on the screen size and the distance from the projector to the screen. Projector mounts shall be provided with all projectors.

C. Design Drafting: If a project has multiple projectors, each projector shall be clearly identified and classified in the design drawings.

2.3 FLAT PANEL DISPLAYS

A. General: The specifications of flat panel display are dependent on the space where the flat panel display will be used. If the display will be used in an office space, consumer grade displays are acceptable. For displays used as part of a complete AVS, use a commercial grade unit. If the display will be used outdoors, use only an outdoor unit with a high brightness.

B. Screen size: The size of the flap panel displays shall be carefully selected given the size of the room and the type of content that will be displayed. To estimate the size of the display, use the 1/5 rule for distance to the LFV in the room.

C. Accessories: Flat panel mounts shall be provided with all displays according to how the displays will be installed (pendant, ceiling, or wall mounted).

D. Design Drafting: All flat panel displays in a project shall have the size, the mounting height, type, and purpose of the display. When multiple display types are used in a project a number system shall be used to identify each device.

2.4 PROJECTION SCREENS

A. General: During the design process, it needs to be determined if the screens shall be electric manual, or fixed screens. The recommendations for the screens are:

1. The screen format shall match the aspect ratio of the projector.
2. Electric screen shall be provided with low voltage controllers. Wireless or infrared controls are not recommended unless they are for retrofit applications.
3. The size of the screen shall be carefully selected to provide good readability, per AVIXA guidelines for screen sizing based on the LFW rules.
4. The lower part of the screen in a room shall not be lower than 40 inches from finished floor.
5. It is recommended to use tensioned screens for larger screens. Pull down screens are acceptable for smaller rooms. To estimate the size of the projection screen, use the 1/5 rule for distance to the LFV in the room.
6. It is recommended to use screens without gain.
7. The selection of manual or electric screens shall be done with the end users of the system.
8. Coordinate location of projection screens and MEP devices such as light fixtures and air diffusers to prevent light fixtures shining light directly to the screens and diffusers to avoid screen movement.

2.5 VIDEO CONFERENCE AND SOFT CODECS

A. Video Conference and soft codes are being widely used in the workspace. When discussions with user groups require the use of soft codecs (i.e., Teams, Go-To-Meeting, Blue Jeans, etc.) the following considerations shall take place:

1. The County has county wide licenses for Microsoft Teams, so it is highly recommended to use this platform, but not required. The user groups for the project shall make the final decision on the platform to be used.
2. The AOC uses Videxio.
3. These codes shall be planned to run in dedicated PCs in the room.
4. Cameras for capturing room video shall be USB high-definition cameras and shall be located at eye-level height, not ceiling mounted. It is recommended to install the cameras below flat panel displays not above.
5. Audio pick up devices (microphones) shall be carefully selected to make sure all participants can be heard.

2.6 VOICE CONFERENCE SYSTEMS

A. Voice conference systems are very common in conference rooms throughout Pinellas County facilities. The recommendations for implementing voice conference systems are:

1. Voice conference systems be integrated into the County Wide Siemens VoIP phone system, as opposed to having conference phones with analog lines back to the service provider.
2. For huddle rooms, small conference room and even medium conference rooms a regular Siemens phone terminal would be sufficient for good quality voice conference.
3. For large conference room, training rooms and other large rooms that require voice conference with multiple participants, the use of a DSP based system, with microphones and speakers located in the room is recommended. The design and location of those devices shall be done by a design professional. In these cases, the A&E shall verify the DSP selected for this system has VoIP and 11 digit dialing capabilities. Also, the project shall allocate funding for the SIP licenses for the ATOS/Unify system required to connect the DSB devices to the existing Siemens PABX.

2.7 WIRELESS PRESENTATION SYSTEM

A. Wireless presentation is a feature that shall be considered for all presentation rooms. Currently Pinellas County does not have a standard for this system. Extron ShareLink is recommended by BTS, other devices should be vetted and approved by BTS. When planning on using those systems, the following consideration shall take place:

1. To date all the systems known in the market have a single wireless connection, it is required to be decided early on, who is going to be the most prevalent user of this feature. If non-Pinellas County employees will be the most prevalent users, the device shall be connected to the guest Wi-Fi. If the most prevalent users are Pinellas County staff, it shall be connected to the employee Wi-Fi. Those two Wi-Fi systems are physically isolated and BTS does not allow any “tunneling” of traffic between the two systems. If the room requires connections for employees and non-employees, consideration shall be given to using two devices in the room.
2. The Wireless Presentation system shall have a secure connection and shall be tested for Network Security. BTS shall approve the use of such devices before they can be specified or purchased for a project.

2.8 LIGHTING CONTROLS

A. For rooms that have front projection systems and hard videoconference codecs, room lighting shall be carefully planned. The following are recommendations for lighting controls:

1. Any light fixture close to the projection screens, that could have direct illumination to the screen shall be switched separately from other light fixtures in the room to avoid reflecting the light from those fixtures.
2. Dimming is highly recommended for all fixtures in those rooms.
3. For ideal performance, two sets of lights shall be planned: dimming down lights to assist users to take notes, and regular 2x4 lights shall be used for other uses of the room different from presentation.
4. Pendant light fixtures shall be avoided in rooms with front projection systems to avoid conflicts between the fixture and the light from the projector.
5. All fixtures shall have the same color temperature. If the room has windows, the color temperature shall match the ambient light.
6. It is not required to have the AV control system integrated with the lighting control system. If desired by users; the following recommendations shall be followed:
    a. The lighting control system shall be a complete system as well as the AV system. Both systems shall be able to operate on their own without the need of the other.
    b. Both systems shall be on the same physical network.
    c. The AV system shall be limited to recalling light presets from the lighting control system.
7. For rooms with hard codecs, VTC style fixtures are recommended.
8. Rooms with windows to the outside are recommended to have blinds, electric, or manual to enhance the visual aspect of the presentation.
9. Integration with Building automation might be required. These features shall be discussed with the users.
10. The user interface for the lighting control is recommended to be as simple as possible. Keypads are recommended, and touchscreens shall be provided only for programming in maintenance areas.

2.9 CONTROL SYSTEMS

A. There are no Pinellas County-wide standards for control systems in Pinellas County Facilities. There are existing facilities with control systems such as:

1. Crestron control systems are used in multiple rooms by the Pinellas County Sheriff's Office, Pinellas County Emergency Management, Clerk of the Court, Tax Collector, Supervisor of Elections, and BTS.

2. AMX control systems are installed in rooms under the control of Pinellas County Communications and Pinellas County Transportation group.
3. Extron control systems are installed at all courtrooms in Pinellas County.

B. It is highly recommended to keep the same brand of control system being used for each user group in new facilities. As part of the planning exercise by the A&E, discussions with user groups shall take place to determine what control systems shall be used.

C. The A&E shall check with BTS for a County contract for programming services.

2.10 DIGITAL SIGNAL PROCESSORS (DSP)

A. There are no Pinellas County wide standards for DSP systems in Pinellas County facilities. There are existing facilities with DSP systems currently installed such as:

1. Biamp DSP systems are used in multiple rooms by the Pinellas County Sheriff's Office, Pinellas County Emergency Management, Clerk of the Court, and BTS.
2. BSS DSP systems are installed in rooms under the control of Pinellas County Communications.
3. QSC DSP systems are installed at all courtrooms in Pinellas County.

B. It is highly recommended to keep the same brand of DSP system being used for each user group in new facilities.

2.11 AUDIO AMPLIFIERS AND SPEAKERS

A. There are no specific guidelines for amplifiers and speakers in Pinellas County facilities. The selection of these devices shall be done by the A&E on every project.

2.12 OVERHEAD PAGING SYSTEMS

A. Overhead paging (in hallways and common areas) are used in many Pinellas County facilities including the St. Petersburg - Clearwater International Airport (PIE).

B. The use of overhead paging shall be discussed with the building users for each specific case. A connection with the phone system is always recommended for using the Paging system as well as to monitor or control the system through a network connection. The Installer shall check with BTS for the compatibility of the analog phone lines.

2.13 SOUND MASKING

A. Sound masking is used in select open office spaces in Pinellas County Facilities. These systems tend to be hard to fine tune to a level acceptable by all users. It is highly recommended that this type of system be designed by a professional with verified experience in the design and installation of these systems.

B. When properly designed, these systems are beneficial for privacy in open office environments.

2.14 NETWORKING EQUIPMENT

A. General: All networking equipment required for the AVS shall be project provided but procured by BTS. The Projects A&E shall provide to BTS a list of all the network ports required for the AVS based on a telecom room by room basis. The use of standalone or dedicated switches to provide connectivity in areas where there are not enough data cable drops, or to provision new drops for the future is highly discouraged by BTS. Final authorization to use such switches shall be provided directly by BTS.

B. Data drops for AVS shall be carefully planned. The use of little network Hubs or switches in AVS racks or podiums to feed multiple devices from a single drop in is not acceptable.

2.15 CABLE BOX (CABLE RECEIVER)

A. To date there are no unified cable TV (commercial TV service) distribution approaches by the County. In the past, TV service providers were required to provide TV signal to County facilities. This is no longer the case. If the use of cable TV is required in the facility, discussions need to take place with user groups and the TV service provider of choice by the users. BTS is considering a consolidated approach; there is no current solution available.

B. Due to technology evolution, TV service providers are no longer providing analog or digital un-encrypted channels. It is highly probably that each TV outlet in a building may require a cable set top box, unless a CATV head end is planned for the facility.

C. For planning purposes, TV outlets with coax to include data drops for the possibility of IP TV distribution is highly recommended.

2.16 WIRE, CABLE, CONNECTORS, AND ACCESSORIES

A. General: The AVS Installer shall provide the system components and materials necessary to properly install, support, and terminate all audiovisual cabling, in accordance with the related documents identified in Part 1.3 of this specification. The AVS Installer shall coordinate and install all required cables into the provided raceway designated for use by the Project Electrical Installer. The AVS Installer shall also provide and attach all required cable connectors.

B. Cable: The AVS Installer shall provide all cabling associated with and required to provide a complete, operable system per the Contract Documents. All cables provided by the AVS Installer shall be of manufacture quality consistent with the design intent and reviewed by the Engineer prior to installation.

C. Cabling in Air Handling Spaces: The AVS Installer is responsible for determining the rating of the cables to be used for the AVS, as per the current version of the National Electrical Code. At the bidding point if the AVS Installer is not confident about the type of cables to be used in the project, the AVS Installer shall assume that all cables are to be plenum-rated cables.

D. Cabling Below Grade: When the cable part of the AVS runs in conduits below slab and grade level, the AVS Installer shall only use cables with water-blocking jackets.

E. Cable Signals: The following is a list of signal types and cables to be used for those signals:

1. Line Level Audio Signal Cable: Provide one twisted pair cable for mono signals and two twisted pair cables for stereo signals. Twisted pair cables to be 22 AWG stranded (7X30) tinned copper conductors with overall foil shield (100% coverage), with 22 AWG stranded tinned copper drain wire.
2. Microphone Level Audio Signal Cable: Provide one twisted pair cable, 20 AWG stranded (7X28) tinned copper conductor, overall foil shield (100% coverage) with a 20 AWG stranded tinned copper drain wire.
3. Proprietary Control Cable (i.e., Cresnet® Signal): Provide one cable with one twisted pair 22 AWG stranded bare copper conductor with overall aluminum/polyester foil (100% coverage) and a 24 AWG tinned copper drain wire, and one unshielded twisted pair, 18 AWG stranded bare copper conductor.
4. Control Cable (i.e., RS-232, RS-485 Signal): Provide one cable with one or two twisted pair 22 AWG stranded bare copper conductors with overall aluminum/polyester foil (100% coverage) and a 24 AWG tinned copper drain wire. Pair count contingent on manufacturer’s specifications.

5. Digital Video, Audio, and Control Over Twisted Pair (HD-Base-T): Provide one, two, or more cables UTP or STP as required by the transceiver equipment manufacturer to ensure the digital signal is transported properly up to 328 ft., at maximum resolution. If the equipment manufacturer supports standard UTP Category (5e, 6, or 6A) for this application, the AVS Installer shall provide cables in compliance with Specification Section 27 10 00 Structured Cabling System. All cables part of the AVS shall be included in the same warranty as provided under Specification Section 27 10 00 Structured Cabling System. If the equipment manufacturer requires proprietary cables, only these specified cables shall be used in the project. The color jacket for these cables shall be different from voice/data cables.
6. UTP Category Cables: Provide UTP category cables for all Ethernet connections part of the AVS as indicated in design drawings, including horizontal cables, patch cords, and station cables. All cables part of the AVS shall have all specifications and be included in the same warranty as all cables provided under Specification Section 27 10 00 Structured Cabling System. The color jacket for these cables shall be different from voice/data cables.
7. Speaker Cable: Provide two unshielded bare high conductivity ETP copper 16 AWG stranded conductors, with overall jacket.
8. IR Control Signal Cable: Provide one pair, unshielded twisted pair cable with 22 AWG solid copper conductors.
9. Contact Closure Signal Cable: Provide one or more unshielded twisted pair cable with 22 AWG solid conductors. Quantity of pairs as required by the application.
10. HD-SDI Cable: Provide coaxial cable RG-59, AWG-20 solid 0.032 inch bare copper conductor, gas injected foam HDPE insulation, Duofold + tinned copper braid shield (95% coverage), PVC jacket. i.e., Belden 1505A. For cable runs with extended distances, the use of RG-6 shall be considered, with similar construction and properties as the RG-59 but with a thicker center core.
11. HDMI Cables: All HDMI cables exceeding 32.8 ft. must include an adaptive cable equalizer capable of providing no less than +40 dB of cable compensation @825 MHz. Such devices must be capable of operating automatically without human intervention and must include an external AC to DC power converter that can accept 100-240VAC @ 50/60 Hz. The device must also include I2C correction circuitry to mitigate the effects of long cable runs on the DDC clock and DDC data signals. HDMI cables shall meet the following requirements:
    a. Support HDMI v1.3 with resolutions up to 1080P with 12-bit color depth
    b. Support HDMI v1.3 Category 2 data rates (3.4 Gbit/sec.) with lengths up to 7.5 meters
    c. Support HDMI v1.3 data rates up to 2.25 Gbit/sec. with lengths up to 40 meters
    d. Support PC data rates up to 1.65 Gbit/sec. with lengths up to 60 meters
    e. Supports PC resolutions up to 1600x1200 / 60 Hz and 1920x1200 / 60 Hz
    f. Made of AWG-22-gauge wires
    g. Triple shield for noise immunity

h. Cable jacket shall have dual UL Ratings: UL13 (CL2) and UL758 (AWM20276) for non-plenum spaces. In plenum environments cables shall have a CL2P rating or CMP rating
i. RoHS compliant
j. Gold plated connectors

12. DVI Cables: All cables carrying DVI signals through conduit, floor slabs, or longer than ten feet shall be HDMI cables as described in previous section with HDMI to DVI adapters in both ends.

F. Connectors and Plates: The AVS Installer shall provide connector and plates to terminate all wiring parts of the AVS, regardless if shown or not in the design drawings. As a general guideline the AVS Installer shall follow these recommendations:

1. Only use crimp type BNC connectors on coaxial baseband video cables. Use crimp type F connectors on RF based coaxial cables. Use only connectors with the same impedance as the cable where they will be terminated.
2. When custom panels or plates are required in the project, the AVS Installer shall submit detailed drawings of all plates for approval by the Design Engineer.
3. Whether shown in the design drawings or not all cables coming out of an outlet box into equipment shall have a disconnect means at the outlet box with a face plate. Faceplates with grommets are not acceptable as pass-through connections to equipment.
4. All termination of UTP Category cables shall be CAT6A done in accordance with Specification Section 27 10 00 Structured Cabling System.

2.17 IDENTIFICATION AND LABELING TAGS

A. The AVS Installer shall follow labeling materials indicated in Specification Section 27 00 10 Technology General Provisions.

PART 3 - EXECUTION

3.1 INSTALLATION PRACTICES

A. General: The AVS Installer shall follow all installation practices indicated in Specification Section 27 00 10 Technology General Provisions.

B. Workmanship: The AVS Installer shall adhere to, at a minimum, the following installation practices:

1. Securely mount equipment plumb and square in place. Where equipment is installed in cabinets and provide mounting bolts in all equipment rack fastening holes. All rack-mount equipment shall be secured with Rackmount Solutions HTX™ security screws (STAR-TYPE or similar) provided with nylon washers between bolt heads and equipment.
2. Where equipment (such as VHS players, monitors, DA's and other system devices) is packaged by the manufacturer without rack mount ears or braces, as part of a regular manufacture process, the Installer shall provide all required, accessory ears, brackets, and shelves, which are necessary to properly mount the equipment within the designated cabinets and rack locations.
3. Provide appropriate ventilation panels, vents, and/or fans to assure sufficient ventilation for adequate cooling of all equipment.
4. Confirm the polarity and phasing of system components before installation. Connect to maintain uniform polarity and phasing.
5. Insulate all non-insulated, stranded conductors before making termination when connecting to equipment terminals.
6. "Wire", "wing", and "twist" NUT type connections are not permissible for any type of signal connection.
7. All wiring is to be free from grounds loops, shorts, opens, and reversals.
8. Neatly tie all cabling within equipment cabinets, housings, and terminal cabinets with nylon cable ties at no more than 12-inch intervals for cables different from 4-pair CAT cables. Use Velcro straps to tie all 4-pair CAT cables. Install in accordance with the latest EIA installation standards. Engineer approved wiring trough may be used in lieu of tie wraps. Cable routing shall not braid or cross with other wires in parallel more than once.
9. Secure all cables in equipment cabinets and terminal cabinets to provide strain relief at all raceways exits in accordance with NFPA 70 including all supplements. All plugs and receptacles are to be the grounding type.
10. Connect all equipment power to surge/noise suppression outlet strips or associated power conditioning devices.
11. Where system cables are extended through an exposed umbilical connection, the Installer shall harness all associated cable within a common, manufactured, flexible, sheath (ex. Snakeskin™).
12. All racks and cabinets shall be bonded to a grounding system as required by NEC.

C. Space Sharing in Telecom Rooms:

1. AV equipment shall not be planned inside telecom rooms unless previously approved by BTS.

2. It is highly recommended that AV equipment be installed inside the room that is serving, in a nearby room, or in a dedicated AV equipment room.

D. Raceways: All raceways for Audio/Visual devices shall have the following specifications:

1. Refer to 27 05 28 Raceways for Technology for all raceways specification.
2. All cables for speaker level signals, regardless of their level shall be run in separate raceways from other low voltage cables.
3. All cables for microphone level signals, regardless of their level, shall be run in separate raceways from other low voltage cables.
4. Raceways for AV Outlets: Outlets for AV cables shall be composed of electrical boxes (sized for the number of connectors) and a conduit to the nearest accessible ceiling space. All AV outlet boxes shall be at least 2.5 inches deep.
5. All indoor rated cables can be supported with J-Hooks or cable hangers above accessible ceiling spaces. J-Hooks shall be spaced no longer than four feet.

E. Labeling System: The labeling system for all cables shall allow for unique identifiers for each cable. Each cable must have an indicator from where it is coming from and an indicator to where it is going to. The AVS Installer shall use the BTS data standard for labeling all data cables used by the AVS, and as a guideline for labeling all audio-visual cables.

F. Engraving: All push buttons interfaces and connection plates that are part of the AVS shall be engraved with descriptive wording relating the use of the button/plate. The AVS Installer shall submit and receive approval for the proposed wording in each button/plate before doing the engraving. Failure to follow this step might cause the AVS Installer to replace the buttons, interfaces, and/or plates if the Owner is not satisfied with the wording of the label at no additional cost to the Owner. The color of the wording in the engraving shall have high contrast with the background color of the button.

G. Installation of Screens: Whether shown in the drawings or not the AVS Installer shall install all projection screens following the following installation practices:

1. All electric screens shall be provided with a low voltage controller to be mounted inside the screen housing.
2. All electric screens shall be provided with a control wall plate mounted at 48 inches A.F.F.
3. All in-ceiling screens shall be level with the ceiling grid.
4. All in-ceiling screen housings shall be plenum rated when installed in plenum spaces.

5. All in-ceiling screens installed in hard ceilings shall include an access panel no smaller than 16”X16” to access the electrical junction box of the screen. Access panel shall be a metal panel, with a hinged door, and painted the same color as the finished ceiling.

H. Projector Installation: The Installer shall adhere to, at a minimum, the following installation practices for projectors:

1. Projector shall be provided with corresponding mounting brackets depending on the projector selected.
2. All anchors and supports, whether prefabricated or custom, required to mount the projector where indicated in the design drawings are in the scope of work of the AVS Installer.
3. When electronics are provided next to the projector (receivers, controllers, etc.), provide an enclosure to mount all electronics suitable for the space above the ceiling (plenum).

I. Flat Panel Display Installation: The AVS Installer shall adhere to, at a minimum, the following installation practices for flat panel display devices:

1. All anchors and supports, whether prefabricated or custom, required to mount the displays where indicated in the design drawings are in the scope of work of the AVS Installers.
2. All walls where flat panel displays will be installed shall be re-enforced with sheet metal behind the drywall. The extent of the re-enforcing shall be the contour of the flat panel display to be installed.
3. When flat panel displays are installed inside a wall niche, the AVS shall provide a wall mount with adjustable depth that allows the flat panel display to be installed flush with the exterior wall.
4. Power and AV outlets installed behind flat panel displays shall use a Wiremold Evolution Wall backbox or approved equal.
5. For flat panel displays mounted on structures, the Installer shall provide anchoring as approved by structure manufacturer.
6. For flat panel displays suspended from the structure above, the Installer shall provide all custom brackets and pipes properly secured to the structure to mount the displays.

J. Speaker Installation: The Installer shall adhere to, at a minimum, the following installation practices for speakers:

1. Each ceiling mounted speaker shall have a support wire tied to the building structure. Ceiling speakers shall not be supported from the ceiling grid.
2. All ceiling mounted speakers shall be installed with a backbox to prevent sound from dispersing into the plenum space and causing noise issues in adjacent rooms.
3. When ceiling speakers are mounted in fire rated partitions, the speakers shall have UL listed speaker back boxes with a fire rating no less than the rating of the partition.
4. All in-wall speakers shall be installed with pre-construction brackets.

K. Equipment Rigging: When speaker assemblies or arrays weigh more than 100 lbs., the AVS Installer shall follow all rigging instructions from the manufacturer. This work shall be done by an experienced rigger. The AVS Installers shall also adhere to the following practices:

1. Only the rigging equipment and method listed by the manufacturer of the equipment are approved for the installation no substitutions are accepted.
2. Only the rigging points available in the speaker assembly are accepted as means of support.
3. All anchors and supports, whether prefabricated or custom, required to mount the displays where indicated in the design drawings are in the scope of work of the AVS Installers.
4. Shop drawings for rigging methods shall be signed and sealed by a licensed structural engineer.

L. Millwork Opening: When AV equipment such as flip tops and plates will be mounted in millwork provided by the Owner or third parties, the AVS Installers shall provide cut out dimensions for all AVS equipment listing locations in the millwork where the cuttings need to be done. It is the AVS Installer's responsibility to install those devices in the millwork once the openings have been completed. All millwork openings shall be done by the furniture manufacturer or the AVS Installer.

M. Floor Boxes: Floor boxes used for connection to lecterns, podiums, conference tables, or mixing boards shall have at least the following minimum requirements:

1. Floor boxes shall be large enough to have at least three different compartments, one for power, one for voice/data cables, and one for AV.

2. Each low voltage compartment shall have a separate raceway back to the accessible ceiling space. If speaker wires are run from the lectern, the AV compartment shall have one inch and one 3/4 inch conduit to the nearest accessible ceiling space. If no speaker wires are run from the lectern, a one-inch conduit from the AV compartment to the accessible ceiling shall be provided. Additional conduits might be required depending on the application.
3. There shall be no daisy-chaining of AV conduits between adjacent floor boxes. Floor boxes shall recess the connectors from the umbilical cord tied to the lectern.
4. Floor boxes shall have a recessed compartment to hold connectors. Floor boxes that leave AV connectors flushed with the floor are not desirable since they become tripping hazards and could be easily broken when moved.
5. AV compartments shall have termination plates and connectors for all cables coming from the accessible ceiling space. Pass-through cables are not permitted in floor boxes. All connectors shall be properly secured to the plates in the floor box. All unused compartments shall have blank plates.

N. Structured Cabling Infrastructure: The AVS Installer shall adhere to Specification Section 27 10 00 Structured Cabling System for all requirements of structured cabling components to be used as part of the AV system. The structured cabling components include but are not limited to:

1. All unshielded twisted pair Category cables and fiber optic cables.
2. Termination devices like termination jacks, patch panels, and faceplates.
3. All UTP and fiber optics patch cords.
4. All testing procedures for Category and fiber optic cables.

3.2 REQUEST OF IP ADDRESS

A. General: The AVS Installer shall follow all requirements indicated in Specification Section 27 20 00 Voice/Data Communications Equipment for the request of IP addresses for devices part of the AVS.

3.3 SOFTWARE PROGRAMMING AND INSTALLER TESTING

A. The software programming and testing of the AVS system will be a multi-step process. The AVS Installer shall provision in the proposal for the time indicated in each of the following steps:

B. Verification Step: The AVS shall first verify with the users if there is a programming standard for each room that is part of the scope. Some users, like the Administrative Office of the Courts (AOC) have specific standards to be used for Courtrooms. If no standard is provided by the users, all steps indicated below shall be followed.

C. Briefing Step: A maximum of 45 days after the AVS Installer receives the NTP for this project, the AVS Installer shall request one or more briefing sessions with the Owner and/or Design Engineer to go over the expectation of each room and clarify any points that might not be clear to the AVS Installer.

D. Shop Programming Step: Once the briefing step has been completed and approved, the AVS Installer shall allocate off-site programming time to accomplish all the requirements listed in this specification and the clarifications done in the previous step. It is the sole responsibility of the AVS Installer to estimate how many man hours are required for this step. This step does not require approval by the Owner and/or A&E.

E. Field Verification Step: After the AVS equipment has been installed on site and the system has been programmed the AVS Installer shall request one or more working sessions with the Owner and/or Design Engineer to verify, in the field, the functionality of the AVS system. Some important notes about this step are:

1. The AVS Installer shall have different AV media and sources to test all features in the AVS system.
2. Physical installation of all devices will be checked by the Owner and/or the Design Engineer. Any deviations in the installation of the equipment part of the AVS from this specifications and previous meeting will be noted by the Design Engineer in a “punch list”. This punch list will be sent to the AVS Installer within the next five days of the meeting for immediate corrective action. One punch list will be prepared for each room with AVS.
3. The AVS Installer shall prepare meeting minutes of the key decisions made during these meetings that affect the programming sequence. The approval of these meeting minutes by the Owner and Design Engineer will be accepted as approval notice of this step.

F. Final Adjustment Step: Once the previous step has been approved, the AVS Installer shall allocate time to make any corrections to the AVS system on site based on the conclusions of the previous step. It is the sole responsibility of the AVS Installer to estimate how many man hours are required for this step. This step does not require approval by the Owner and/or Design Engineer.

G. Data Wiring and Fiber Optic Testing: Testing of UTP data wiring, copper patch cords, fiber optic cables and fiber optic patch cords shall be done as indicated in Specification Section 27 10 00 Structured Cabling System. Testing results shall be submitted as indicated in the same Specification Section.

H. Signal Adjustment: The AVS Installer shall ensure that the following adjustments, tests, and measurements have been completed:

1. The system shall be measured and adjusted for optimum signal quality and minimum signal loss, to all audio and video signals, through the system channel, using appropriate test equipment and standardized testing procedures.
2. The system shall be measured and adjusted for optimum signal-to-noise ratio and maximum headroom in the system electronics.
3. The system shall be measured and adjusted to eliminate distortions or degradation of signal resulting from, but not limited to, clipping, hum, noise, and RFI interference.
4. The Installer shall check the quality of each signal, at its source, and compare it against the quality of the signal at various points of its transmission through the system. The Installer shall correct the system for any significant (the lesser of 2dB or the manufacturers throughput requirements) signal distortion or loss.

3.4 SYSTEM WARRANTY AND SERVICE

A. General: The AVS Installer shall follow all warranty and service requirements indicated in Specification Section 27 00 10 Technology General Provisions.

3.5 ENGINEER'S FINAL ACCEPTANCE TEST

A. General: All AVS systems shall be tested and accepted by the Design Engineer.

3.6 TRAINING AND INSTRUCTION

A. General: The AVS Installer shall follow all training requirements indicated in Specification Section 27 00 10 Technology General Provisions. The AVS Installer shall provide the Owner with different types of training as described herein.

B. System Administration Training: The AVS Installer shall provide system administration training at the job site as described below:

1. The objective of the system administration training will be to properly operate, trouble shoot, calibrate, and perform specific field repairs to AVS equipment.
2. Field repair and calibration training will be limited to those repairs noted by the manufacturer of the equipment as field repairs done by non-factory trained personnel.
3. Training shall be done at the job site with all the equipment operational after final acceptance.

4. Operation and Maintenance manuals shall be delivered at the beginning of this session.

C. User Training: The Designer or Consultant shall check with the users to determine who will perform the training of the end users. They may be trained by the AVS Installer, or by other end users if they have the staff to perform this task. In cases where it is determined that the end user does not have staff capable of providing training, the AVS Installer shall provide system administration training at the Job site as described below:

1. The objective of the user training will be to properly operate the AVS.
2. User short form guides shall be provided to all attendees of the sessions.
3. Short form guides shall provide the users with quick finding ways to operate the system. If AVS operation is different from one room to the other, one separate short form guide shall be provided for each room. Each form shall be provided with a plastic laminate and frame, so it can be wall mounted inside the room or attached to the touch panel interface.

D. Factory Training: Factory training shall only be required if specifically requested by end users and approved by Pinellas County REM.

3.7 AS-BUILT DOCUMENTS AND CLOSEOUT INFORMATION

A. General: The AVS Installer shall follow as-built and closeout information requirements indicated in Specification Section 27 00 10 Technology General Provisions. All as-built information shall be provided on or before the end user occupies the space.

B. The following information shall be included in the as-built drawings:

1. Drawings indicating final floor plan locations of all AV devices.
2. One-line diagrams with all devices connected in the system.
3. Mounting details.
4. Any signed and sealed structural calculations required for the AVS.

C. Additional closeout information to be delivered by the AVS Installer:

1. All programming source code done by the AVS for this project for all pieces of equipment in digital format (no printed copies required).
2. All JPEGS and graphics used for all interfaces, including all code used to create the interfaces.
3. List of all IP addresses assigned to each equipment part of the AVS.

4. All master passwords for all devices shall be provided to the end users. Details on how these passwords shall be delivered and coordinated with the end users. Passwords shall not be emailed. These passwords shall be delivered in a secure manner.
5. Compiled executable files as requested for Computer based user interface.
6. All printed test results.

END OF SECTION 27 41 00

SECTION 27 41 34 – BROADBAND DISTRIBUTION SYSTEM

PART 1 - GENERAL

1.1 PURPOSE OF THIS DOCUMENT

A. The purpose of this specification section is to indicate to A&E and designers of low voltage infrastructure, working in construction or renovation projects for Pinellas County Government, the design requirements by BTS when it comes to such infrastructure. This document will be a starting point for completing a set of construction documents but SHALL NOT be used unedited as a bid document.

1.2 RELATED DOCUMENTS

A. General: Requirements indicated in the following standard apply to the work to be performed under this Specification Section:

1. TIA-568-C.4 (July 2011) “Broadband Coaxial Cabling and Components Standard”. Including addendum and errata.

B. Supplemental: Refer to the specification sections identified below for additional requirements, which are supplemented by this section:

1. 27 00 10 Technology General Provisions
2. 27 05 28 Raceways for Technology
3. 27 05 26 Grounding and Bonding for Telecommunications Systems

1.3 DEFINITIONS

A. Agile Receiver: A broadband receiver that can be tuned to any desired channel.

B. Broadband: For the purposes of this Section, wide bandwidth equipment or systems that can carry signals occupying in the frequency range of 54 to 1002 MHz. A broadband communication system can simultaneously accommodate television, voice, data, and many other services.

C. Carrier: A pure-frequency signal that is modulated to carry information. In the process of modulation, it is spread out over a wider band. The carrier frequency is the center frequency on any television channel.

D. CATV: Community Antenna Television. A communication system that simultaneously distributes several different channels of broadcast programs and other information to customers via a coaxial cable.

E. CCTV: Closed-circuit television.

F. CEA: Consumer Electronics Association.

G. dBmV: Decibels relative to 1 mV across 75 ohms. Zero dBmV is defined as 1 mV across 75 ohms. dBmV = 20 log 10(V1/V2) where V1 is the measurement of voltage at a point having identical impedance to V2 (0.001 V across 75 ohms).

H. DOCSIS: Data Over Cable Service Interface Specification. This is an international telecommunications standard that permits the addition of high-speed data transfer to CATV system.

I. Headend: The control center of the master antenna television system where incoming signals are amplified, converted, processed, and combined into a common cable along with any locally originated television signals, for transmission to user-interface points. It is also called the "Central Retransmission Facility."

J. MATV: Master Antenna Television. A small television antenna distribution system usually restricted to one or two buildings.

K. RF: Radio frequency.

1.4 DESCRIPTION

A. BTS requires that the Project Engineer shall clarify in the construction documents the following questions:

1. Where and how is the CATV signal going to come into the building from the service provider?
2. Is the input to the broadband system a Satellite TV system or a cable TV service provider?
3. Would the system have a local head end?
4. Does the system need a return path or not?
5. The location and values of all distribution TAPs in the system.

B. General: The CATV system shall be a complete system with all accessories.

C. Standards: Distribution system components and overall system performance shall meet or exceed the following standards:

1. Federal Communications Commission Technical Specifications Title 47, Part 76 as applied to cable television systems.
2. TIA – 568-C.4 “Broadband coaxial cabling and components”. July 2011.
3. TIA-606-B (June 2012), “Administration Standard for Telecommunications Infrastructure” with addendum and errata.

D. RFI: Special emphasis shall be placed on radio frequency interference (RFI) integrity as licensed radio services outside the cable system share the same frequencies designated for use within.

1.5 SERVICES SUPPORTED

A. The system configuration will allow the forward distribution of the following incoming TV signals:

1. List all TV sources for the distribution system.

B. The system bandpass shall allow for the following channel loading and forward distribution. (Engineer to select one based on project requirements):

1. Sixty channels from 47 MHz to 450 MHz.
2. Seventy-seven channels from 47 MHz to 550 MHz.
3. One hundred and ten channels from 47 MHz to 750 MHz.
4. One hundred and twenty-nine channels from 47 MHz to 860 MHz.
5. One hundred and fifty-two channels from 47 MHz to 1000 MHz.

C. The system shall allow for a return path with a loading of three channels from 5 MHz to 42 MHz.

1.6 INSTALLER QUALIFICATIONS

A. Qualifications: The CATV Installer shall be experienced in the design, installation, proof of performance testing, and maintenance of broadband cable television systems comparable or larger in size and complexity to the system required on this project. Such experience shall be indicated in a list of successfully completed systems with the submittal for this system. Contact names and addresses for all references shall be provided.

B. Equipment: The CATV Installer executing this work shall own and maintain at least the following equipment for execution and maintenance of this system:

1. A CATV signal level meter capable of measuring levels between 5 and 1000 megahertz for both digital and analog channels. For example, Blonder Tongue BTPPRO-1000.
2. CATV Plant certification meter such as JDSU DSAM Wavetek Series Field Meter Model DSAM 6300.
3. A flat noise generator or sweep/marker generator capable of providing a calibrated output between 5 and 1000 megahertz.
4. An oscilloscope with a suitable RF detector for use in sweep testing system response.
5. A return loss bridge and variable termination for on-site cable sweep testing prior to installation.
6. A time domain reflectometer designed for operation into 75-ohm polyethylene dielectric cable for verification of installed cable.
7. Composite test sets, simul-sweep equipment, and other test systems capable of providing the required functions shall be considered equivalent to the equipment specified.
8. A stripping/coring tool appropriate for 0.500 inch hardline cable or larger cables.

C. Provisions: The CATV Installer shall own and maintain all necessary equipment and tooling to properly provide the system in accordance with recommendations set forth by the manufacturers of each item of system equipment.

1.7 MATERIALS ALTERNATES AND SUBSTITUTIONS

A. General: See details for alternates and substitution in Specification Section 27 00 10 Technology General Provisions.

B. Substitutions are only allowed for active components if they have exactly the same performance as the basis of design.

1.8 SHOP DRAWINGS AND SUBMITTALS

A. The CATV Installer shall follow all requirements for shop drawings indicated in Specification Section 27 00 10 Technology General Provisions.

B. Additional information to be included in the shop drawings:

1. Cut sheet of all devices to be provided as part of this system. When multiple devices are in the same cut sheet, the Installer shall highlight the specific part number to be used. Cut sheets of the following devices shall be provided:
   a. All copper and fiber optic cables
   b. All passive devices
   c. All amplifiers to be used
   d. All connectors
   e. All outlets indicating colors
   f. All surge suppressors
   g. All fiber optics equipment
2. Proof of Installer qualifications per paragraph 1.5.
3. A list of all testing equipment owned by the Installer as requested in this specification. The list shall include all make and model numbers of all devices and the last time they were calibrated.
4. Drawings indicating all outlets in the project, with cable distances included types of cables and how they are connected to the backbone system. The drawings shall include all pad and equalization calculations to the input of all amplifiers in the system.

1.9 GENERAL SYSTEM PARAMETERS

A. Devices and products described below may or may not be required for the overall design. If such devices are required during this project to achieve the design distribution parameter, the Installer shall provide such devices as a part of their design solution and said devices shall be included as part of the Installers package in the bid. These items would include those listed below as well as splitters, taps, couplers, and pads.

B. The CATV Installer shall be familiar with the ANSI/SCTE standards and shall follow those standards during the installation process.

C. Amplifiers: In most cases, the output from the amplifier shall be adequate for building distribution. However, in larger building distribution systems, additional amplifiers will possibly be required. If such is the case, Input pads and equalizers shall be provided to compensate for short spacing and cable slope, respectively. Outputs shall be adjusted to the rated sloped output of the amplifier selection (typically 36 dBmV to 44 dBmV or rated output by equipment manufacturer) at the selected frequency range indicated in this specification section.

D. Output: All outlets shall provide a minimum output of between +3 dBmV and +10dBmV for the complete frequency range specified in this section.

E. Minimum acceptable distribution system performance at all outlets shall be as follows:

1. RF Video Carrier Level: Between 3 and 12 dBmV
2. Relative Video Carrier Level: Within 3 dB to adjacent channel
3. Carrier Level Stability, Short Term: Level shall not change more than 0.5 dB during a 60-minute period
4. Carrier Level Stability, Long Term: Level shall not change more than 2 dB during a 24-hour period
5. Channel Frequency Response: Across any 6-MHz channel in 54- to 220-MHz frequency range, referenced to video, signal amplitude shall be plus or minus 1 dB, maximum
6. Carrier-to-Noise Ratio: 45 dB or more
7. RF Visual Signal-to-Noise Ratio: 43 dB or more
8. Cross Modulation: Less than minus 50 dB
9. Carrier-to-Echo Ratio: More than 40 dB
10. Composite Triple Beat: Less than minus 53 dB
11. Second Order Beat: Less than minus 60 dB
12. Terminal Isolation from Television to Television: 25 dB, minimum
13. Terminal Isolation between Television and FM: 35 dB, minimum
14. Hum Modulation: 2 percent, maximum
15. RF FM Carrier Level: 13 to 17 dB below video carrier level
16. FM Frequency Response: More than the 88- to 108-MHz frequency range, signal amplitude is plus or minus 0.75 dB, maximum
17. FM Carrier-to-Noise Ratio: More than 24 dB

F. RF Leakage: Radio frequency leakage into the system shall comply with all FCC rulings and regulations.

G. Delay: Combined reverse and forward path chroma delay, as measured at the most distant bridged port, to the headend and or main distribution point in the building and back, shall not exceed 28 nanoseconds.

H. The complete CATV distribution system shall be certified form compliance with DOCSIS 3.1.

I. All display outlets in the project shall be provided with one UTP Category cable terminated in an RJ-45 connector at the faceplate and at a patch panel in the telecommunications room side for IPTV. This cable shall be terminated in the same telecom room as the coaxial drop and shall have the same performance, warranty, and installation methods described in Specification Section 27 10 00 Structured Cabling System for all other voice/data drops in the project.

PART 2 - PRODUCTS

2.1 DISTRIBUTION AMPLIFIERS (NOT AT HEADEND)

A. This amplifier shall be used only in the distribution system and shall have the following specifications:

1. Forward Frequency Range: 54 to 1000 MHz
2. Reverse Frequency Range: 5 to 42 MHz
3. Forward gain: 35dB
4. Reverse gain: 20 dB
5. Gain Control Range: Through plug in pads
6. Slope Control Range: Through plug in equalizer
7. Input Return Loss: Greater or equal to -16dB
8. Noise Figure: Greater or equal to 6dB
9. Composite triple beat (CTB): -78 dBc
10. Composite Second order (CS) -74 dBc
11. Required output Level: 37/47 dBmV,
12. Hybrid technology: Power doubling
13. Input/Output Test Point Level: -20dB

B. Design Selection: Toner TBLE-1035-42 or approved equal with external power supply and required pads and equalizers.

2.2 PASSIVE DEVICES

A. All passive devices shall have a minimum bandwidth of 5 to 1000 MHz.

B. Splitters for drops or backbones designed with RG-6 or RG-11 lines: Splitters shall be Blonder Tongue SXRS-2, 3, 4, 6 & 8 as required by the system configuration.

C. Directional Couplers for drops or backbones designed with RG-6 or RG-11 lines: shall be Blonder Tongue SRT series, with dB TAP setting as required by the system configuration.

D. Splitters for backbones designed with PIII-500 or bigger diameter cable: shall be Toner TLP-SP series as required by the system configuration.

E. Directional couplers for backbones designed with PIII-500 or bigger diameter cable: Shall be Toner TLP-DC series as required for the system configuration.

F. Multi-taps shall be Toner Total tap with 3 or 6 tap housings as indicated by the system configuration. Tap values and quantity of tap ports as indicated in system configuration.

G. Equalizer. Equalizer shall be mounted in the tap housings and shall be a Toner TXMT plate. Equalizers could be mounted also inside distribution amplifiers. The value to equalize shall be as indicated in system configuration.

2.3 OUTLETS

A. The television outlet shall provide one "F" type barrel connector mounted alone or with other structured wiring connectors on a common face plate. Outlets shall be mounted as indicated on the documents, or as otherwise stipulated and directly in line with the proposed television location. Coordinate final location based upon provided drawings and coordination with the Owner. A three-wire grounded, 120 VAC power outlet shall be located adjacent to the television outlet and be provided by Owner selected Division 26 Installer. Coaxial cable shall be provided by the CATV Installer to each outlet location indicated on the drawings. Conduit and boxes shall also be provided according to Specifications Section 27 05 28 Raceways for Technology. Coordinate location with Electrical Installer if not already provided at time of installation.

B. Design selection: F- connector with a single barrel connector to match (faceplate style and color) the design selection of the structured wiring system as described in Specification Section 27 10 00 Structured Cabling System.

2.4 VIDEO DISTRIBUTION CABLE

A. Structural Return Loss Testing: All cable shall be 100% swept tested. Return loss shall be no less than 23dB at any given frequency between 5MhZ and 1000MhZ.

B. Construction: Cable shall be constructed of a copper clad steel or solid copper center conductor, gas expanded cellular polyethylene dielectric, multiple aluminum braided shields, and an overall jacket. All cables shall have characteristic impedance of 75 Ohms.

C. Attenuation: Attenuation characteristics in decibels per 100 ft. at 20oC shall not deviate more than 10% from the following values:

FREQUENCY (MHz)	**RG-6**	**RG-11**	**PIII-500**
5	0.57	0.36	0.16
55	1.5	0.95	0.54
211	2.87	1.81	1.09
300	3.43	2.17	1.31

400	4.0	2.53	1.53
450	4.28	2.69	1.63
550	4.76	3.01	1.82
750	5.62	3.58	2.16
870	6.09	3.9	2.35
1000	6.54	4.23	2.53

D. RG-6 Cable: 18 AWG solid bare copper conductor. Four layers of shield, two aluminum foil-polyester tape aluminum foil, one 60% aluminum braid and one 40% aluminum braid. NEC article 820 compliant jacket suitable for the environment being installed.

E. RG-11 Cable: 14 AWG solid bare copper center conductor. Two layers of shield, one aluminum foil-polyester tape aluminum foil and one 60% aluminum braid. NEC article 820 compliant jacket suitable for the environment being installed.

F. PIII-500: 0.109 inch diameter copper clad center conductor: Solid aluminum tube swaged onto a high compression micro-cellular foam dielectric core. NEC article 820 compliant jacket suitable for the environment being installed.

G. Indoor Cables: The following table indicates the design selection for all CATV cables. Cables shall be selected according to the environment in which they will be installed:

CABLE TYPE	**GENERAL (CM)**	**RISER RATED**	**PLENUM RATED**
RG-6	Belden 5339Q5	Use Plenum rated cable	Belden 6339Q8
RG-11	Belden 1617A	Use Plenum rated cable	Belden 1617AP
PIII-500	Use Riser rated cable	CommScope P3 500 JCAR	CommScope P3 500 JCAP

H. Outdoor Cables: When coaxial cables are to be installed outdoors, or underground in conduit, they need to have a jacket with a water blocking compound.

I. RG-59 cable shall never be used for the distribution system.

J. For all fiber optic cables and connectors for broadband distribution see Specification Section 27 10 00 Structured Cabling System. All connectors for fiber optic cables shall be APC (Angled Polished Connectors) type connectors.

K. For all 4-pair category cable runs used for IPTV or video distribution, all requirements and specifications indicated in Specification Section 27 10 00 Structured Cabling System shall be followed.

2.5 CONNECTORS AND ADAPTER

A. Site Cable Connectors: All connectors shall be as recommended by the Cable manufacturer for the cable size and jacket of the cable.

B. Connectors for RG-6 Cables: All connectors for RG-6 cable shall be one-piece compression connectors with color coded sleeve. Design selection: Belden part number SNS1P6QS or equivalent.

C. Connectors for RG-11 Cables: All connectors for RG-11 cable shall be one-piece compression connectors with color coded sleeve. Design selection: Belden part number SNS1P11 or equivalent.

D. Connectors for PIII-500 Cables: All connectors for PIII-500 cable shall use a 5/8-inch three pin type connector. Design selection: Amphenol ACC-500-CHT10 or equivalent.

E. Adapters: The Installer shall provide all adapters to connect all different cables listed above to an F type connector or a 5/8-inch three pin connector, as required in the design to make complete connections. Design selection: Amphenol ACC series or equivalent.

F. Crimping: All connectors shall be installed using the connector manufacturer's recommended cutting, coring, and pin crimping tools.

2.6 SURGE SUPPRESSION

A. All coaxial cables entering or exiting a building (above or below ground) shall be surge protected as required by NEC article 820.

B. All surge suppression devices shall be grounded with an AWG-12 isolated wire to the closest electrical ground.

C. All surge suppression devices shall be UL 497 listed, gas tube suppression, power passing, and specifically designed for broadband network applications.

D. Design selection: TII in-line coaxial lighting surge protector part number 212FF757225-31.

2.7 IDENTIFICATION AND LABELING TAGS

A. The CATV Installer shall follow labeling materials indicated in Specification Section 27 00 10 Technology General Provisions.

PART 3 - EXECUTION

3.1 INSTALLATION PRACTICES

A. The CATV Installer shall follow all installation practices indicated in Specification Section 27 00 10 Technology General Provisions.

B. In Raceway: All cables shall be installed in raceways without kinks, dents, or abrasions. Specified pulling strength of cable shall not be exceeded.

C. All indoor cables shall have no splices at any points.

D. Terminal Locations: Cables at terminal locations shall be neatly formed using a bending form to prevent kinks or other discontinuities. Cables showing evidence of abuse or physical damage shall be replaced at the Installer's expense.

E. It is envisioned that television service will migrate into the overall telecommunications scheme for a given facility, therefore television distribution shall be accomplished via the following methods.

F. Distribution Topology: Broadband distribution points shall be located throughout the facility and all wiring shall be run back to the Telecommunication closet where the connection to the Broadband distribution backbone will take place.

G. The facility contains telecommunication rooms or associated closets, which shall be used for amplification and distribution equipment as well as all TRUNK/FEEDER & DROP cable terminations. Cabling used shall conform to the specifications as previously outlined, with the addition of CMP type cables for use in plenum rated areas if applicable, and environmental air circulation spaces, if required by the facility air distribution system.

H. All unused outputs of splitters, directional couples or distribution taps shall have a 75-ohm termination installed.

I. All unused cavities of the Toner Total Tap housing shall be filled with blank plates.

J. All equipment with a grounding lug shall be grounded as recommended by the equipment manufacturer to an acceptable grounding point as described by the NEC.

K. All amplifiers shall be used at the rated output. The Installer shall provide the required equalization and attenuation pads for all amplifiers to operate at the rated output at only 80% of the maximum gain control of the unit.

L. Cable and equipment identifiers shall be provided and shall follow a standard labeling system like TIA/EIA-606. The identification system chosen by the CATV Installer shall be submitted for approval to the A&E.

M. The Installer shall use attenuator or adjustment for fiber optic equipment to ensure proper budget levels are getting to each receiver.

3.2 INSTALLATION OF CONNECTORS

A. Provisions: All connectors shall be installed in strict accordance with the manufacturers' instructions.

B. Residue Removal: All dielectric residues shall be removed from surfaces of center conductors to insure proper electrical contact.

C. Preparation: Semi-rigid cables shall have jacket removed to a length of two inches from the cable end to allow proper seating of connectors without scoring of the aluminum sheath. A tubing cutter shall not be used for this purpose. All flooding compounds shall be removed from the connector location with a suitable solvent.

D. Connections: All connections including terminations and connections on flexible cables shall be wrench tightened to insure RFI integrity. Connectors at manhole or exterior pedestal tap locations and antennas shall be filled with Dow Corning #5 compound prior to wrench tightening.

E. Tooling: Cables shall be prepared to accept connectors using the manufacturer's recommended tooling.

F. Crimp Connections: Crimp type connections on flexible cables in manholes shall be made with a Hex crimp tool and encapsulated with flooded heat shrink tubing.

G. Heat Shrink Boot: All cables containing flooding compound shall be provided with a heat shrink boot at all termination points which covers the housing connector boss, body of the connector and extends not less than 12 inches along the cable jacket. Heat shrink boot shall be of the filled type.

H. Splices: Cable splices below grade or in other locations shall be made according to manufacturers' recommendations, tested, and covered with a filled heat shrink boot approximately 30 inches in length. Boot shall contain a resilient compound which melts as heat is applied and fills all voids between the shrink tube and cable jacket. Resin casts shall not be acceptable.

3.3 EQUIPMENT MOUNTING

A. Mounting: All remote terminal equipment (amplifiers, taps, couplers etc.) shall be neatly arranged and securely mounted. When installed above the ceiling, all devices need to be in accessible places. All accessories required for wall mounting equipment shall be provided when equipment is to be wall mounted.

B. Integrity: All equipment housing hardware including amplifiers shall be wrench tightened to insure full RFI integrity.

3.4 SYSTEM ADJUSTMENTS

A. Installation: System design drawings are based on estimated distances between devices. The Installer shall measure the exact cable footages between equipment locations and submit a revised drawing to the engineer for review containing the following.

1. Exact footage of each cable
2. Revised coupler and tap values
3. Revised equalizer and pad values

3.5 SYSTEM PERFORMANCE

A. General: Upon completion the system shall be adjusted, tested, and left in perfect operating condition.

B. Provisions: The system shall not exhibit any audible or visible components of hum, noise, or distortion.

C. Before the system acceptance test, the Installer shall test all outlets in the system and document the result in a spreadsheet or an automated test print out from the test equipment. This report is called Test Result Report (TRR). The TRR report shall include the following information:

1. Project name and location
2. Day test was done (if done in different days, the report shall be broken in sections by days the tests were done)

3. Name of the Installer that performed the test
4. Serial number of the tester used
5. For each outlet in the project the report shall include:
    a. Room number
    b. Room name
    c. Outlet number (with permanent label matching as-built drawings)
    d. Lowest channel - signal level (in dBmV)
    e. Mid bandwidth channel – signal level (in dBmV)
    f. Highest channel (as identified in part 1 of this specification) – signal level (in dBmV)
6. For each amplifier in the system the report shall include:
    a. Room number
    b. Room name
    c. Lowest channel - signal level (in dBmV, measured @ test port)
    d. Mid bandwidth channel – signal level (in dBmV, measured @ test port)
    e. Highest channel (as identified in part 1 of this specification) – signal level (in dBmV, measured @ test port)

D. All Fiber optic cables and UTP category cable shall be tested in accordance with Specification Section 27 10 00 Technology General Provisions.

3.6 SYSTEMS WARRANTY AND SERVICE

A. General: The CATV Installer shall follow all warranty and service requirements indicated in Specification Section 27 00 10 Technology General Provisions.

3.7 ENGINEER'S FINAL ACCEPTANCE TEST

A. General: The CATV Installer shall follow all test requirements indicated in Specification Section 27 00 10 Technology General Provisions

B. General: The Installer shall demonstrate the operation of the system to the Architect & Engineer (A&E) during the final inspection in the following manner:

1. Measure signal levels with a calibrated field strength meter at outlets and or amplifiers selected by the A&E. At a minimum 5% of all outlets will be tested. The readings of the meter shall be between 1.5 dBmV of the value documented in the TRR.
2. Observe picture quality at outlets selected by the Engineer using a television receiver.

C. If at least one measurement fails, the A&E can request to the Installer to test more outlets (beyond the 5% indicated previously) until the A&E is satisfied with the results. Any failures shall be corrected by the Installer at no additional cost to the Owner.

3.8 TEST EQUIPMENT REQUIRED

A. At a minimum during the acceptance test to the A&E the Installer shall have the following equipment:

1. TV Receiver: 17-inch minimum diagonal screen size color receiver in good working order.
2. Signal Meter: This signal meter needs to be the same tester used during the TRR.

B. Age and Calibration: Test equipment used in demonstrating system performance shall be less than six months old or bear the calibration seal of a recognized lab which is dated within six months of the date of acceptance test.

3.9 TRAINING AND INSTRUCTION

A. General: The CATV Installer shall follow all training requirements indicated in Specification Section 27 00 10 Technology General Provisions.

B. The training shall include the following topics:

1. How to make connectors part of this system with the provided tools.
2. How to balance the system with amplifiers at rated output.
3. A walk-through of the facility pointing out the location of all active and passive equipment of the system and showing the Owner the as-built drawings with matching labels for those pieces of equipment.
4. A complete training on the use of the test tools provided.

3.10 AS-BUILT DOCUMENTS AND CLOSE-OUT INFORMATION

A. General: The CATV Installer shall follow all as-built and closeout information requirements indicated in Specification Section 27 00 10 Technology General Provisions.

B. General: As-built drawings shall include the following information:

1. A block diagram of the entire system indicating all cable routing and lengths
2. Revised coupler and tap values for each cable drop
3. All cable types, active components, and passive components
4. All equalizing and attenuating pads used for each amplifier

5. All system settings
6. All brands and part number of all devices shall be indicated in the drawings
7. Location of each outlet and the unique label identifier of each outlet
8. High/low signal level measured at each amplifier test port

C. Additional information to be provided by the CATV Installer, as part of the closeout information:

1. A copy of the TRR signed approved by the A&E.

END OF SECTION 27 41 34

APPENDIX A: Abbreviations

1.4 ABBREVIATIONS

ABV CLG	Above Ceiling
AC	Alternating Current
ACD	Automatic Core Detection
ADA	American Disabilities Act
AFF	Above Finished Floor
AFG	Above Finished Grade
AMP	Ampere/Amplifier
ANSI	American National Standards Institute
AOC	Administrative Office of the Courts
APC	Angled Polished Connectors (Angle physical contact connector)
APWA	American Public Works Association
ASTM	American Society for Testing and Materials
AVS	Audio Visual System
AWG	Average Wire Gauge
A&E	Architect & Engineer
BC	Bare Copper or Bonding Conductor
BCC	Pinellas County Florida Board of County Commissioners
BICSI	Building Industry Consultant Services International
BTS	Pinellas County Business Technology Services
CCTV	Closed Circuit Television
CATV	Community antenna television
cd	Candle (Unit – measurement of light)
CEA	Consumer Electronics Association
CLG	Ceiling
COAX	Coaxial Cable
CO	Certificate of Occupancy
COOPM	Customer Owned Outside Plant Manual
CPU	Central Processing Unit
CTS	Certified Technology Specialist
DA	Data Center
dBmV	Decibels/measurements
DC	Direct Current
DEG	Degree
DBPR	Department of Business and Professional Regulation
DOCSIS	Data Over Cable Service Interface Specification
DSP	Digital Signal Processors
DX	Direct Expansion
EIA	Electronic Industry Alliance
EMC	Electromagnetic compatibility

EMI	Electromagnetic Interference
EMT	Electrical Metallic Tubing
EOR	Engineer of Record
ER	Equipment Room
FCC	Federal Communications Commission
FODC	Fiber Optics Distribution Center
FOCIS	Fiber Optic Connector Intermateability Standard
FT./ft.	Feet
FTP	Foiled Twisted Pair
GND	Ground
HDPE	High Density Polyethylene
HTAP	Crimp or Compression type connectors
IDC	Insulation Displacement Connector
IDF	Intermediate Distribution Frame (Telecom Room)
IEEE	Institute of Electrical and Electronics Engineers
IMC	Intermediate Metallic Conduit
IP	Internet Protocol
ISP	Internet
JB	Junction Box
Kg	Kilogram
KVA	Kilo-Volt-Amps
kW	Kilowatts
LBS	Pounds
LED	Light Emitting Diode
LFV	Least Favorable Viewer
LM	Linear Meter
MATV	Master Antenna Television
MAX	Maximum
MCBN	Mesh Common Bonding Network
MDF	Main Distribution Frame (Main Telecom Room)
MEP	Mechanical, Electrical, and Plumbing
MIC	Microphone
MIN	Minimum
MM/mm	Millimeter
MTD	Mounted
MTG	Mounting
MTR	
NRTL	Nationally Recognized Testing Laboratory
NEC	National Electrical Code
NECA	National Electrical Contractors Association
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association

NOC	Network Operations Center
NIC	Not in Contract
NRTL	Nationally Recognized Testing Laboratory
NVP	Nominal Velocity of Propagation
OFE	Owner furnished equipment
OFSTP	Optical Fiber System Test Procedure
OHM	Unit of Electrical Resistance (Ω)
OSHA	Occupational Safety and Health Administration
OTDR	Optical Time Domain Reflectometer
PB	Pull box
PC	Personal Computer
PCSO	Pinellas County Sherriff's Office
PDU	Power Distribution Units
PCF/pcf	Per Cubic Foot
PIE	St. Petersburg - Clearwater International Airport
POP	Point of Presence
PS-SCS	Pathways and Spaces for Structured Cabling System
PWR	Power
PVC	Polyvinyl chloride
PVDF	Polyvinylidene fluoride
RCDD	Registered Communications Distribution Designer
RF	Radio Frequency
RFI	Radio Frequency Interference
RMC	Rigid Metal Conduit
RU	Rack Units
SCS	Structured Cabling System
ScTP	Screened Twisted Pair
SOW	Scope of Work
Sq. Ft.	Square Feet/Foot
TEF	Telecommunications Entrance Facility
TAPS	Compression Tap Connector
TBB	Telecommunications Bonding Backbone
TCO	Temporary Certificate of Occupancy
TDMM	Telecommunications Distribution Method Manual
TGB	Telecommunications Grounding Busbar
TIA	Telecommunications Industry Association
TMGB	Telecommunications Main Grounding Busbar
TR	Telecommunications Room
TRR	Test Result Report
TSER	Telecommunication Services Entrance Room
TSP	Telephone
TTB	Telephone Terminal Board

TVSP	Television
UL	Underwriter Laboratories
UPC	Ultra-Physical Contact Connector
UPS	Uninterrupted Power Supply
UTP	Uniform Twisted Pair
UV	Ultraviolet
V	Volt
VAC	Volts Alternating Current
VAV	Variable Air Volume
VCT	Vinyl Composition Tile
W	Watts
WAP	Wireless Access Points
WP	Weatherproof

APPENDIX B: Substitution Request Form

SUBSTITUTION REQUEST FORM

Substitution Request Number: _____

PROJECT: _____ DATE: _____

SPECIFICATION SECTION: _____ ITEM(S): _____

SPECIFIED MANUFACTURER: _____

SPECIFIED MODEL NO: _____

PROPOSED MANUFACTURER: _____

PROPOSED MODEL NO: _____

REASON(S) FOR NOT PROVIDING SPECIFIED ITEM: _____

Attach product description, drawings, photographs, performance and test data, samples, and other information necessary for side-by-side evaluation. Fill in all blanks.

Provide substantiated reason for requested substitution. _____

_____

Does the requested substitution affect dimensions, locations, or configurations?

No:___ Yes:___

Explain (attach drawings if necessary): _____

_____

What are the differences between the specified item and the requested item?

_____

_____

Will the Contractor pay for any changes to the building design, including engineering and detailing costs caused by the approval?

No:____ Yes:____

Explain (if No, and describe modifications required to install or accommodate the requested change):

_____

_____

_____

Will approval affect the work of other trades, including the Construction schedule?

No:____ Yes:____

Explain (if Yes):_____

_____

_____

Manufacturer's guarantees of the proposed and specified items are:

Same:____ Different:____

Explain (if Different):_____

_____

_____

Does the proposed item meet all applicable codes, ordinances, and regulations for this specific application?

No:____ Yes:____

Explain (if No):_____

_____

_____

Has proposed item been used locally in similar applications?

No:___ Yes:___

Explain (give nearest location):_____

_____

_____

Will maintenance and service parts be locally available for the requested item?

No:___ Yes:___

Explain (if No, give nearest location):_____

_____

_____

Will the requested item require waiving of any qualifications or other requirements?

No:___ Yes:___

Explain (if Yes):_____

_____

_____

Are there any license fees or royalties associated with the requested substitution?

No:___ Yes:___

Explain (if Yes):_____

_____

_____

If approved, will the Owner receive a credit for the proposed alternate material?

No:___ Yes:___

Explain (if No):_____

_____

Does the proposed alternate material meet the same applicable standards (ASTM, ANSI, UL, FS) as the specified item?

No:___ Yes:___

Explain (if No, attach drawings if necessary):_____

_____

_____

Identify the recycled materials or components or features that lead to the claims to being "Green":

_____

_____

_____

Has the required line-by-line comparison been included?

No:___ Yes:___

Explain (if No):_____

_____

_____

The undersigned agrees to pay for the Designer's review time and for changes to the building design, including review, re-design, engineering, drawings, and other costs caused by the requested substitution.

Signature: _____

Print Name: _____

Return form to Department of Admin Services (DAS) Project Manager.

APPENDIX C Network Configuration IP Request Form

Fill in this form and return to Department of Admin Services (DAS) Project Manager.

PROJECT NAME	
DATE	
SUBCONTRACTOR	
TRADE	
HVAC / VRF / LIGHTING	
DEVICE CHARACTERISTICS	**DEVICE INFORMATION**
Device name	
Device description	
Device location (campus, building, floor, room) if known	
Manufacturer	
Part number	
Firmware version	
Is a fixed address required? Or can device work with a dynamic address (DHCP)?	
Does device require an address from a DNS server?	
Does device support Layer 3 traffic (IP)?	
Does device need access to the internet?	
Does device need remote access from outside network?	
Number of physical network ports per device?	
Does device require IPv6 to work or IPv4?	
Does device support SNMP?	
Does device need specific TCP ports open? Please list.	
Is this device connecting to existing network devices? (yes/no) If yes, list server/client application(s).	
If yes to above, please describe to what device, located where.	

APPENDIX D: TG106 Premises Cable Conduit Fill Quick Reference

TECHNICAL GUIDELINE

July 23, 2020
TG106 Rev.1

SUPERIOR ESSEX

Premises Cable Conduit Fill Quick Reference

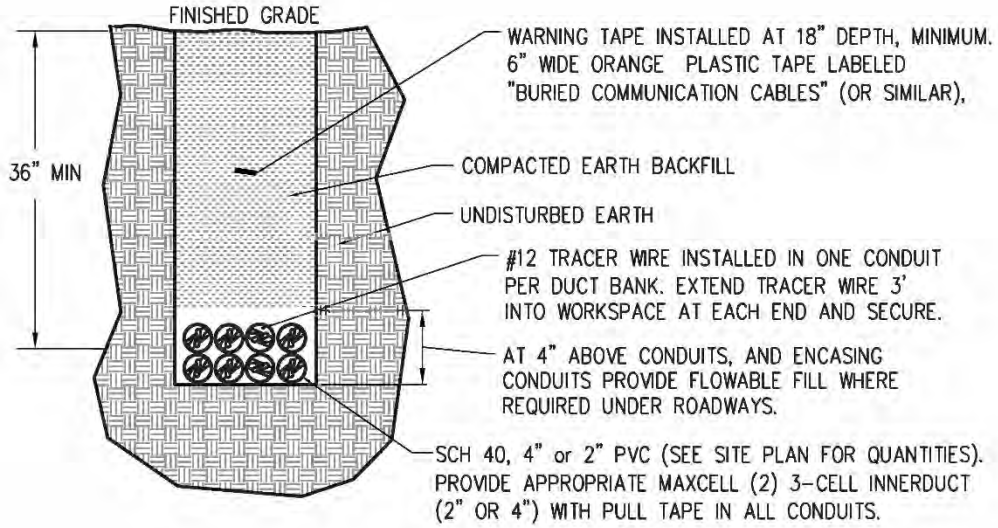
This information is intended as a guideline. Because conduit sizes may vary by manufacturer, please verify all dimensions prior to using this reference chart. This guideline is based on National Electrical Code (USA) recommendations for conduit fill of runs with no more than two 90° bends. For assistance in calculating conduit fill, refer to the "Resources" area of our site for the Technical Guideline, "How to Calculate Conduit Fill." Use only approved lubricants.

Conduit Trade Size Designator* English (Metric)	½ (16)	¾ (21)	1 (27)	1¼ (35)	1½ (41)	2 (53)	2½ (63)	3 (78)	3½ (91)	4 (103)	5 (129)
Conduit Internal Diameter in (mm)	0.62 (15.7)	0.82 (20.9)	1.05 (26.6)	1.38 (35.1)	1.61 (40.9)	2.07 (52.5)	2.47 (62.7)	3.07 (77.9)	3.55 (90.1)	4.03 (102.3)	5.05 (128.2)
Conduit Cross-Sectional Area in^2 (mm^2)	0.30 (195)	0.53 (345)	0.87 (559)	1.51 (973)	2.05 (1,322)	3.39 (2,177)	4.82 (3,106)	7.45 (4,794)	9.96 (6,413)	12.83 (8,268)	20.15 (12,984)
Cable Nominal Diameter in (mm)	Number of Cables at Maximum Recommended Conduit Fill (1 Cable @ 53% Maximum, 2 Cables @ 31% Maximum, 3 or More Cables @ 40% Maximum)										
0.10 (2.5)	15	26	44	76	103	171	262	376	504	649	1020
0.13 (3.3)	9	15	26	45	61	101	155	223	298	384	603
0.15 (3.8)	6	11	19	33	46	76	116	167	224	288	453
0.18 (4.6)	4	8	13	23	32	52	80	116	155	200	314
0.20 (5.1)	3	6	11	19	25	42	65	94	126	162	255
0.21 (5.3)	3	6	10	17	23	38	59	85	114	147	231
0.22 (5.6)	3	5	9	15	21	35	54	77	104	134	210
0.23 (5.8)	2	5	8	14	19	32	49	71	95	122	192
0.24 (6.1)	2	4	7	13	18	29	45	65	87	112	177
0.25 (6.4)	1	4	7	12	16	27	41	60	80	103	163
0.26 (6.6)	1	3	6	11	15	25	38	55	74	96	150
0.27 (6.9)	1	3	6	10	14	23	35	51	69	89	139
0.28 (7.1)	1	3	5	9	13	21	33	48	64	82	130
0.29 (7.4)	1	3	5	9	12	20	31	44	59	77	121
0.30 (7.6)	1	2	4	8	11	19	29	41	56	72	113
0.31 (7.9)	1	2	4	7	10	17	27	39	52	67	106
0.32 (8.1)	1	2	4	7	10	16	25	36	49	63	99
0.33 (8.4)	1	1	4	6	9	15	24	34	46	59	93
0.34 (8.6)	1	1	3	6	8	14	22	32	43	56	88
0.35 (8.9)	1	1	3	6	8	13	21	30	41	53	83
0.40 (10.2)	1	1	2	4	6	10	16	23	31	40	63
0.45 (11.4)	1	1	1	3	5	8	12	18	24	32	50
0.50 (12.7)	0	1	1	3	4	6	10	15	20	25	40
0.55 (14.0)	0	1	1	1	3	5	8	12	16	21	33
0.60 (15.2)	0	0	1	1	2	4	7	10	14	18	28
0.65 (16.5)	0	0	1	1	1	4	6	8	11	15	24
0.70 (17.8)	0	0	1	1	1	3	5	7	10	13	20
0.75 (19.1)	0	0	1	1	1	3	4	6	8	11	18
0.80 (20.3)	0	0	0	1	1	2	4	5	7	10	15
0.85 (21.6)	0	0	0	1	1	1	3	5	6	8	14
0.90 (22.9)	0	0	0	1	1	1	3	4	6	8	12
0.95 (24.1)	0	0	0	1	1	1	2	4	5	7	11
1.00 (25.4)	0	0	0	1	1	1	2	3	5	6	10

*Identifier only; not an actual dimension

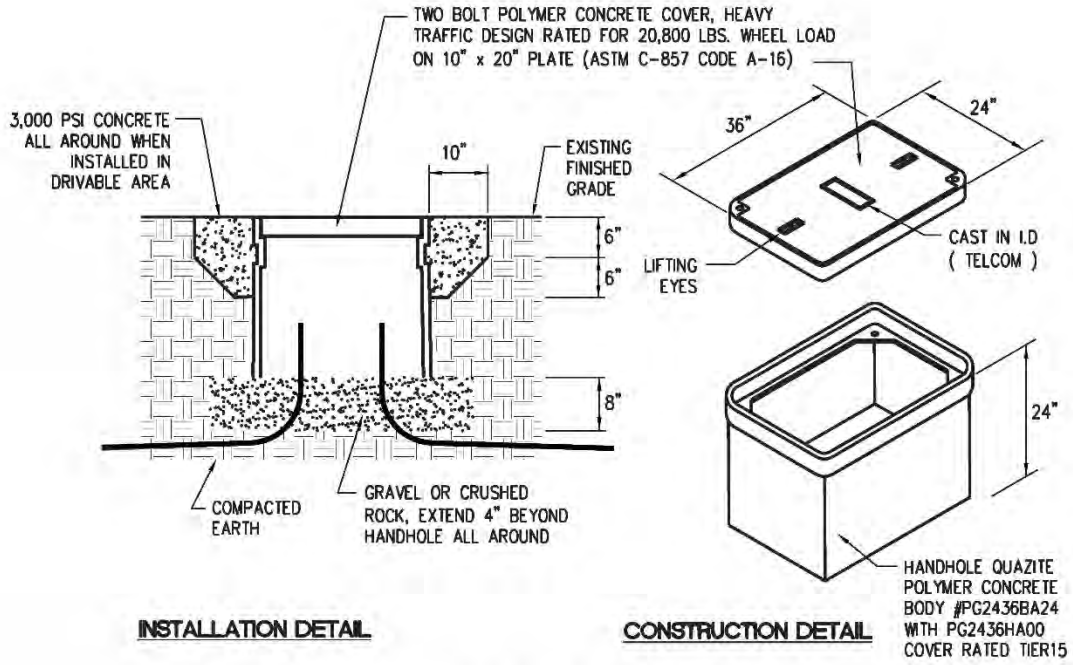
APPENDIX E: All Drawings

Duct bank Trenching/Boring



01 DUCT BANK TRENCHING / BORING DETAIL
NO SCALE

Technology Handhole (HH)

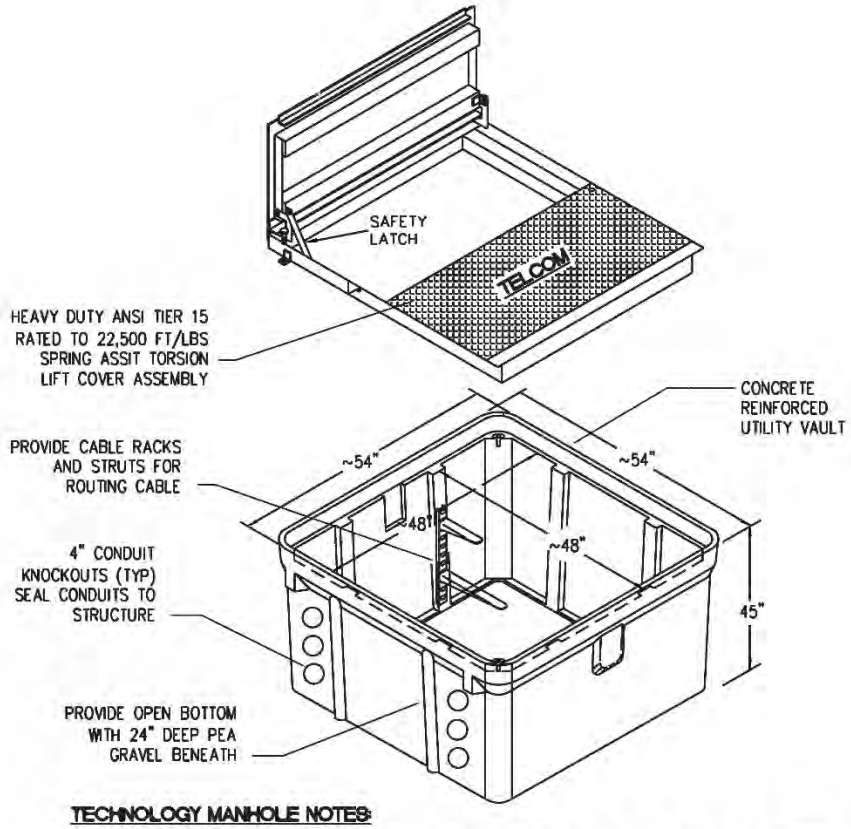


TECHNOLOGY HANDHOLE NOTES:

1. HANDHOLE WITH COVER (LOGO=TELCOM) SHALL BE QUAZITE OR EQUAL. INSTALL IN ACCORDANCE WITH THE MANUFACTURER'S PRINTED INSTRUCTIONS AND THESE REQUIREMENTS.
2. TERMINATE CONDUITS ENTERING HANDHOLE WITH END BELL (CARLON E997). CONSTRUCT CONDUIT RISE TO ENTER BOX FROM SIDE WITH 22-1/2" SWEEP ELBOWS.

02 TECHNOLOGY HANDHOLE (HH) DETAIL

NO SCALE

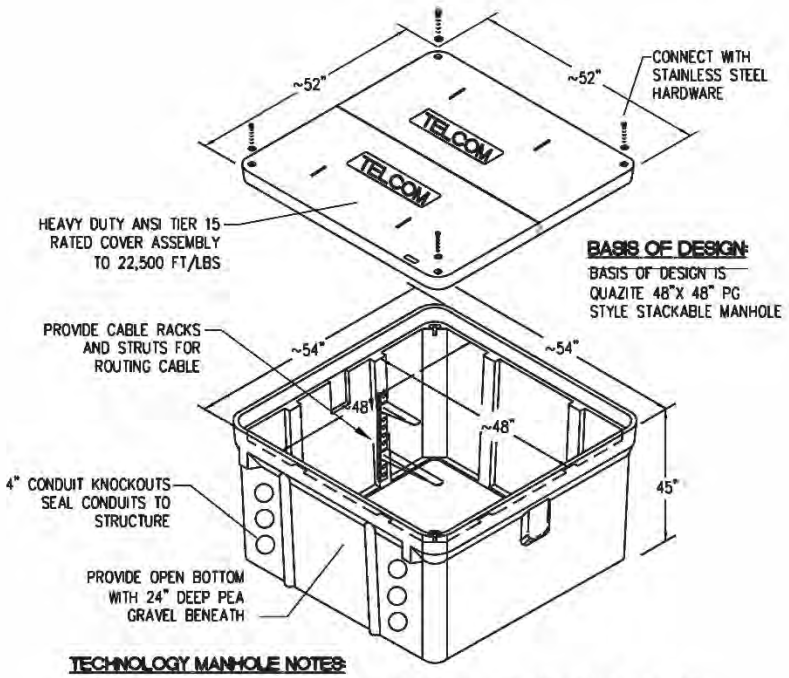


TECHNOLOGY MANHOLE NOTES:

1. INSTALL IN ACCORDANCE WITH THE MANUFACTURER'S PRINTED INSTRUCTIONS AND THESE REQUIREMENTS.
2. TERMINATE CONDUITS ENTERING MANHOLE WITH END BELL. CONSTRUCT CONDUIT RISE TO ENTER BOX FROM SIDE WITH 22-1/2° SWEEP ELBOWS.
3. PROTECT ALL CABLES INSIDE MANHOLE WITH TEFLON (OR WEATHER RESISTANT NYLON) SPIRAL WRAPPING, DIAMETER AS REQUIRED. INSTALL SPIRAL WRAPPING BUTTED (NO GAPS). EXTEND INTO CONDUIT 1" BOTH ENDS.
4. ALL CABLES SHALL BE PROPERTY ROUTED AND SECURED AGAINST THE SIDES OF ALL COMMUNICATIONS MANHOLES USING PROPER SUPPORTS AS REQUIRED.
5. PENETRATE CONDUITS NEAR THE CORNERS OF THE MANHOLE, NOT AT THE CENTER.

03 TECHNOLOGY MANHOLE (MH)-METAL LID, SPRING LOADED

NO SCALE



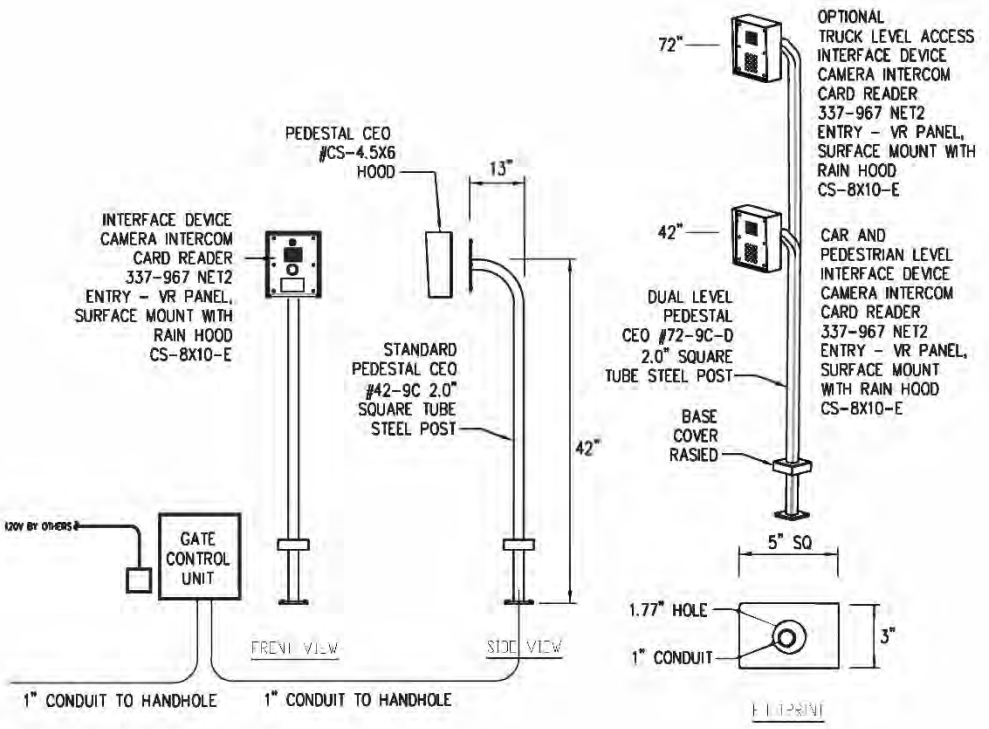
TECHNOLOGY MANHOLE NOTES:

1. INSTALL IN ACCORDANCE WITH THE MANUFACTURER'S PRINTED INSTRUCTIONS AND THESE REQUIREMENTS.
2. TERMINATE CONDUITS ENTERING MANHOLE WITH END BELL. CONSTRUCT CONDUIT RISE TO ENTER BOX FROM SIDE WITH 22-1/2" SWEEP ELBOWS.
3. PROTECT ALL CABLES INSIDE MANHOLE WITH TEFLON (OR WEATHER RESISTANT NYLON) SPIRAL WRAPPING, DIAMETER AS REQUIRED. INSTALL SPIRAL WRAPPING BUTTED (NO GAPS). EXTEND INTO CONDUIT 1" BOTH ENDS.
4. ALL CABLES SHALL BE PROPERTY ROUTED AND SECURED AGAINST THE SIDES OF ALL COMMUNICATIONS MANHOLES USING PROPER SUPPORTS AS REQUIRED.
5. PENETRATE CONDUITS NEAR THE CORNERS OF THE MANHOLE, NOT AT THE CENTER.

04 TECHNOLOGY MANHOLE (MH)-STANDARD

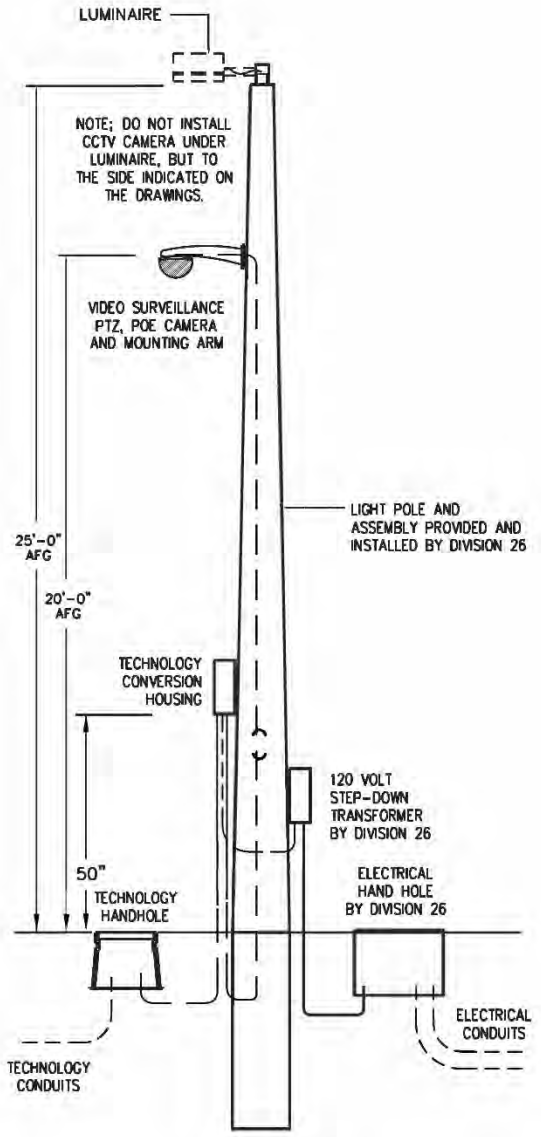
NO SCALE

Entry Gate Pedestal

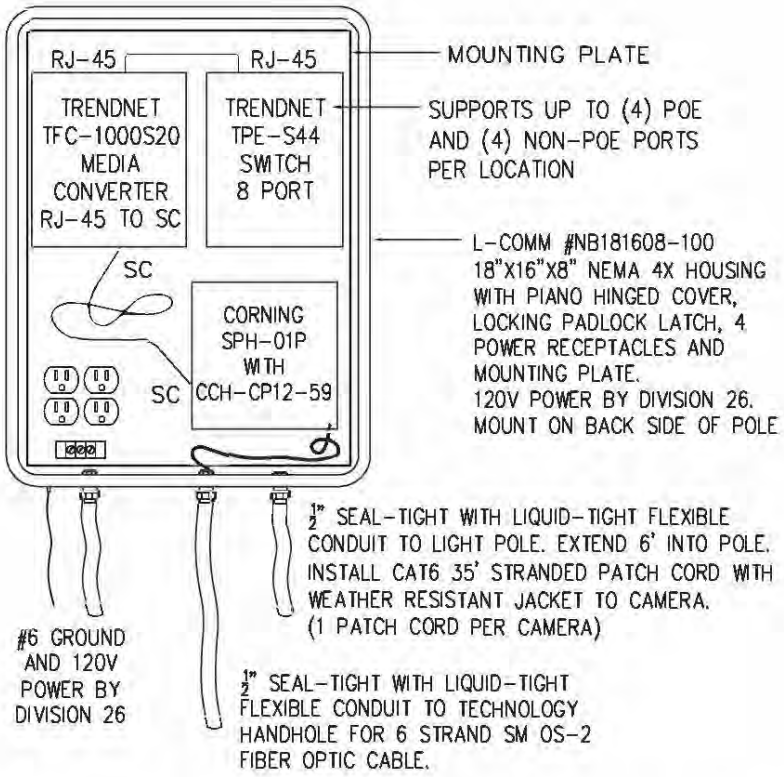


05 ENTRY GATE PEDESTAL DETAIL
NO SCALE

CCTV Light Pole Mounting

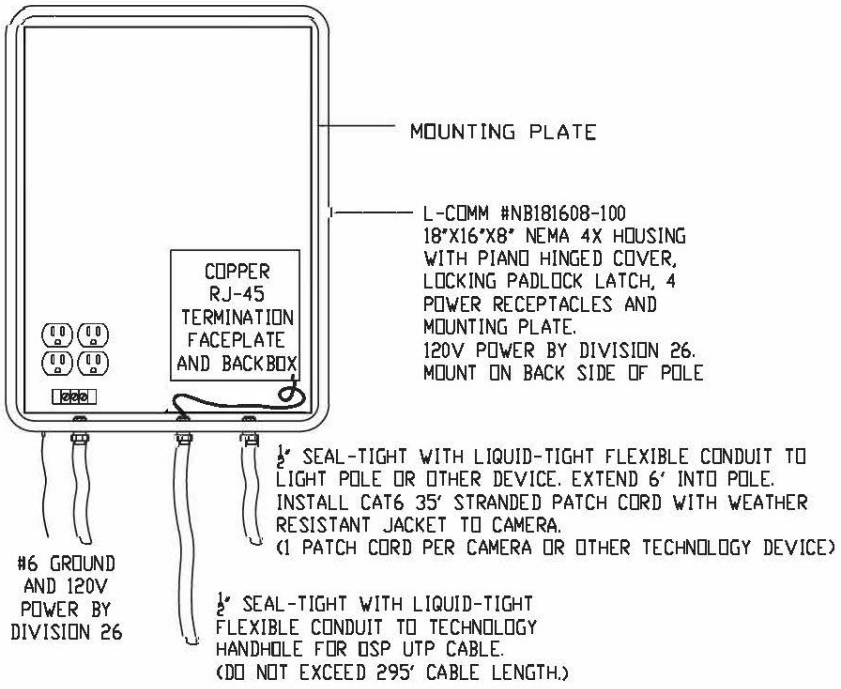


06 CCTV LIGHT POLE MOUNTING DETAIL
NO SCALE



07 TECHNOLOGY CONVERSION HOUSING-FIBER WITH MEDIA CONVERTER INSTALLATION

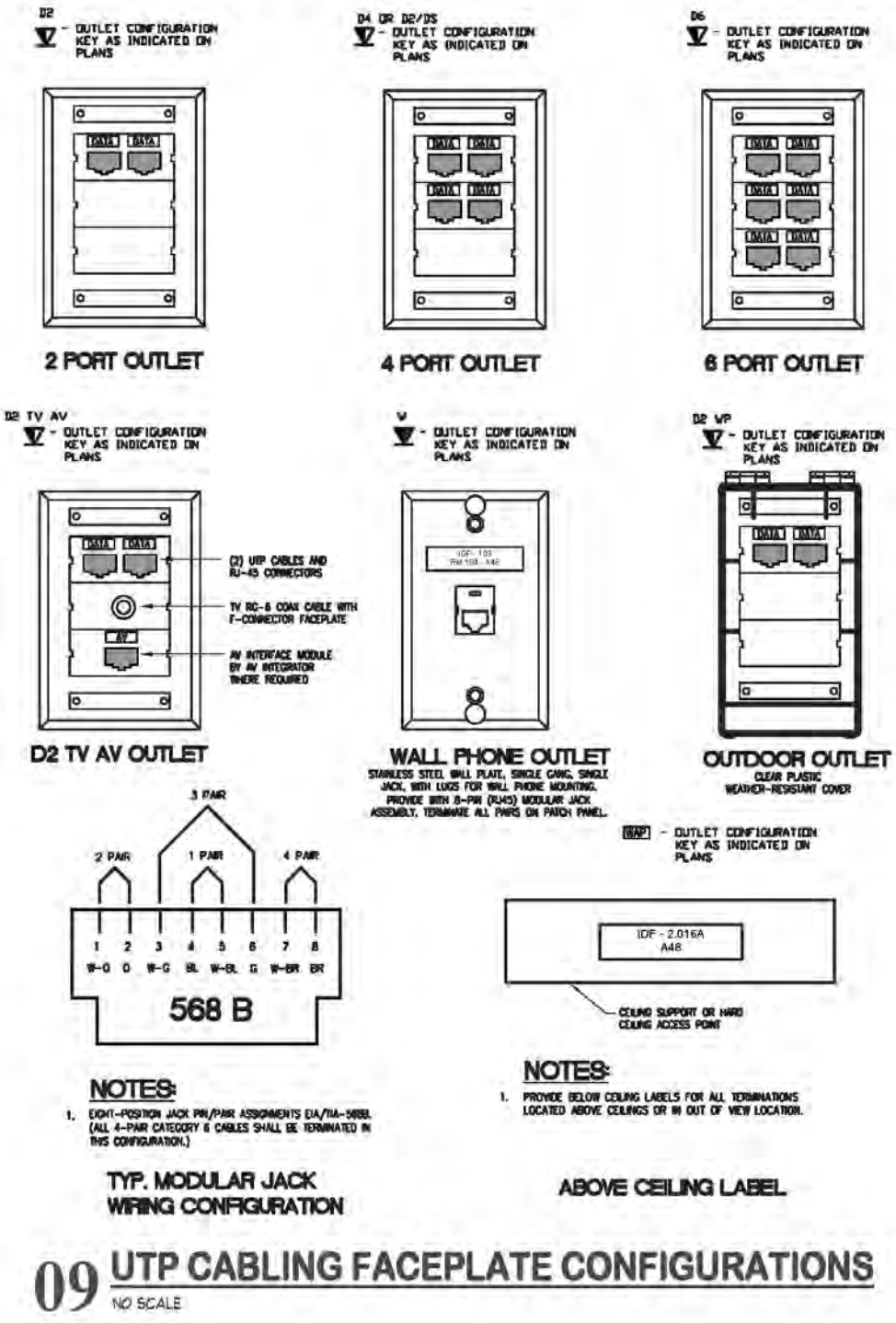
NO SCALE



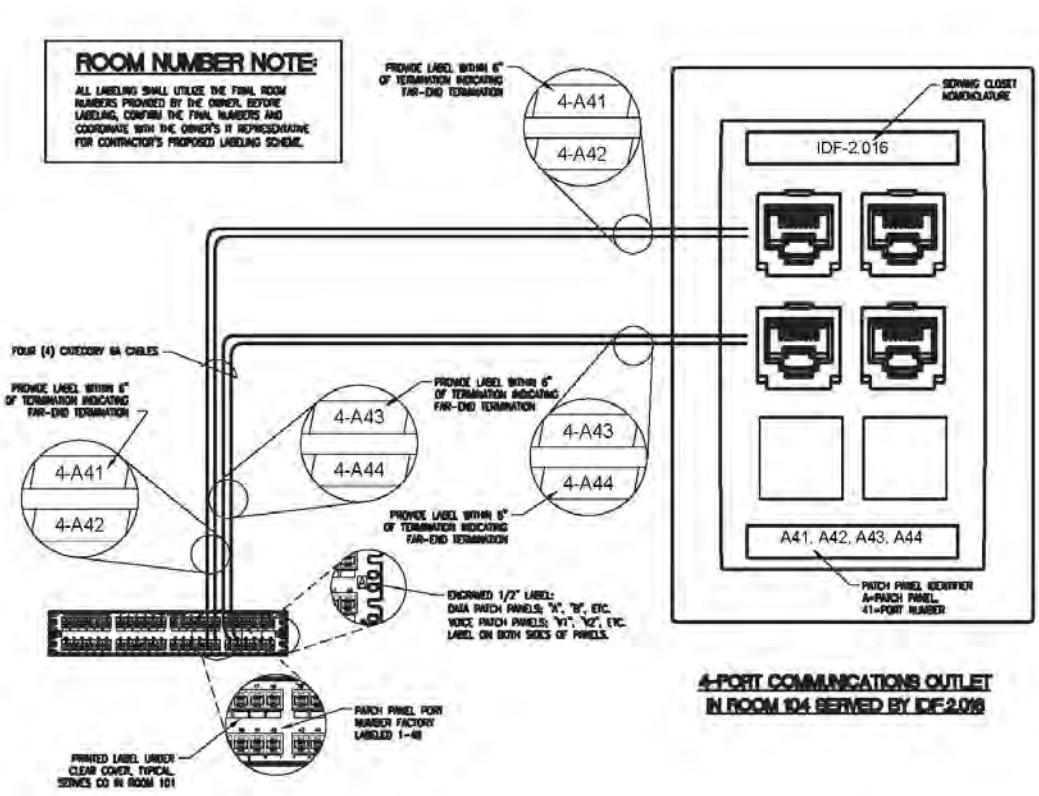
08 TECHNOLOGY CONVERSION HOUSING - COPPER INSTALLATION

NO SCALE

UTP Cabling Faceplate Configurations



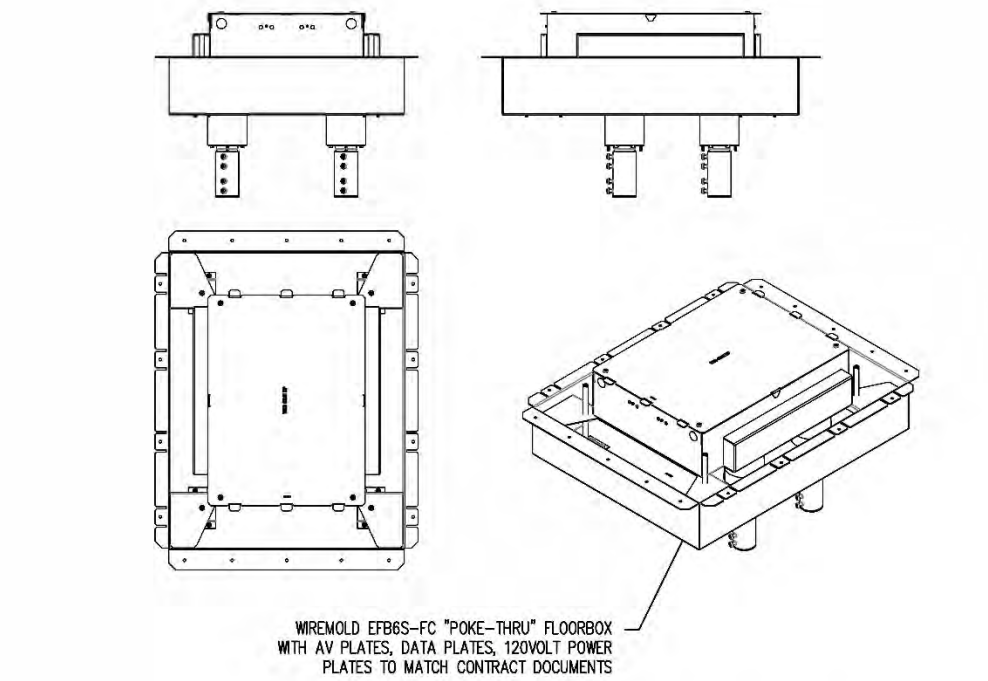
UTP Labeling from Closet to Communications Outlet

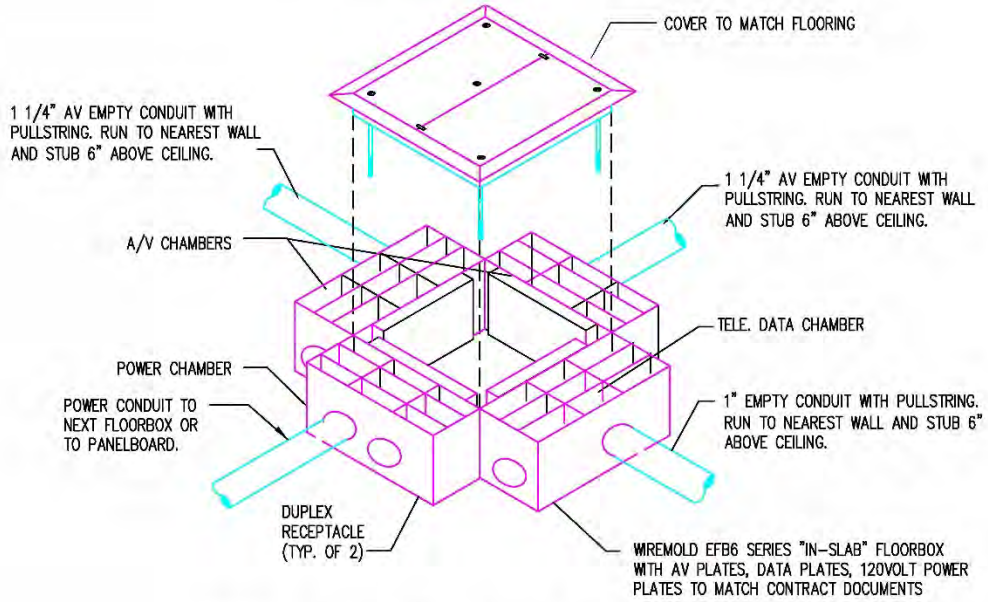


10 UTP LABLING FROM CLOSET TO COMMUNICATIONS OUTLET

NO SCALE

Power / Comm / AV Floor Box

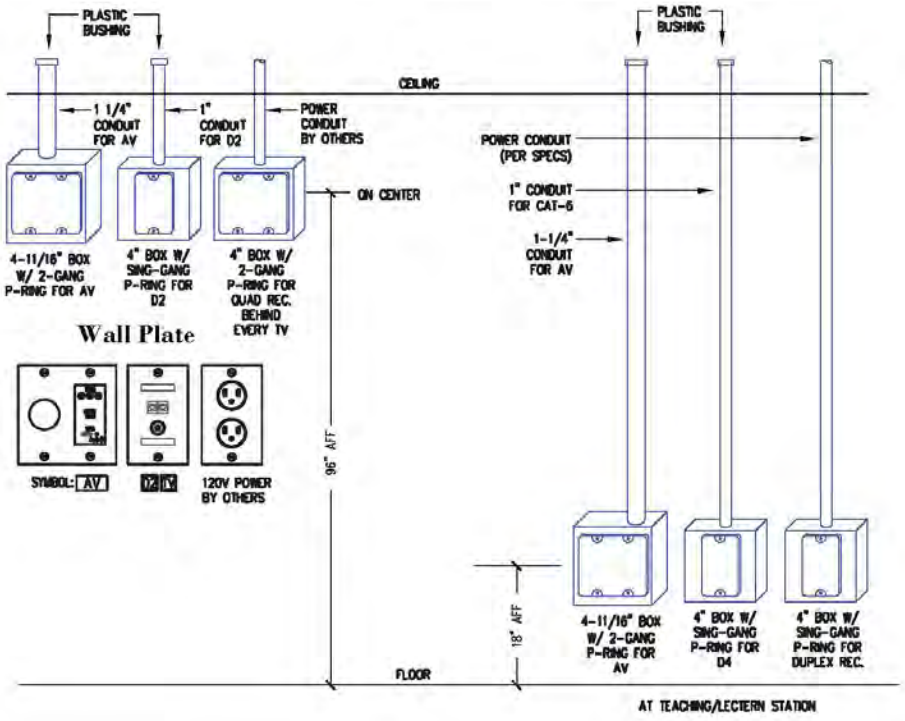




11 POWER / COMM / AV FLOOR BOX

NO SCALE

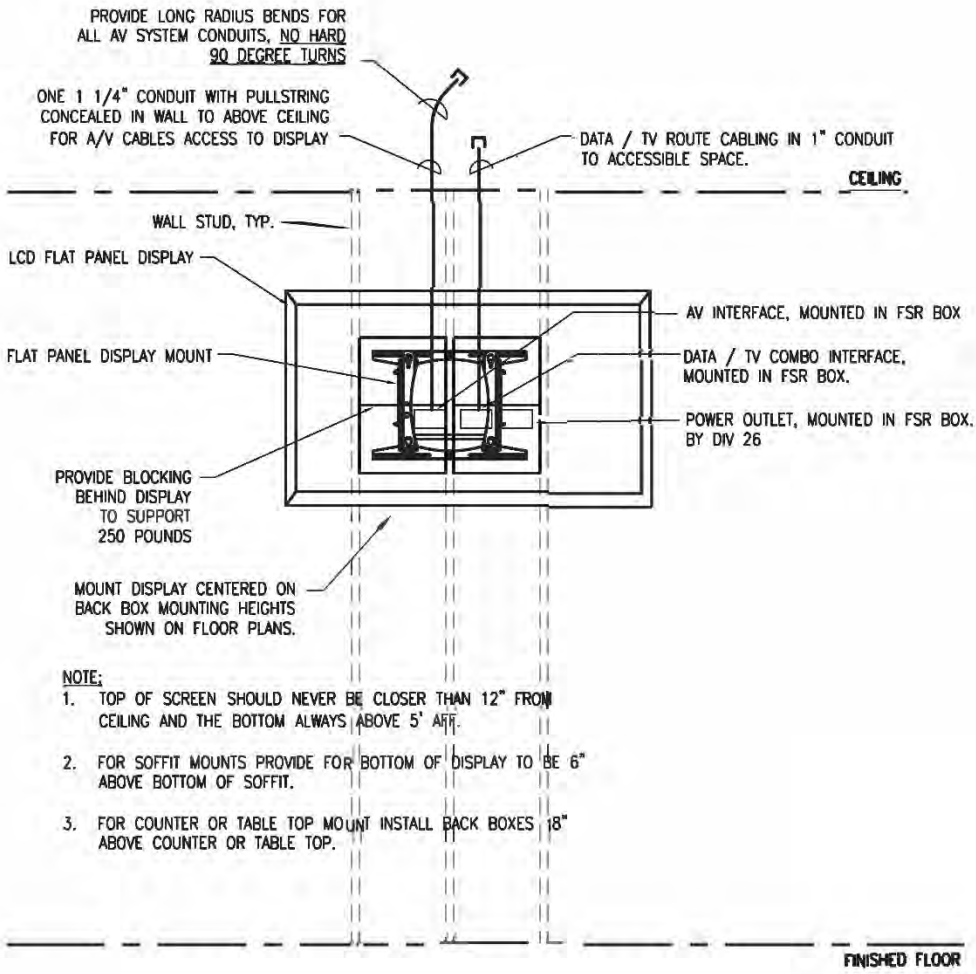
AV Wall Data, AV, Power Rough-in Plan



12 AV WALL DATA, AV, POWER ROUGH-IN PLAN

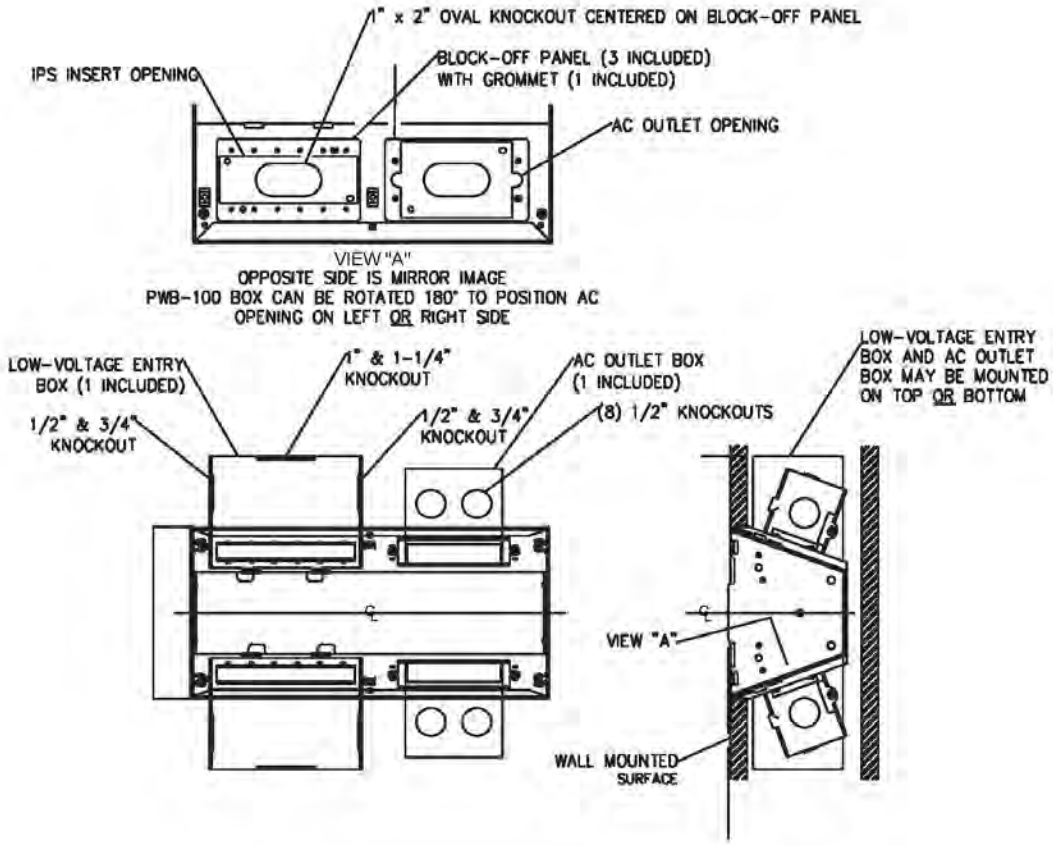
NO SCALE

TV/AV Display Standard Wall Mount



13 TV / AV DISPLAY STANDARD WALL MOUNT
NO SCALE

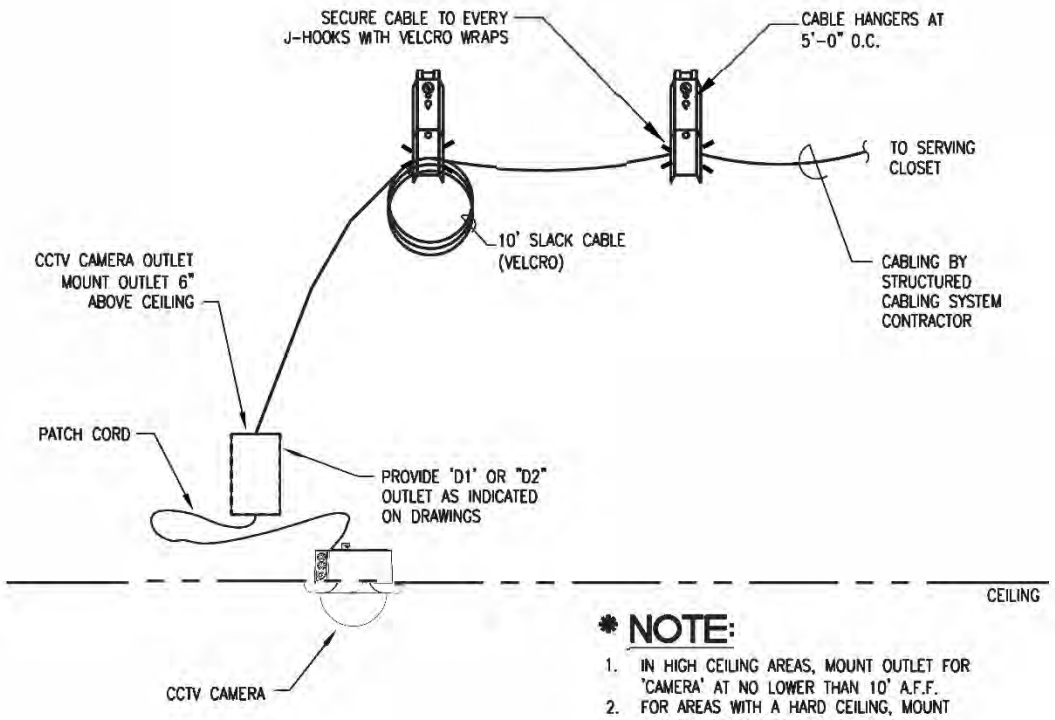
Recessed FSR PWB-100 Wall Box



14 RECESSED FSR PWB-100 WALL BOX DETAIL

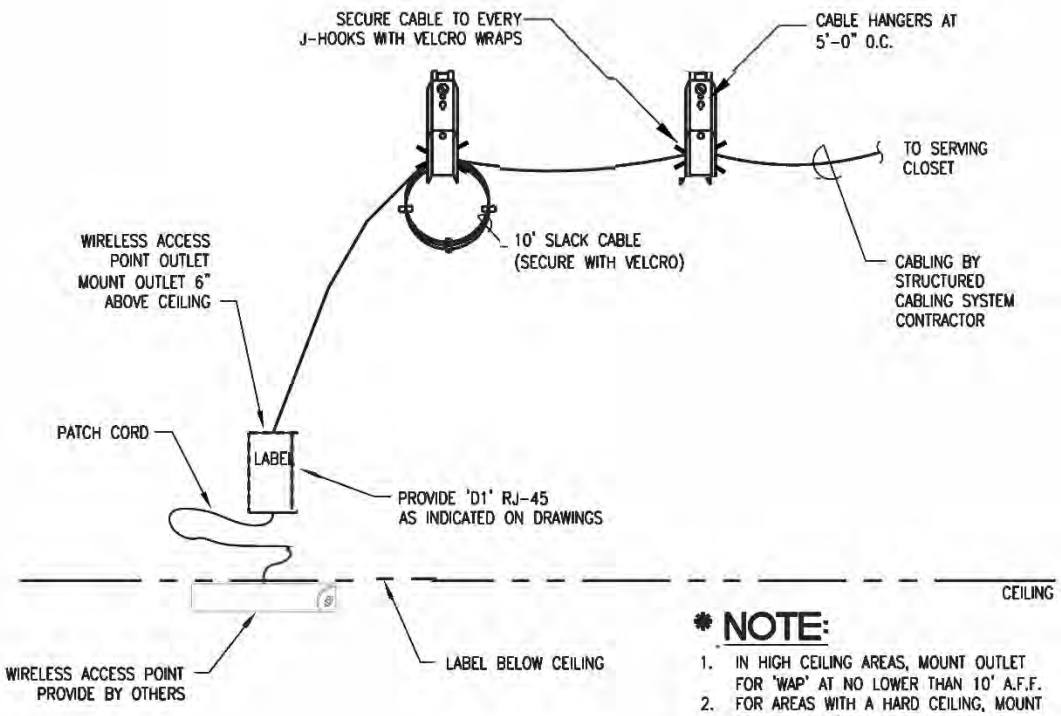
NO SCALE

Surveillance Camera Ceiling Mount



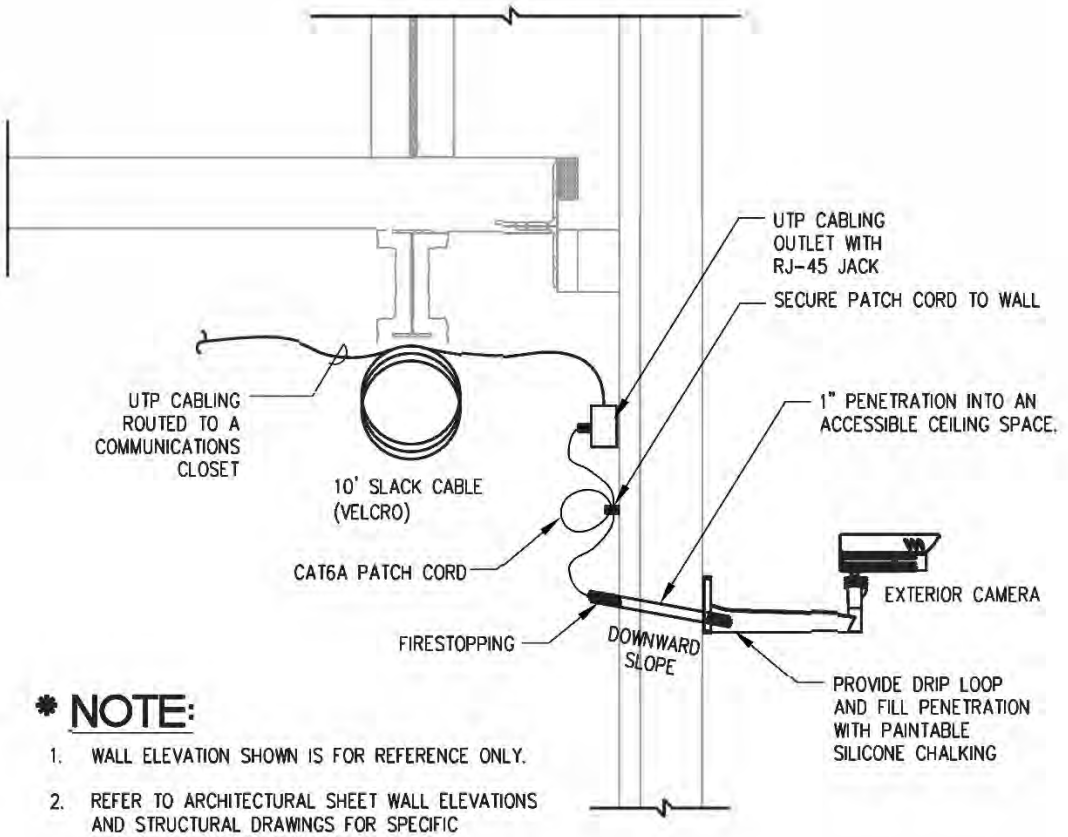
15 SURVEILLANCE CAMERA CEILING MOUNT
NO SCALE

Wireless Access Point Ceiling Mount



16 WIRELESS ACCESS POINT CEILING MOUNT
NO SCALE

CCTV Camera on Outdoor/Exterior Wall



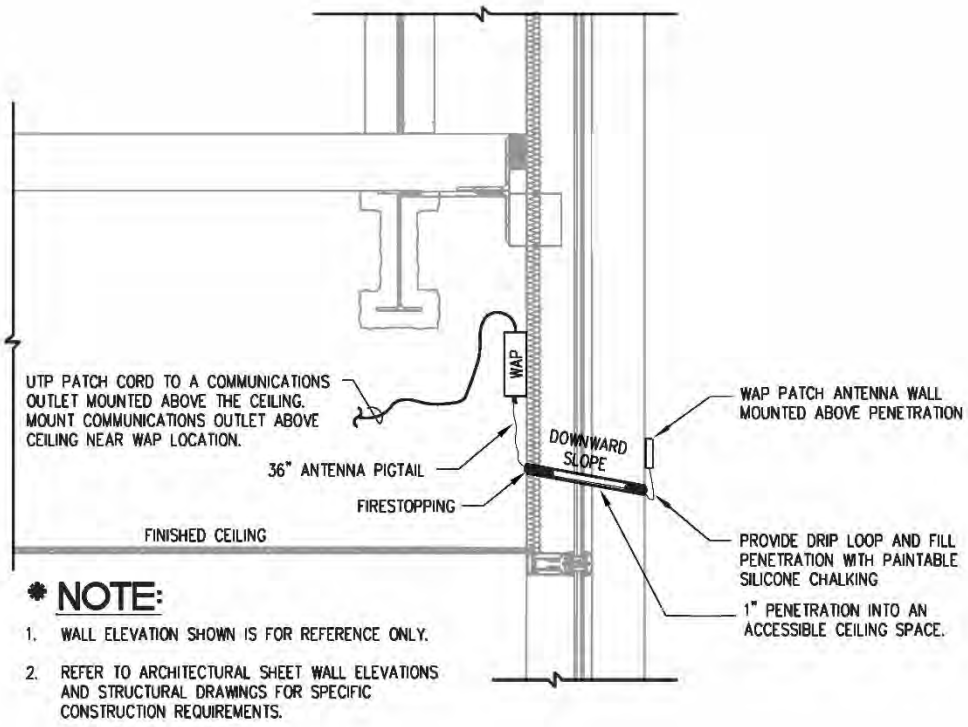
*** NOTE:**

1. WALL ELEVATION SHOWN IS FOR REFERENCE ONLY.
2. REFER TO ARCHITECTURAL SHEET WALL ELEVATIONS AND STRUCTURAL DRAWINGS FOR SPECIFIC CONSTRUCTION REQUIREMENTS.

17 CCTV CAMERA ON OUTDOOR / EXTERIOR WALL

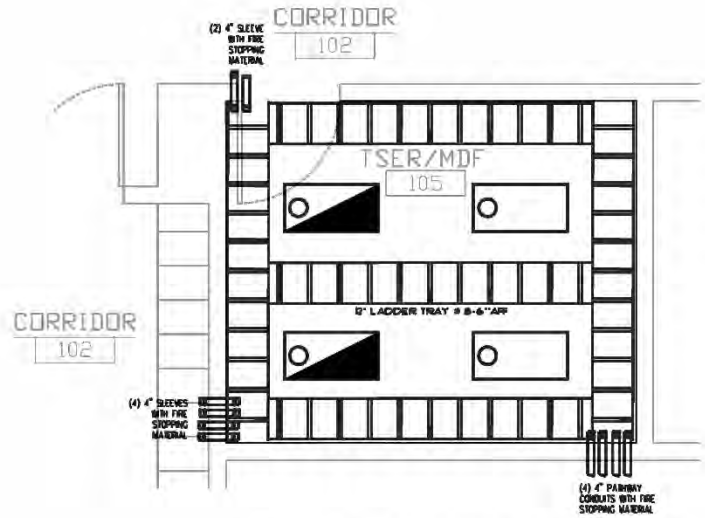
NO SCALE

WAP Antenna on Outdoor/Exterior Wall

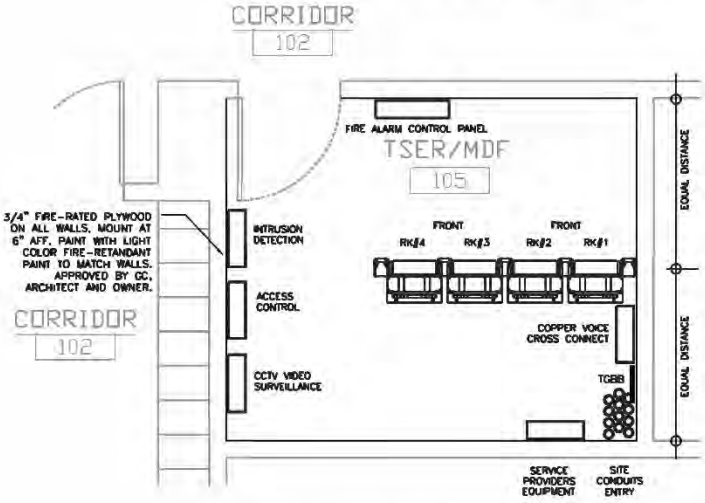


18 WAP ANTENNA ON OUTDOOR / EXTERIOR WALL
NO SCALE

TSER/MDF Layout

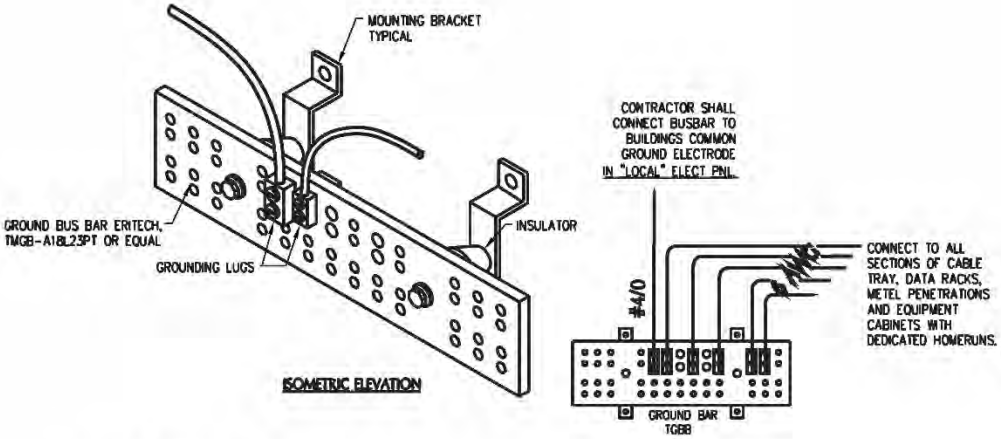


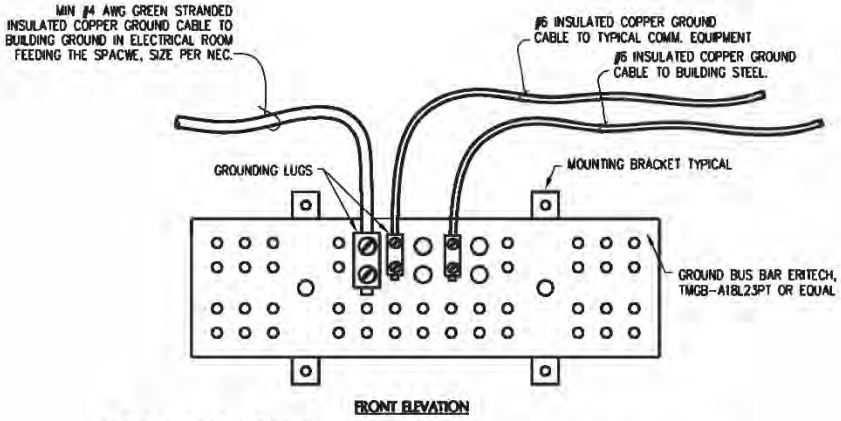
19B TSER/MDF OVERHEAD LAYOUT
NOT TO SCALE



19A TSER/MDF LAYOUT DETAILS
NOT TO SCALE NOTE: ROOM SIZE IS 12' X 10', 120 SQ FT

19 TSER / MDF LAYOUT
NO SCALE





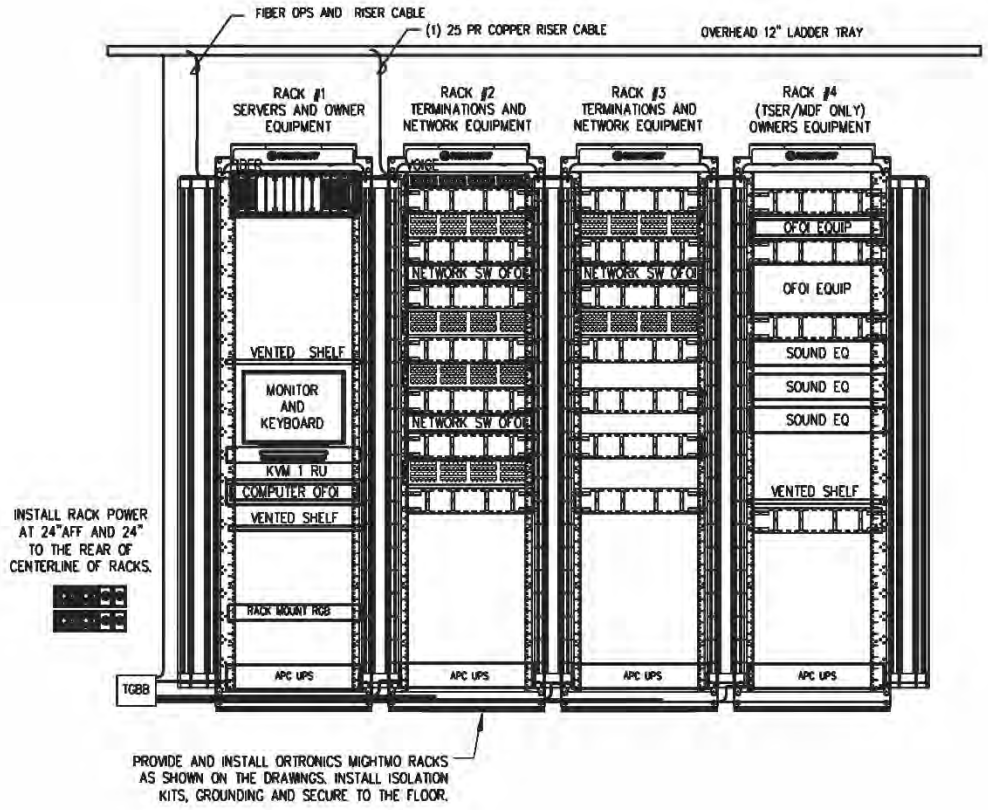
GROUNDING NOTES:

1. ALL GROUND CONNECTIONS SHALL BE MADE WITH HEAVY DUTY 2 HOLE COMPRESSION LUGS WITH STAINLESS STEEL HEX HEAD CAP SCREWS WITH SS LOCKING NUTS (TWO SCREWS AND NUTS PER 2 HOLE LUG).
2. PROVIDE GROUNDING BUSBARS IN ALL COMMUNICATION CLOSETS AND DATA CENTER. GROUND MAIN BUSBAR TO BUILDING MAIN ELECTRICAL SERVICE GROUND WITH INSULATED (GREEN) COPPER GROUNDING CONDUCTOR (SIZE PER NEC) AND #6 BETWEEN BUSBARS IN THAT PARTICULAR SPACE. RUN CONDUCTOR FROM BUSBAR LOCATION TO BUILDING SERVICE GROUND IN EMT CONDUIT. PROVIDE INSULATED GROUNDING BUSHING - MALLEABLE IRON, AT CONDUIT ENDS AND GROUND PER NEC. GROUNDING TO BUILDING STRUCTURE, CONDUITS OR UTILITY PIPING IN LIEU OF BONDING TO BUILDING MAIN ELECTRICAL SERVICE GROUND IS NOT ACCEPTABLE.
3. GROUND ALL COMMUNICATION RACK/CABINET WITH #6 AWG INSULATED (GREEN) COPPER GROUNDING CONDUCTOR TO MAIN GROUNDING BUSBAR. GROUND RACKS INDIVIDUALLY TO BUSBAR (DO NOT LOOP GROUNDS). ROUTE CONDUCTOR ALONG RACK REAR AND IN CABLE RUNWAY TO GROUNDING BUSBAR.
4. GROUND EACH CONDUIT AND CONDUIT SUPPORTS STRUTS IN ALL COMMUNICATIONS ROOMS WITH #6 AWG INSULATED (GREEN) COPPER GROUNDING CONDUCTOR TO GROUNDING BUSBAR. ROUTE CONDUCTOR IN CABLE RUNWAY TO GROUNDING BUSBAR. ALL CONDUITS SHALL HAVE A BARE EQUIPMENT GROUND WIRE, CONTINUOUS FROM ALL EQUIPMENT CONNECTIONS, AND BONDED AT ALL BOXES, RUN TO THE FEED PANEL, AND SUBSEQUENTLY TO THE BUILDING EQUIPMENT GROUND.
5. GROUND CABLE RUNWAY WITH #6 AWG INSULATED (GREEN) COPPER GROUNDING CONDUCTOR TO GROUNDING BUSBAR. ROUTE CONDUCTOR IN CABLE RUNWAY TO GROUNDING BUSBAR.

20 TGBB COMMUNICATIONS GROUNDING DETAIL

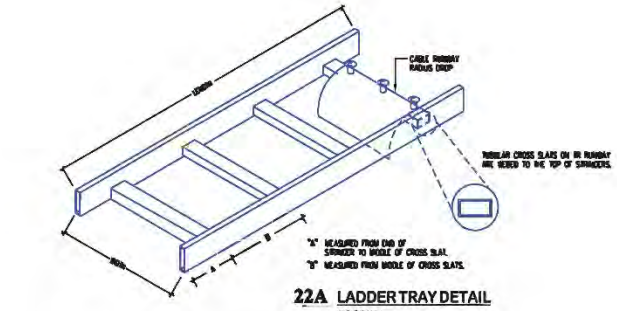
NO SCALE

Telecom 2-Post Rack Layout

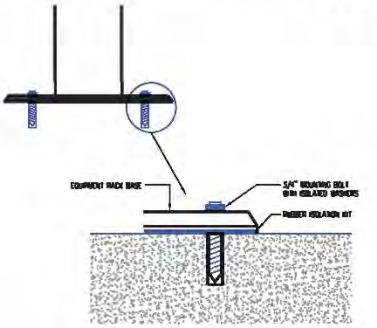


21 TELECOM 2-POST RACK LAYOUT
NO SCALE

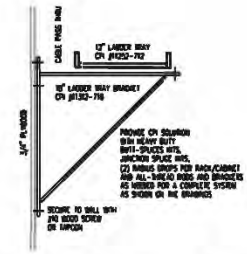
Rack Floor Mounting



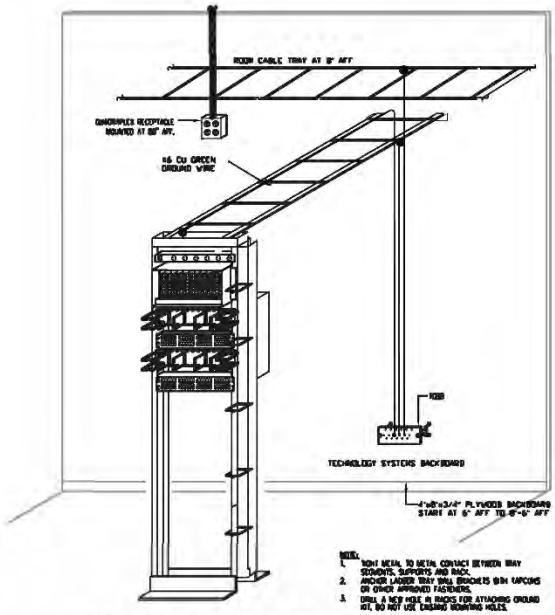
22A LADDER TRAY DETAIL
NO SCALE



22B RACK FLOOR MOUNTING DETAIL
NO SCALE



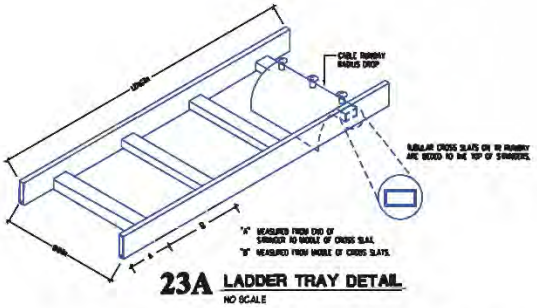
22C WALL BRACKET DETAIL
NO SCALE



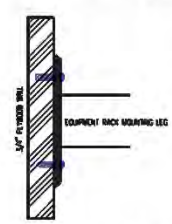
22A TYPICAL TECHNOLOGY 2-RAIL RACK
NO SCALE

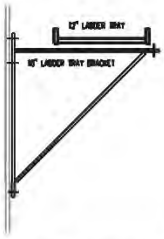
22 RACK FLOOR MOUNTING
NO SCALE

Ladder Rack / Rack Wall Mount Detail



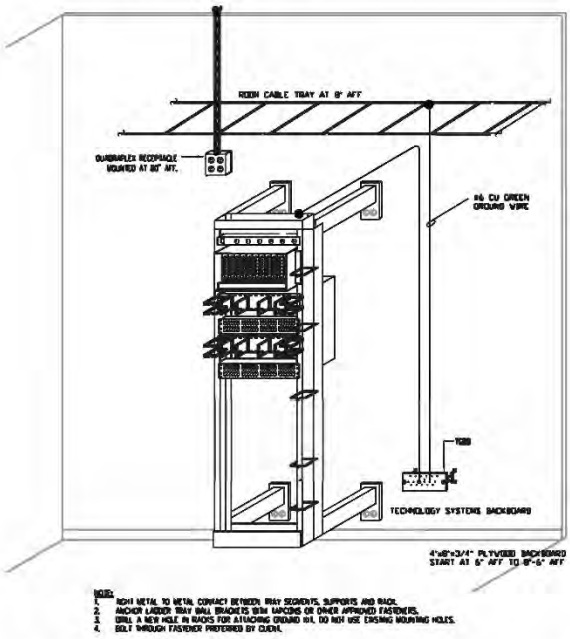
23A LADDER TRAY DETAIL
NO SCALE





23B RACK MOUNTING DETAIL
NO SCALE

23C WALL BRACKET DETAIL
NO SCALE



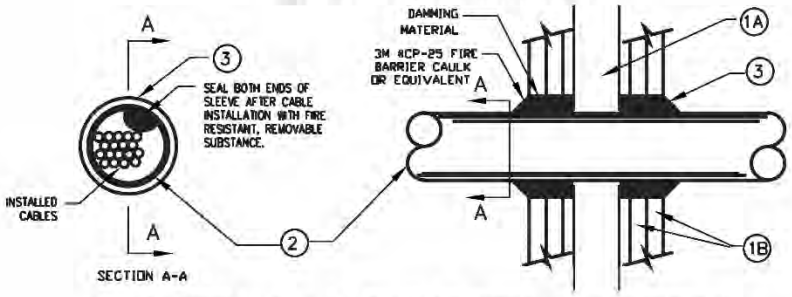
23 LADDER RACK / RACK WALL MOUNT DETAIL
NO SCALE

Firestop Sleeve Assembly

SYSTEM NO. WL1001

PROVIDE AT FIRE RATED WALL OR FLOOR PENETRATIONS

(FORMALLY SYSTEM NO. #7)
F RATINGS - 1, 2, 3 AND 4 HR (SEE ITEMS 2 AND 3)
T RATING - 1, 1, 2, 3AND 4 HR (SEE ITEM 3)



1. WALL ASSEMBLY - THE 1, 2, 3 OR 4 HR. FIRE-RATED GYPSUM WALLBOARD/STUD WALL ASSEMBLY SHALL BE CONSTRUCTED OF THE MATERIALS AND IN THE MANNER DESCRIBED IN THE INDIVIDUAL U300 OR U400 SERIES WALL OR PARTITION DESIGNS IN THE UL FIRE RESISTANCE DIRECTORY AND SHALL INCLUDE THE FOLLOWING CONSTRUCTION FEATURES:

   A. STUDS - WALL FRAMING MAY CONSIST OF EITHER WOOD STUDS (MAX 2 HR. FIRE RATED ASSEMBLIES) OR STEEL CHANNEL STUDS. WOOD STUDS TO CONSIST OF NOM 2 BY 4 IN. LUMBER SPACED 16 IN. OC WITH NOM 2 BY 4 IN. LUMBER END PLATES AND CROSS BRACES. STEEL STUDS TO BE MIN 3-5/8 IN. WIDE BY 1-3/8 IN. DEEP CHANNELS SPACED MAX 24 IN. OC.

   B. WALLBOARD, GYPSUM* - NOM 1/2 OR 5/8 IN. THICK, 4 FT. WIDE WITH SQUARE OR TAPERED EDGES. THE GYPSUM WALLBOARD TYPE, THICKNESS, NUMBER OF LAYERS, FASTENER TYPE AND SHEET ORIENTATION SHALL BE AS SPECIFIED IN THE INDIVIDUAL U300 OR U400 SERIES DESIGN IN THE UL FIRE RESISTANCE DIRECTORY. MAX DIAM OF OPENING IS 13-1/2 IN.

2. PIPE AND CONDUIT - NOM 12 IN. DIAM (OR SMALLER) SCHEDULE 10 (OR HEAVIER) STEEL PIPE, NOM 6 IN. DIAM (OR SMALLER) STEEL CONDUIT, NOM 4 IN. DIAM (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING OR TYPE L OR (OR HEAVIER) COPPER TUBING OR NOM 1 IN. DIAM (OR SMALLER) FLEXIBLE STEEL CONDUIT. WHEN COPPER PIPE OR FLEXIBLE STEEL CONDUIT IS USED, MAX F RATING OF FIRESTOP SYSTEM (ITEM 3) IS 2 H. STEEL PIPES OR CONDUITS LARGER THAN NOM 4 IN. DIAM MAY ONLY BE USED IN WALLS CONSTRUCTED USING STEEL CHANNEL STUDS. A MAX OF ONE PIPE OR CONDUIT IS PERMITTED IN THE FIRESTOP SYSTEM. PIPE OR CONDUIT TO BE INSTALLED NEAR CENTER OF STUD CAVITY WIDTH AND TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF WALL ASSEMBLY.

3. FILL, VOID OR CAVITY MATERIAL* - CAULK - CAULK FILL MATERIAL INSTALLED TO COMPLETELY FILL ANNULAR SPACE BETWEEN PIPE OR CONDUIT AND GYPSUM WALLBOARD AND WITH A MIN 1/4 IN. DIAM BEAD OF CAULK APPLIED TO PERIMETER OF PIPE OR CONDUIT AT ITS EGRESS FROM THE WALL. CAULK INSTALLED SYMMETRICALLY ON BOTH SIDES OF WALL ASSEMBLY. THE HOURLY F RATING OF THE FIRESTOP SYSTEM IS DEPENDENT UPON THE HOURLY FIRE RATING OF THE WALL ASSEMBLY IN WHICH IT IS INSTALLED, AS SHOWN IN THE FOLLOWING TABLE. THE HOURLY T RATING OF THE FIRESTOP SYSTEM IS DEPENDENT UPON THE TYPE OR SIZE OF THE PIPE OR CONDUIT AND THE HOURLY FIRE RATING OF THE WALL ASSEMBLY IN WHICH IT IS INSTALLED, AS TABULATED BELOW.

MAX PIPE OR CONDUIT DIAM, IN.	ANNULAR SPACE IN.	F RATING HR	T RATING HR
1	0 TO 3/16	1 OR 2	0+, 1 OR 2
1	1/4 TO 1/2	3 OR 4	3 OR 4
4	0 TO 1/4	1 OR 2	0
6	1/4 TO 1/2	3 OR 4	0
12	3/16 TO 3/8	1 OR 2	0

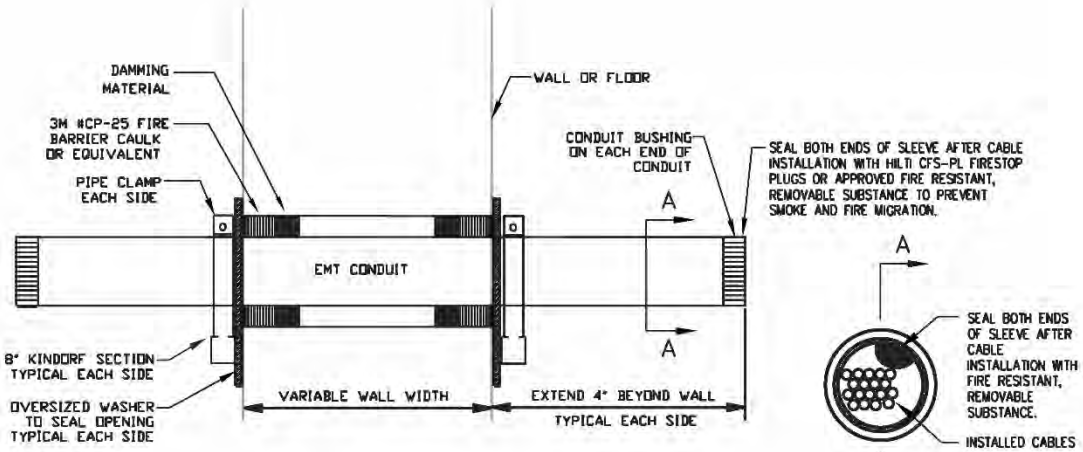
+ WHEN COPPER PIPE IS USED, T RATING IS 0 H.
MINNESOTA MINING & MFG CO. - TYPES CP-25 S/L, SP-25 N/S, CP-25 WB, CP-25 WB+

*BEARING THE UL CLASSIFICATION MARKING

24 FIRESTOP SLEEVE ASSEMBLY

NO SCALE

Firestop Sleeve Standard



NOTE: CONTRACTOR SHALL RESTORE THE INTEGRITY OF RATED WALLS PER SPECIFICATIONS PROVIDE AT SMOKE RATED WALL PENETRATIONS.

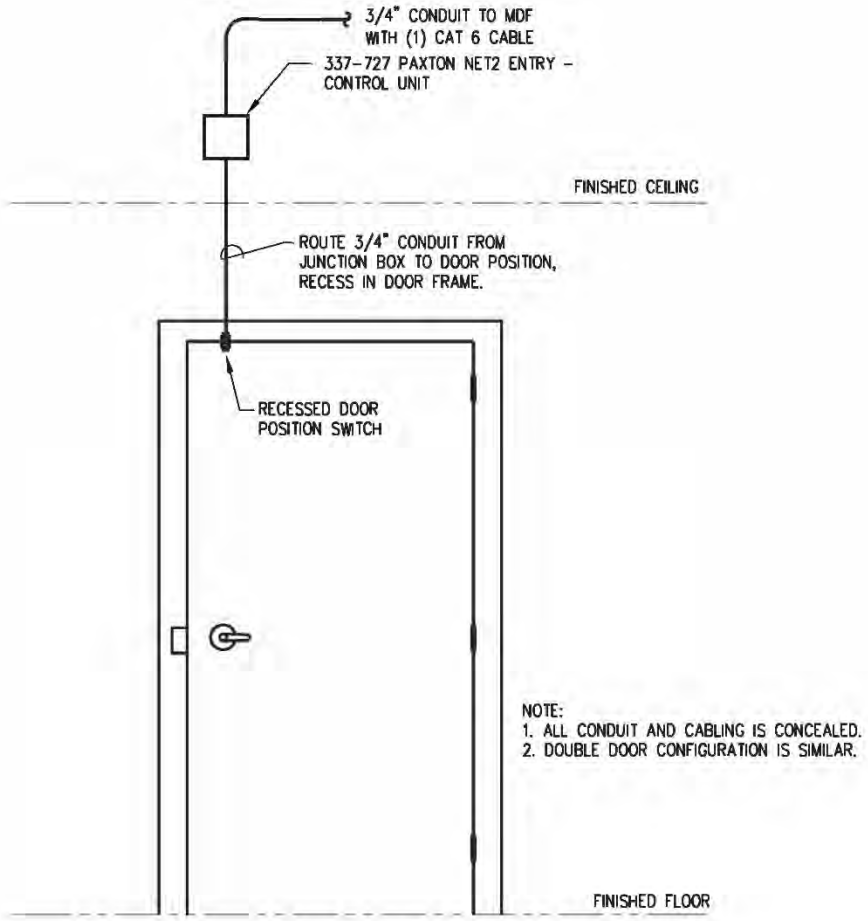
TABLE FOR CAT. 6A CABLES (OD.23")

# OF CABLES	SLEEVE SIZE
1-6	1"
5-7	1"1/4"
6-10	1 1/2"
9-15	1 3/4"
14-18	2"
17-28	2 1/2"
25-41	3"
40-70	4"

25 FIRESTOP SLEEVE STANDARD

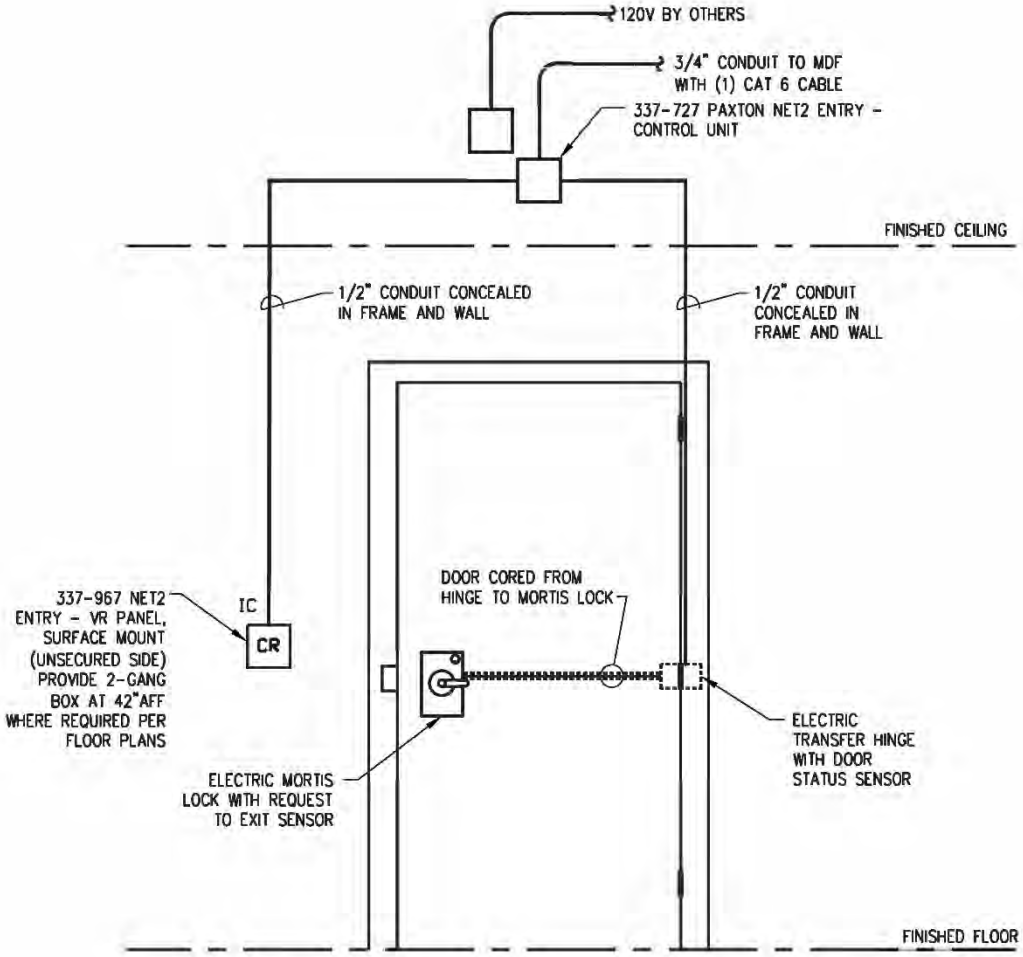
NO SCALE

Single Door with Contacts



26 SINGLE DOOR WITH DOOR CONTACTS
NO SCALE

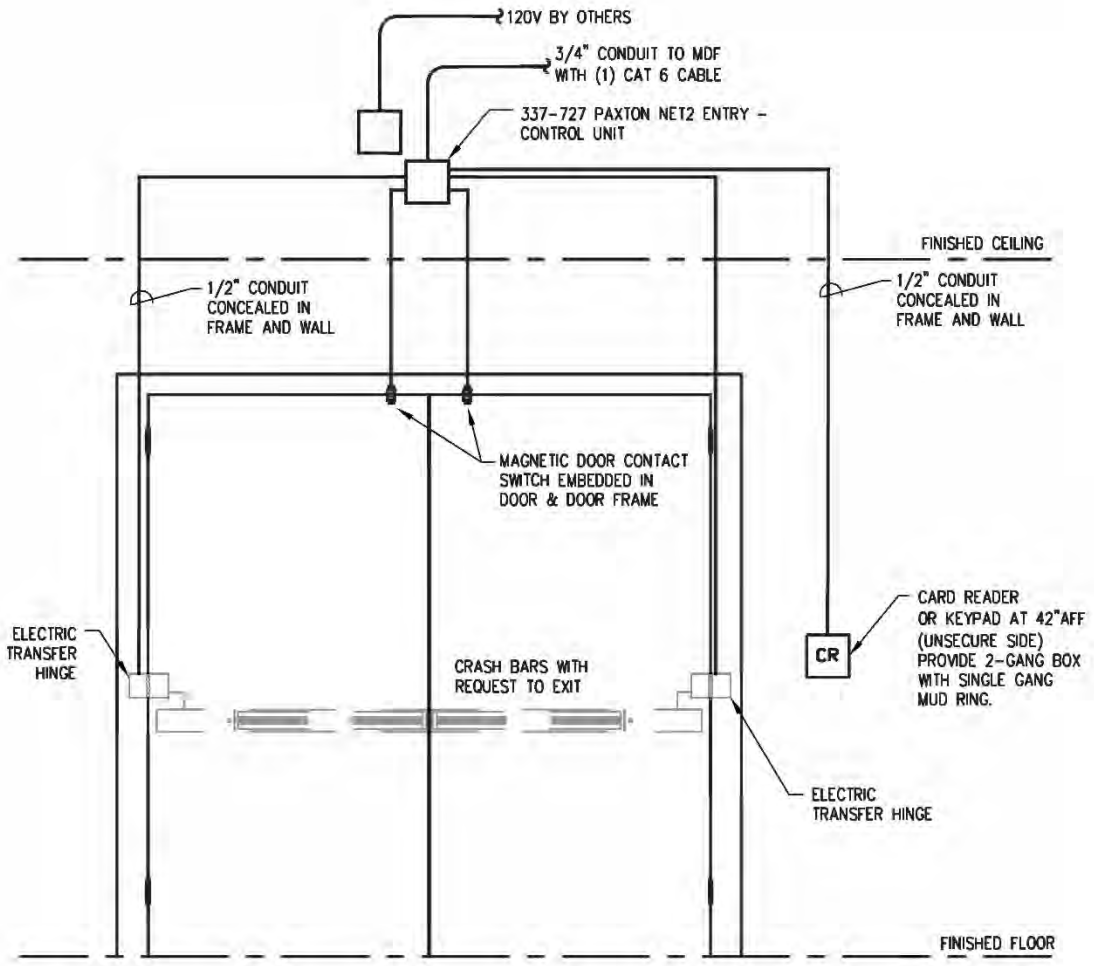
Single Door with Intercom Camera Card Reader/Keypad



27 SINGLE DOOR WITH INTERCOM CAMERA CARD READER/KEYPAD

NO SCALE

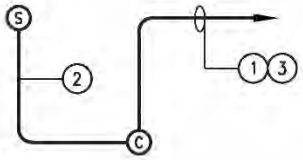
Double Door with Card Reader/Keypad



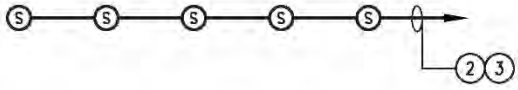
28 DOUBLE DOOR WITH CARD READER/KEYPAD
NO SCALE

Intercom Wiring Typical

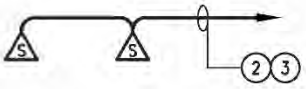
TYPICAL OPEN AREA



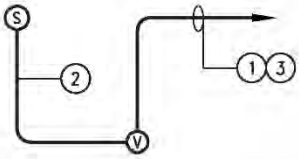
TYPICAL CORRIDOR



TYPICAL OUTDOOR SPEAKERS/HORNS



TYPICAL OFFICES + DORMS



INTERCOM NOTES:

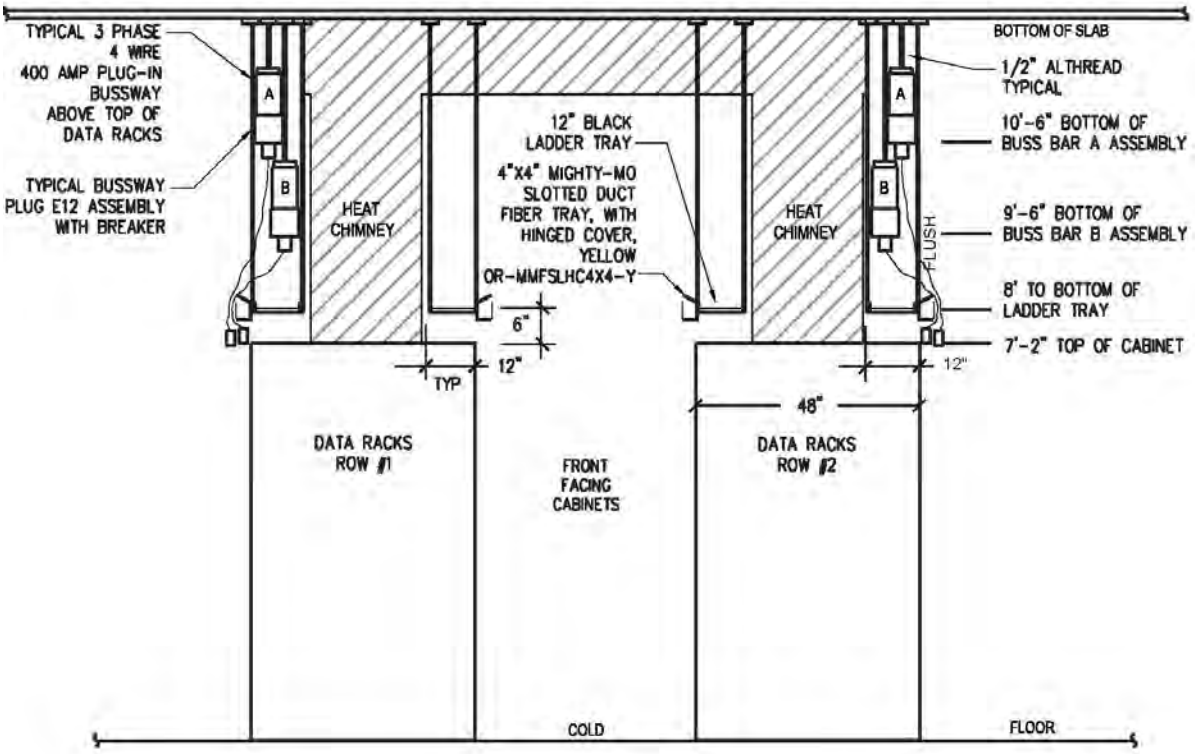
1. MAX. FIVE (5) SPEAKERS PER CIRCUIT (WITH OR WITHOUT VOLUME CONTROLS).
2. MAX. ONE (1) CALL-BUTTON PER CIRCUIT.
3. MAX. TWO (2) EXTERIOR HORNS/SPEAKERS PER CIRCUIT.

INTERCOM WIRING (X):

1. WEST PENN 355 CABLE - (4) 22 AWG STRANDED W/ 2 SHIELDED, 2 UNSHIELDED
2. WEST PENN 291 CABLE - (2) 22 AWG STRANDED W/ SHIELD
3. EACH OFFICE, AREA, SPACE, ROOM, OUTDOOR SPEAKER GROUP, OR CORRIDOR SPEAKER GROUP SHALL BE HOMERUN TO INTERCOM WALL-FIELD IN NEAREST IDF/MDF ROOM. DAISY-CHAINING OF INTERCOM FEEDERS WILL NOT BE ACCEPTED.

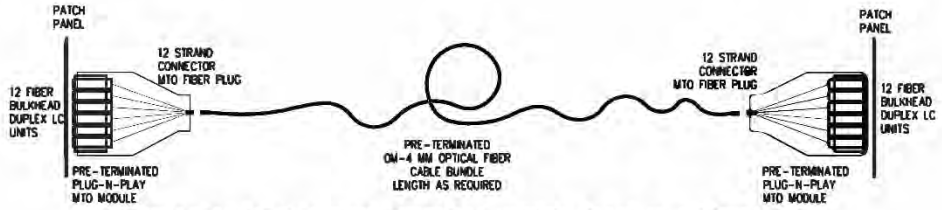
29 INTERCOM WIRING TYPICAL
NO SCALE

Data Center Cabinet Section

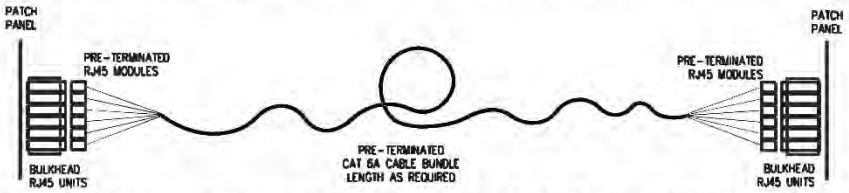


30 DATA CENTER CABINET SECTION
NO SCALE

Data Center Pre-Manufactured Cable Assembly



PRE-MANUFACTURED OPTICAL FIBER CABLE ASSEMBLY



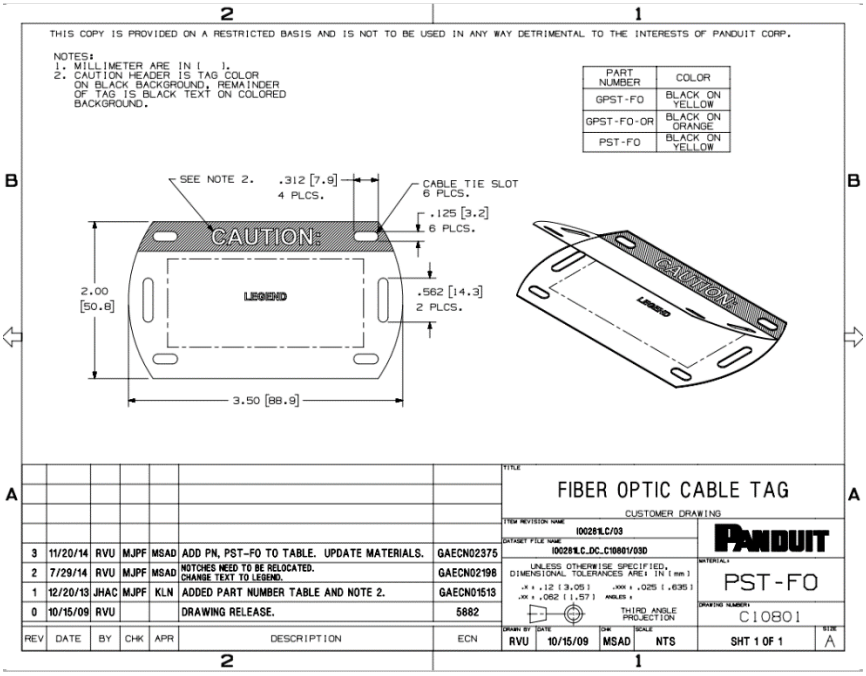
PRE-MANUFACTURED CATAGORY 6A CABLE ASSEMBLY

PINELLAS COUNTY PCJ DATA CENTER
Pre-Manufactured Cable Assembly Length Matrix
OCI ASSOCIATES

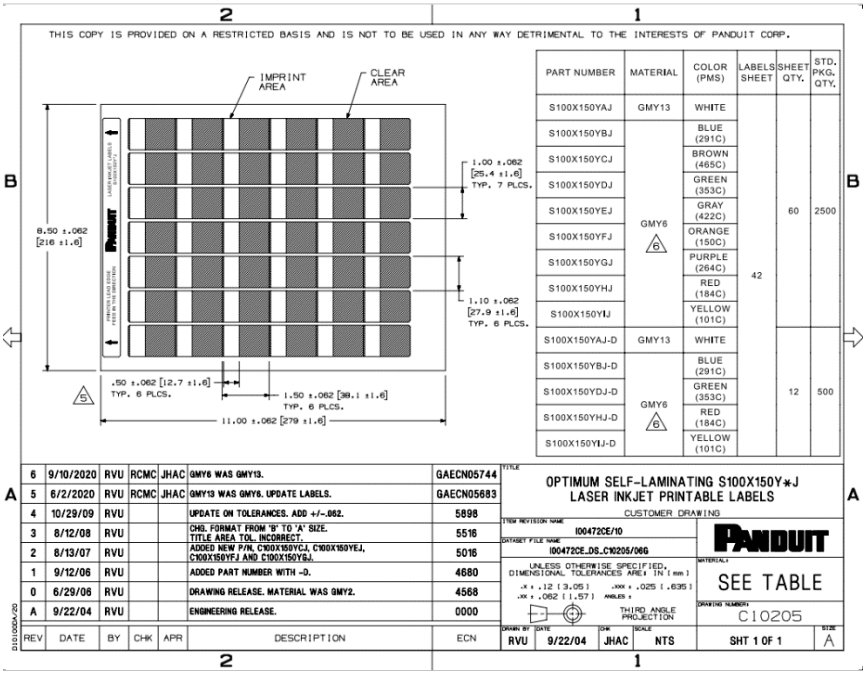
Description	Quantity	Length
12 STRAND MM-OS-4 OPTICAL FIBER ASSEMBLY	0	14'-0"
12 STRAND MM-OS-4 OPTICAL FIBER ASSEMBLY	0	17'-0"
12 STRAND MM-OS-4 OPTICAL FIBER ASSEMBLY	0	20'-0"
12 STRAND MM-OS-4 OPTICAL FIBER ASSEMBLY	0	23'-0"
12 STRAND MM-OS-4 OPTICAL FIBER ASSEMBLY	0	26'-0"
12 STRAND MM-OS-4 OPTICAL FIBER ASSEMBLY	0	30'-0"
12 STRAND MM-OS-4 OPTICAL FIBER ASSEMBLY	0	33'-0"
12 STRAND MM-OS-4 OPTICAL FIBER ASSEMBLY	0	36'-0"
12 STRAND MM-OS-4 OPTICAL FIBER ASSEMBLY	0	39'-0"
12 STRAND MM-OS-4 OPTICAL FIBER ASSEMBLY	0	42'-0"
24 RJ-45 CAT-6A UTP ASSEMBLY	0	17'-0"
24 RJ-45 CAT-6A UTP ASSEMBLY	0	20'-0"
24 RJ-45 CAT-6A UTP ASSEMBLY	0	23'-0"
24 RJ-45 CAT-6A UTP ASSEMBLY	0	26'-0"
24 RJ-45 CAT-6A UTP ASSEMBLY	0	26'-0"
24 RJ-45 CAT-6A UTP ASSEMBLY	0	33'-0"
24 RJ-45 CAT-6A UTP ASSEMBLY	0	36'-0"
24 RJ-45 CAT-6A UTP ASSEMBLY	0	39'-0"
24 RJ-45 CAT-6A UTP ASSEMBLY	0	42'-0"
24 RJ-45 CAT-6A UTP ASSEMBLY	0	45'-0"

31 DATA CENTER PRE-MANUFACTURED CABLE ASSEMBLY
NO SCALE

Labeling Diagrams



FIBER OPTIC CABLE TAG



INSIDE CABLE WRAP AROUND LABELS

SECTION 280500 – COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY

PART 1 - GENERAL

1.1 PURPOSE OF THIS DOCUMENT

A. The purpose of this specification section as well as other specifications under Division 28 is to indicate to Architects & Engineers (A&E) and designers of security systems in construction or renovation projects for Pinellas County Government what the design preference are by Pinellas County when it comes to such infrastructure. This document will be a starting point for completing a set of construction documents but it **SHALL NOT** be used unedited as a bid document

1.2 GENERAL CONDITIONS AND DEFINITIONS

A. Scope: This specification section applies to all Division 28 specification sections with the exception of Fire Alarm. All systems under the specifications indicated above are referenced also in this contract documents as “security systems”.

B. Drawings and specifications: The words “drawings” and “specifications” used on this section refer to all contract drawings and specifications describing the scope of work of the security system.

C. **Project owner**. When the word owner is used in these specifications, it means Board of County Commissioners Pinellas County or any other agency associated with Pinellas County such as Pinellas County Sheriff’s Office or Pinellas County Tax collector but not limited to these.

D. **BTS**. The acronym BTS referrers to Pinellas County Business Technology services. BTS is a group within the BoCC Pinellas County responsible for managing and supporting many of the telecommunications systems located in buildings owned and/or operated by BoCC Pinellas County.

E. Installer and Contractor: The word “installer” where used on the drawings or specifications without any further description shall reference the installer of the system under reference. The word “contractor” where used on the drawings or specifications without any further description shall reference to the General Contractor (or Construction Manager) holding the prime agreement with the owner for the construction of this project.

F. Provide and Install: The word, "provide" where used on the drawings or specifications shall mean, "furnish, install, mount, connect, test, complete, document and make ready for operation". The word "install" where used on the drawings or specifications shall mean, "mount, connect, test, complete, and make ready for operation".

G. The word **Enginee**r (also referenced as A&E) where used on the drawings or specification refers to the design engineer of record (EOR) of the project working for the project architect or the owner. It does not refer to an engineer working for the General contractor, Construction Manager or any of the installers in the project.

H. Active equipment: Active equipment is defined as equipment composed of electronic component and electric materials, design to work with power applied to it. Cables are not considered active equipment.

1.3 RESPONSIBILITY MATRIX

A. The set of construction documents for a project shall include a Responsibility Matrix regarding all security systems. This matrix shall be created by the Project Engineer and shall be developed with all project stakeholders. The matrix shall clearly indicate the design, procurement and construction responsibility of all components of the security systems.

1.4 ABBREVIATIONS

A. Abbreviations: The following abbreviations or initials may be used:

1. ABV CLG - Above Ceiling
2. AC - Alternating Current
3. ADA - American Disabilities Act
4. AFF - Above Finished Floor
5. AFG - Above Finished Grade
6. AMP - Ampere
7. ANSI - American National Standards Institute
8. AWG - American Wire Gauge
9. BC - Bare Copper
10. CCTV - Closed Circuit Television
11. COAX - Coaxial Cable
12. CPU - Central Processing Unit
13. DC - Direct Current
14. DEG - Degree
15. EMT – Electrical Metallic Tubing
16. GND - Ground
17. IDF - Intermediate Distribution Frame (Telecom Room)
18. IMC - Intermediate Metallic Conduit
19. IN - Inches
20. IP - Internet Protocol
21. JB - Junction Box
22. KVA - Kilo-Volt-Amps
23. KW - Kilowatts
24. LBS - Pounds
25. LED - Light Emitting Diode
26. MAX - Maximum
27. MDF - Main Distribution Frame (Main Telecom Room)
28. MIN - Minimum
29. MTD - Mounted
30. MTG - Mounting
31. NEC - National Electrical Code
32. NECA - National Electrical Contractors Association
33. NEMA - National Electrical Manufacturers Association
34. NFPA - National Fire Protection Association
35. NIC - Not in Contract
36. OFE - Owner furnished equipment
37. OSHA - Occupational Safety and Health Administration
38. PB - Pullbox
39. PWR - Power
40. PVC - Polyvinylchloride
41. EF - Telecommunications Entrance Facility
42. TR - Telecommunications Room
43. V - Volt
44. WP - Weatherproof

1.5 CODES AND STANDARDS

A. Application: The codes, standards and practices listed herein generally apply to the entire project and all security systems. Other codes, standards or practices that are more specific will be referenced within a particular specification.

B. Requirements: All articles, products, materials, fixtures, forms or types of construction covered in the specifications will be required to meet or exceed all applicable standards of manufacturer, testing, performance, capabilities, procedures and installation according to the requirements of ANSI, NEMA, IEEE, NEC, BICSI and TIA referenced documents where indicated and the manufacturer's recommended practices. Requirements indicated on the contract documents which exceed but are not contrary to governing codes shall be followed.

C. UL Labels: All materials shall be new and free of defects, and shall be U.L. listed, bear the U.L. label or be labeled or listed with an approved, nationally recognized Electrical Testing Agency. No equipment shall be installed if there is no labeling or listing service is available for such equipment.

1.6 MATERIALS ALTERNATES AND SUBSTITUTIONS

A. Definitions:
1. Basis of design: A product or group of products from an identified manufacturer that was used as the basis of systems layouts and installation details, part of the contract documents.
2. Prototype: Is a product or a group of products that are not yet ready for commercial use because they are in the testing phase (Beta testing) of the product development.
3. Alternates: Products or manufacturers listed in the contract documents as acceptable compare to the basis of design. Use of alternates shall follow the same system architecture as the basis of design.
4. Obsolete: A product that has been discontinued by the manufacturer or declared in end of life, and it is no longer being manufactured.
5. Substitution: A product not listed in the contract documents but capable of similar characteristics as the basis of design operating as a direct replacement in the system in reference. The installers can propose a substitution if all requirements are met as indicated in this specification.
6. Substitutions that create a change in system architecture are products that create a very different system configuration impacting other trades (i.e. change in power/cooling requirements, changes in raceways layout or sizes, changes in equipment space requirements, changes in low voltage wiring layouts, types and quantities, etc) but providing a similar end result as the system/products basis of design.

B. Use of Prototype. Prototypes are not allowed in any security system.

C. Use of alternates. Alternates are allowed and installer shall follow these requirements:
1. Where several brand names make or manufacturers are listed as acceptable alternates each shall be regarded as equally acceptable, based on the design selection. Where a manufacturer's model number is listed, this model shall set the standard of quality and performance required. Where no brand name is specified, the source and quality shall be subject to Engineer's review and acceptance. Where three or more manufacturers are listed, one of the listed manufacturers shall be submitted for acceptance.
2. The use of alternate products does not allow the change of system architecture with such products.

D. Use of substitutions. Substitutions are only allowed when they meet all the requirements below:
1. Substitutions are only allowed when a particular specification section for a security system, allows the use of substitutions for that particular system.
2. The performance of all substitutions components must meet or exceed those of the basis of design. Should an installer wish to submit a substitution product or a product set stated in the construction documents as 'acceptable', it shall be the responsibility of the installer to submit to the Engineer an item-for-item CROSS REFERENCE for all specifications of the product, all related specifications

and product data sheets, for the proposed substitution. Use the substitution request form indicated in Attachment 1 of this specification.

3. The Engineer, the Owner or BTS has the authority to reject a substitution without cause and the installer shall provide the basis of design and no additional compensation.
4. Substitutions of unnamed manufacturers will not be acceptable.
5. Certification of substitutions: When a basis of design is specified to be in accordance with a trade association or government standard requested by the Engineer, installer shall provide a certificate that the substitution complies with the referenced standard. Upon request of Engineer, Contractor shall submit supporting test data to substantiate compliance.
6. Substitutions that create a change in system architecture are not allowed.

1.7 SHOP DRAWINGS AND SUBMITTALS

A. General: Shop drawings shall be submitted for equipment and material as indicated in the individual specification sections for each system. .

B. All low voltage submittals shall be approved not only by the A&E but also by owner and/or BTS. Materials not approved by owner or BTS can be requested to be changed at no additional cost to the owner

C. Electronic submittals. Submittals in electronic format (PDF) are accepted.

D. When cut sheets of products are submitted and the manufacturer cut sheets indicate several model numbers or variations of the same product, the cut sheet shall be highlighted by the installer to indicate the specific product that will be provided for this project. Submittals received with cut sheets indicating multiple parts numbers and not highlighted will be rejected and not reviewed.

E. All electronic equipment prone to obsolescence and with lead times less than 3 months shall be submitted for approval no sooner than 12 month before the date set for substantial completion of the project. Electronic equipment prone to obsolescence includes devices like flat panel displays, transceivers, servers, players, workstation and routers

F. Equipment and materials installed not in accordance with the approved shop drawings shall be replaced at installer’s expense.

G. Multiple stages of shop drawings shall be required as indicated in each specification section. For final completion and testing the installer shall provide a submittal with the following information:

1. Detailed course syllabus for each type of training required in the specifications
2. A proposed schedule of training sessions in compliance with the specification sections and indicating place where the training will take place.
3. A copy of all training material to be used during each session.
4. Test result sheets for all testing done by the installer prior to the system acceptance test.

PART 2 - PRODUCTS

2.1 IDENTIFICATION AND LABELING TAGS

A. All conduit, cabinets, cables, wires, wiring forms, terminal blocks, and terminals shall be clearly identified with pre-printed labels or tags.

B. The only approved types of labels for inside premise environments for any security systems are:

1. Non-laminated thermal transfer labels, printed with a high quality thermal transfer printer.
2. Laminated thermal transfer labels printed with a high quality thermal transfer printer.

3. Thermal transfer polyolefin tape printed with a high quality thermal transfer printer.
4. Self laminated dot-matrix labels, printed with a high quality dot matrix printer.
5. Non-laminated dot-matrix labels, printed with a high quality dot matrix printer.

C. For labeling of cables or equipment in outdoor environments use only marker plates attached to cable or equipment with cable ties. Do not use any labels with adhesive materials. Use different color plates for different cable types. Use only waterproof ink for writing on marker plates.

D. Any type of write-on labels (except for outdoor marker plates), hand writing on cable jackets or directly on equipment, labels made with masking tape or any other type of tape not listed in previous paragraph are not acceptable and shall be corrected with approved labeling methods at no additional cost to the owner.

E. Approved manufacturer:
1. Rhino,
2. Brady,
3. Panduit or
4. approved equal

2.2 RACEWAYS AND SLEEVES FOR SECUIRITY SYSTEMS

A. For all security systems, all raceways shall be in compliant with specification section 270528 Raceways for Technology, as issued by Pinellas County BTS.

B. For all fire stop systems for raceways see also the same specification section issued by Pinellas County BTS.

2.3 STRUCTURED CABLING SYSTEMS.

A. For all network cabling for security system, all products, materials and installation guidelines shall be in compliance with specification section 271000 Structured Cabling System, as issued by Pinellas County BTS.

2.4 NETWORK EQUIPMENT.

A. For all network equipment to be used for security systems, please refer to specification section 272000 Data Communications Equipment as issued by Pinellas County BTS.

B. Isolated networks for security systems are not acceptable in Pinellas County facilities, unless specific written permission is provided by Pinellas County BTS, or Pinellas County Sheriff's Office.

2.5 SECURITY EQUIPMENT AND MATERIALS

A. General: Each item of equipment or material shall be manufactured by a company regularly engaged in the manufacturer of the type and size of equipment, shall be suitable for the environment in which it is to be installed, shall be approved for its purpose, environment, and application, and shall bear a label as indicated in paragraph 1.5.C. of this section.

B. Installation Requirements: Each item of equipment or material shall be installed in accordance with instructions and recommendations of the manufacturer and the contract documents.

C. Required Accessories: All equipment specified in the security systems shall be provided with all required accessories for proper operation and mounting. Typically these accessories are not specifically indicated in the design drawings but shall be provided per this specification section. Such accessories include items such as power supplies, power cords, rack ears, rack rails, bolts, lugs, faceplates, etc.

PART 3 - EXECUTION

3.1 INSTALLATION PRACTICES

A. WORKMANSHIP: The installation of materials and equipment shall be performed in a neat, workmanlike and timely manner by an adequate number of craftsmen knowledgeable of the requirements of the Contract Documents. They shall be skilled in the methods and craftsmanship needed to produce a quality level of workmanship. Personnel who install materials and equipment shall be qualified by training and experience to perform their assigned tasks.

B. STANDARD OF QUALITY: To define good workmanship, all installation practices described in BICSI standards shall be followed.

C. PROTECTION OF EQUIPMENT: Equipment for Security systems shall at all times during construction be adequately protected against mechanical/chemical damage by the elements or work perform by other trades. Equipment shall be stored in dry permanent shelters. If equipment or materials has been damaged, such equipment shall be replaced at no additional cost or time extension to the Contract. Damaged equipment and materials include the following conditions:

1. Equipment that has visible scratches, cracks or equipment that has paint or finished surface peeled off.
2. Equipment with visible indication of rust or water intrusion.
3. Equipment that has dents on the metal enclosures and are clearly visible to the end user.
4. Equipment that has been sprayed with paint, fire proofing materials, or other type of chemicals, when the equipment was not intended to have this type of materials applied to it, per contract documents.
5. Equipment that has been burnt by controlled fires, power surges, power sags or by lightning.
6. Equipment that has a known damage to any parts, electronic board or component, even if such component or board has no specific use in the project.
7. Cables that have visible damages to the jackets even if cables are not broken and still provide electrical continuity.
8. Cables sprayed with paints that affect the warranty of the cable as defined by the cable manufacturer.
9. Equipment with screws with stripped heads.

D. CLEAN EQUIPMENT: All equipment installed in spaces accessible to the building occupants like in racks, cabinets, wall mounted panels, credenzas, etc. shall be free of dust at the time the space part of the project gets the final Certificate of Occupancy and at the time of the acceptance test by the A&E. A clean equipment is defined as an equipment that if wiped with a finger, in any surface, does not leave visible debris and dust in the finger, also equipment with no visible signs of dust inside the equipment, like in ventilation fans.

E. IDENTIFICATION AND TAGGING: All security systems items shall be labeled and identified as specified in the Contract Documents. Such identification shall be in addition to the manufacturer's nameplates and shall serve to identify the item's function and the equipment or system which it serves or controls. Refer to Identification Section of the specifications for additional information. All labels of equipment and wiring shall match the labeling used in the shop drawings for the system.

3.2 COORDINATION

A. General: The installer shall compare shop drawings with those of other trades and report any conflicts between them to the A&E. Obtain from the A&E written instructions to make the necessary changes in any of the affected work. All work shall be installed in cooperation with other Trades installing interrelated work.

B. Adjustments: Locations of conduit and equipment shall be adjusted to accommodate the work with interferences anticipated and encountered. Determine the exact routing and location of all systems prior to fabrication or installation.

C. Replacement: All work shall be installed in a way to permit removal (without damage to other parts) of all other system components provided under this Contract requiring periodic replacement or maintenance. All conduits shall be arranged in a manner to clear the openings of swinging overhead access doors as well as ceiling tiles.

3.3 REQUEST OF IP ADDRESSES

A. General: When contract document require the installer of any of the security systems to use IP addresses for the configuration of such system, inside the owner's controlled IP network, the installer shall request the owner to provide such IP addresses. The installer shall request such information no less than one (1) month in advance from the moment the installer will be programming the system and by using the form named "Network Connections Programming Plan" indicated in Attachment 3 of this specification. An electronic copy of this form is available upon request from Pinellas County BTS.

B. Completing the form. The Network Connections Programming plan shall be completed in separate by each trade that requires IP addresses. This form has two parts. The first part indicates all the different device types for a system (i.e. cameras, workstation, servers, controllers, VoIP phones, etc). The second part is a list of all devices required classified by their type and properly indicating location where the device will be used.

C. Request that do not follow this process, or have incomplete information will be ignored and will not be processed.

D. Reprogramming cost of any security systems due to un-approved addresses used by the installer shall be at the installer's expense

3.4 SYSTEMS WARRANTY AND SERVICE

A. General: At a minimum all security system shall include a warranty from the manufacturer and installer of the system for no less than one (1) year with the following exceptions:
   1. Structured Cabling system shall have a warranty longer than one year as indicated in that specification section.
   2. When specific equipment or software manufacturers include a warranty longer than one year, the manufacturer's warranty shall be transferred to the owner in the same terms as indicated by the manufacturer.

B. Warranty coverage. The warranty for the security system shall cover the following elements:
   1. All equipment parts, cabling and materials.
   2. Any software updates/patches issued during the warranty period by the manufacturer.
   3. The labor to replace those parts and programming time to re-configure equipment.
   4. Shipping and freight charges to send equipment back and forth from the manufacturer and/or site.
   5. Tool rentals such as scaffold or lifts to access equipment.
   6. The troubleshooting time to detect the faults in the system.

7. All travel time and expenses associated with the service.

C. Start of warranty. The warranty period for the security systems starts the day the project gets the Certificate of Occupancy (CO), for new construction projects. For retrofit jobs of a particular system, the warranty starts when the project is accepted by A&E. For most equipment/software manufacturer's the warranty period starts when the equipment is shipped from the factory, so it is the responsibility of the installer of each system to provide additional warranty coverage from the manufacturer to cover the additional time of warranty up to the CO date plus one year.

D. Service calls. During the warranty period the installer shall support the system when called by owner/contractor for service. All equipment/software service shall be done by personnel with the same qualifications as the personnel who installed the system and as indicated in each security system specification section. Service calls shall be taken during business hours (same time zone as the project) for normal service and twenty (24) hours three hundred and sixty five (365) days in the year for emergency service. Emergency Service shall be defined as the loss or failure of any critical component necessary to maintain the overall integrity and operation of the system. Normal service shall be defined as the loss or failure of a system component that does not compromise the complete operation of the system and allows the owner to operate the system at a minimum of 90% of its capacity. See individual specification sections for delineation on critical components and normal service.

E. Response time for service. The maximum allowed response time after a service call for emergency service shall be four (4) hours and for normal service twenty four (24) hours.

F. Equipment registration. All equipment/software part of the security system shall be registered to the owner with the manufacturer of the equipment/software for warranty and support. Equipment/software registered with the manufacturer to the name of the Contractor or installer shall be removed from the project and replaced with equal equipment registered to the owner at no additional cost to the owner.

G. Periodic preventive maintenance visits. During the warranty period the installer of the system shall provide no less than one (1) preventive maintenance services. These services shall be provided at 6 months from start of the warranty period and a few weeks before the end of the warranty period. The installer of the system shall coordinate with the owner the precise dates for this type of service. During these visits the following task shall be perform:
   1. Clean up of any active equipment that shows visible accumulation of dirt, dust of debris of any kind.
   2. Replacement of any consumable parts in the system that require replacement per manufacturer's instructions during the warranty period, such as filters.
   3. Oiling/greasing of any mechanical parts that require period maintenance as per manufacturer's instructions during the warranty period.
   4. Run manufacturer's recommended test for each piece of equipment installed. The installer shall provide at the end of the service a report of such test.
   5. Visual observation of all devices in the system to spot any anomalies.
   6. Review of error logs from any system components and analysis of such logs with explanation to owner on the cause of those errors.

H. Extended service agreement. Prior to final acceptance testing, and within thirty 30-days of project completion, the installer of each security system shall submit to the Owner an option to purchase extended service coverage. This proposal shall provide for the purchase option of 1, 3, or 5, year coverage. Coverage shall include, at a minimum, the same provisions as during the warranty period.

3.5 FINAL ACCEPTANCE TEST

A. The security systems shall be tested during installation by the installer as frequently as required to solve any installation issues and non compliance of system specifications. Security systems will not be considered delivered to the owner until final acceptance test is passed. The final acceptance test shall be

done in presence of the A&E and/or the owner. The installer shall request in writing with 2 weeks in advance the presence of the A&E and/or owner for the final acceptance test.

B. In order for the installer of the system to request final acceptance the following task shall be completed:
   1. All components shall be inspected to ensure they have been properly installed by the installer, securely attached, and remain clean and unmarred
   2. All equipment shall be properly adjusted, clearly labeled, and fully operational.
   3. The installer shall have tested the system previously to ensure the final acceptance test will be successful. Detailed proof of test shall be sent to the A&E with the request for final acceptance
   4. All permanent and final labels as requested in the identification and tagging section of this specification are completed.
   5. No temporary conditions shall be present in the system.
   6. All batteries on all system components shall be connected.
   7. All system programming shall be completed as indicated in the specification for each security system.

C. All test equipment required for the Final acceptance shall be provided by the installer of the system unless specifically indicated by the A&E.

D. The A&E shall define the scope of the testing but the installer shall be prepared for testing every single component of the system. During the day of the test the A&E will indicate the testing process and procedures for each system. Test could include operation of the system during power outages. The installer of the system shall be available during the complete testing process to answer questions from the Engineer and to demonstrate specific parts of the system. If personnel form the installer or test equipment is not available, the test will be considered and marked as a failure.

E. A punch list of the items to be corrected will be prepared by the A&E during the final acceptance test. The installer shall correct all items and request a second day for verification of all punch-list items by the A&E and Owner. During the second test, no additional punch list items shall be expected, and only the items in the punch list will be tested.

F. If during the testing process the A&E and/or Owner consider that the rate of failure of the test is too high (more than 5 failures or non-compliance with specifications in one hour of test), the test will be cancelled unilaterally by the A&E and/or owner. The installer shall correct all items and re-schedule the final acceptance test again. The new test will start over from the beginning and nothing previously tested will be accepted. The installer shall not be entitled to additional compensation for the additional effort to test the system during this condition.

G. Upon successful completion of the final acceptance test the installer of the system will receive a written notice by the A&E and/or Owner acknowledging the acceptance of the test

H. See individual specification sections for system specific requirements for testing.

3.6 TRAINING AND INSTRUCTION

A. Training for each security system shall be provided as indicated in this specification and in the individual specification section for each system.

B. The following training guidelines shall be followed for all security system
   1. Training shall not be scheduled in a way that no attendee or presenter shall be required to attend more than 6 hours of training per day.
   2. Prior to starting all training, the training submittal shall be approved. See section one of this specification for details on the training submittal
   3. No training shall be scheduled prior to the system being completed and accepted by the A&E.
   4. Training shall be conducted during the business hours of the client (not necessarily from 8:00 AM to 5:00 PM), at a date and time of mutual convenience to the Owner and installer. All training

sessions need to be scheduled by the installer at least 2 weeks in advance. The Owner shall be notified in writing by the installer on when are the possible dates for each session.

5. All different types of training shall be digitally recorded and delivered to the owner as part of the close out information in digital copy. All tapes shall be recorded in hi-quality HD recorders, and the media turned to the owner shall be in electronic format viewable through Current digital Media Player available on Windows based operating systems.
6. The installer is responsible for completing list of attendants for each session of training. All these sheets shall be submitted as part of the close out information

3.7 AS BUILT DOCUMENTS

A. Production: During the course of this project the contractor shall maintain record "as-built drawings". One set shall be maintained at the site and at all times and it shall be accurate, clear, and complete, showing the actual location of all equipment as installed. The "As-Built" drawings shall show all security systems work installed complete to the present stage of progress. These drawings shall be available for review by the A&E's field representatives at all times.

B. Completion: At the completion of the Work, transfer onto the second set of drawings all changes marked in colored and submit to the A&E.

C. Final: Upon installer's completion of the Engineer's final punch list, transfer all "As-Built" conditions and all requirements by the Engineer to a reproducible set of drawings. Submit full size drawings and one (1) set of CAD/Autodesk Revit© disks for review and acceptance.

D. Additional documents. At project completion, the installer of the security system shall provide, as part of the as-built documents, updated tables, equipment schedules, configuration worksheets and labeling system used. See individual system specification section for more details on these documents.

E. See individual specification sections for each system for additional requirements for As-Built documents.

3.8 CLOSE OUT DOCUMENTS

A. Closeout information shall be provided to the owner in electronic format at the end of the project. The file shall be organized by each system and shall follow this organization:

1. PART 1 – OPERATION AND MAINTENANCE MANUALS. Operation and Maintenance manuals as issued by the manufacturer of each system's component. Such manuals shall include all maintenance procedures required to be done by the owner. Also, when required by each individual specification section, a short form operation guide, prepared by installer) for the system.
2. PART 2 – INVENTORY OF EQUIPMENT INSTALLED. A detailed list of all relevant active equipment (equipment with electronic components with a market value over $200) installed in the project including the following information and presented in electronic format (Microsoft Excel):
    a. Make
    b. Model
    c. Serial number
    d. Room location
    e. Warranty period, including manufacturer's extended warranties.
3. PART 3 – PROOF OWNERSHIP, DELIVERY AND ACCEPTANCE. The following letters/documents shall be attached in this part:
    a. Acceptance letter signed by A&E for each of the security systems installed.
    b. Proof of training by submitting sign in sheets for each training session done
    c. Signed transmittal for all training videos and training material.
    d. Signed transmittal for all spare parts and consumables delivered to the owner.

e. A list of all the user names and passwords for all the different software programs used by the security systems and any equipment with password codes. All levels of passwords shall be provided, from the lowest hierarchy to the highest.
f. At least four (4) copies of all physical keys to different devices part of the security systems. Each key shall be individually tagged in a key ring. All keys shall be included and organized inside a key ring management enclosure.
g. A list of all software modules and licenses delivered to the owner. The list shall include part numbers, serial numbers, license certificate of authenticity, hardware key (dongles) numbers and software version. This list shall have a clear signature, name and date on person that received this software by the Owner.
h. A copy of all official equipment and software registrations with manufacturer.

4. PART 4 – AS BUILT DOCUMENTS. All as-built documents as indicated in this specification section

END OF SECTION 280500

ATTACHMENT 1 – SUBSTITUTION REQUEST FORM

Substitution Request Form Request No.: Date:

Project:	Specified Manufacturer:	Proposed Manufacturer:
Spec Section:	Specified Model No.:	Proposed Model No.:
Item(s):	Reason(s) for not providing specified item:	

*Please attach product description, drawings, photographs, performance and test data, samples, and other information necessary for side-by-side evaluation. Fill in all blanks.

Provide substantiated reason for requested substitution below.
Does the requested substitution affect dimensions, locations, or configurations? (Yes/No) Please explain below (attach drawings if necessary).
What are the differences between the specified item and the requested item? Please list below.
Will the Contractor pay for any changes to the building design, including engineering and detailing costs caused by the approval? (Yes/No) If no, explain below. Describe modifications required to install or accommodate the requested change.
Will approval affect the work of other trades, including the Construction schedule? (Yes/No) If yes, please explain below.

Manufacturer's guarantees of the proposed and specified items are: (Same/Different) **If different, please explain below.**
Does the proposed item meet all applicable codes, ordinances, and regulations for this specific application? (Yes/No) **If no, please explain below.**
Has the proposed item been used locally in similar applications? (Yes/No) **If yes, please explain below and give nearest location.**
Will maintenance and service parts be locally available for the requested item? (Yes/No) **Please explain below. If not locally available, give nearest location.**
Will the requested item require waiving of any qualifications or other requirements? (Yes/No) **If yes, please explain below.**
Are there any license fees or royalties associated with the requested substitution? (Yes/No) **If yes, please explain below.**

If approved, will the Owner receive a credit for the proposed alternate material? (Yes/No) **If no, please explain below.**
Does the proposed alternate material meet the same applicable standards (ASTM, ANSI, UL, FS) as the specified item? (Yes/No) **If no, please explain below (attach drawings if necessary).**
Identify the recycled materials or components or features that lead to the claims to being "Green":
Has the required line-by-line comparison been included? (Yes/No) **If no, please explain below.**

The following Purchase Order or billing number is to be used for billing the Contractor for costs incurred in evaluating and if applicable accommodating the requested substitution:

The undersigned agrees to pay for the Designer's review time and for changes to the building design, including review, re-design, engineering, drawings, and other costs caused by the requested substitution.

Signature

Name (please print)

The Engineer will not be required to approve any product that is not equal or suitable for the specific application and functionality of this project.

SECTION 281000 ELECTRONIC SECURITY SYSTEMS

PART 1 - GENERAL

1.1 PURPOSE OF THIS DOCUMENT

A. The purpose of this specification section as well as other specifications under Division 28 is to indicate to Architects & Engineers (A&E) and designers of access control systems in construction or renovation projects for Pinellas County Government what the design preference are by Pinellas County when it comes to such infrastructure. This document will be a starting point for completing a set of construction documents, but it **SHALL NOT** be used unedited as a bid document

1.2 SCOPE OF WORK

A. The scope of work shall include furnishing all labor, materials, enclosures, wiring, equipment, programming, training, testing, documentation, and warranty support, required to provide a completely operational and working Security System.

B. The Security System Installer (SSI) shall coordinate with the door frame installer, the door installer, the door hardware installer, the owner and gate installers on the placement of all electronic locking hardware and door controls for this project. The SSI shall provide the low voltage power supplies for all electric locks, wire and cable, terminate all connections, and shall interface this equipment with the integrated security system. Specific installation responsibilities will be coordinated between Owner and installer on a per project basis.

C. All materials for the structured cabling system (4-pair UTP cables, fiber optic cables and 24-AWG multi-pair (25 pairs or higher) components required for the security system shall be in compliance with specification Section 271000, as issued by Pinellas County BTS.

D. This specification section applies to Access Control System in particular. Intrusion detection systems are covered under specification section 281010 and for CCTV systems refer to specification section 282000.

E. The following parts of a security system are not included in this specification:
1. All networking equipment (switches, routers, etc) for the operation of the system
2. All computers and software to run the security system.
3. All door hardware, door, frames, automatic doors, roll up doors, etc.

1.3 RELATED DOCUMENTS

A. Supplemental: Refer to the specification sections identified below for additional requirements, which are supplemented by this section.
1. 280500 COMMON WORK RESULTS FOR SAFETY AND SECURITY SYSTEMS.
2. 281010 INTRUSION DETECTION SYSTEM
3. 282000 CLOSED CIRCUIT TELEVISION-VIDEO SURVEILLANCE SYSTEM

1.4 EXISTING SYSTEMS.

A. Pinellas County Facilities has multiple card access systems as follows:

1. For all facilities managed by Pinellas County Sheriff's Office, the access control system is a Honeywell WinPak software using HID Proximiy card and different access control panels.
2. For all facilities managed by Pinellas County Real state Management (REM), the access control system is a Honeywell WinPak software using HID Proximity card and different access control panels.
3. For all facilities managed by Pinellas County Utilities, the access control system is the Lenel On Guard, with HID proximity readers and the Mercury boards in different configurations.

B. NOTE TO DESIGNERS OR CONSULTANTS. The designer or consultant for each project shall communicate with the owner's Project Manager to establish what party in particular will be managing the building to determine what system needs to be specified, based on the existing systems above. No different systems than the ones mentioned above shall be installed in a new or renovated facility at Pinellas County Facilities. Pinellas County can provide details about the latest version of the software used by each party.

1.5 SECURITY SYSTEM INSTALLER QUALIFICATIONS

A. The SSI selected for this project must be a direct manufacturer authorized representative of the product they propose to provide. All technicians assigned to install and configure this system shall be factory trained and certified for the proper installation of this equipment. The SSI must have a minimum of 5 qualified and factory trained technicians to support this system. This company must be of established reputation and experience, regularly engaged in the supply and support of such systems for a period of at least five consecutive years.

B. Other required SSI qualifications are:
1. The SSI shall agree, in writing, as part of their proposal, to provide both warranty and non-warranty service within 4 hours of notification of a problem. The SSI shall be able to perform any and all repairs to the system within 24 hours.
2. The SSI, as a minimum, must carry a current state issued limited energy license.

1.6 MATERIALS ALTERNATES AND SUBSTITUTIONS

A. General: See details for alternates and substitution in specification section 280500.

B. Due to compatibility issues with other buildings under the control of the owner, the only approved system are the existing systems indicated in paragraph 1.3. No substitutions are accepted for this type of equipment.

C. Sensors or door security devices with the exception of card readers shall allow for substitutions.

1.7 SHOP DRAWINGS AND SUBMITTALS

A. The SSI shall follow all requirements for shop drawings indicated in specification section 280500.

B. The submittal process for this scope of work will be a two stage process. The first stage is the product/installer approval. Within 30 business days of receiving contract approval and notice to proceed, the following items shall be submitted to the A&E for review and approval, as part of the product/installer approval process.
1. Proof of Installer qualifications, addressing all requirements of paragraph 1.5 of this specification.
2. Product numbers, specifications, and data sheets for all equipment.
3. Data sheets and samples of all labeling materials and equipment to be used in the project.

4. A complete explanation of the identification method to be used for all equipment and cabling part of the security system.
5. Data sheets of all termination blocks and mounting accessories to be used in the project. A paragraph shall be added before each data sheet indicating the intended use of each type of termination block.
6. Detailed drawings of all custom products to be used in the project.
7. Data sheets for all wire and cable to be used as part of this system. A paragraph shall be added before each data sheet indicating the intended use (to connect what type of devices) of each cable.

C. The second stage of the submittal process is the shop drawing process. Shop drawings shall only be submitted after all portions of the product/installer approval have been accepted by the A&E. The following information is required as part of the shop drawings:
1. Floor plans indication all devices to be provided and all cable runs to all devices or junction boxes. Access controlled doors shall have the door name. All other devices shall have a unique identifier, as they will be programmed in the system.
2. Point to point wiring diagrams indicating all termination points for each conductor and for each device, cable types and color coding of each termination. These diagrams shall be submitted for each door type and for each type of device in the system.
3. Panel schedules in a table format, indicating all ports being used and what device is connected to each port. Panel schedules shall be submitted for all access control panels, alarm panels, fiber optics distribution frames, Ethernet switches, patch panels, termination blocks, etc.
4. Completely fill out network configuration template provided by Pinellas County BTS upon request, to explain all network devices to be used in a project and to get IP addresses from the network administrator.
5. Overall system diagrams indicating all head end components, their room location, and all configuration characteristics like IP addresses, serial ports used, etc.
6. Termination details for multi-conductor connectors and other details not included in item 2 of the shop drawings.
7. Outline of the testing process.
8. Training syllabus for all systems included in this scope.

1.8 ABBREVIATIONS

A. Additional abbreviations used in this document:
1. ADA - Americans with Disabilities Act
2. API - Application Programming Interface
3. ASCII - American Standard Code for Information Interchange
4. BPS - Bits Per Second
5. DIN - German Institute of Standardization
6. DPS - Door Position Switch
7. FCC - Federal Communications Commission
8. GUI - Graphical User Interface
9. ID - Identification
10. I/O - Input /Output
11. ISC: Intelligent System Controller
12. ODBC - Open Database Connectivity
13. OSDP – Open Supervised Device Protocol
14. O&M - Operations and Maintenance
15. PIN - Personal Identification Number
16. PTZ - Pan/Tilt/Zoom
17. RAID - Redundant Array of Independent Disks
18. REX - Request to Exit
19. RoHS - Restriction of Hazardous Substances Directive
20. SCS - Security Control System
21. SDRAM - Synchronized Dynamic Random Access Memory

22. STP - Shielded Twisted Pair
23. UL - Underwriters Laboratories, Inc.
24. UPS - Uninterrupted Power Supply
25. USB - Universal Serial Bus
26. UTP - Unshielded Twisted Pair
27. VOC - Volatile Organic Compounds

1.9 GLOSSARY OF TERMS

A. The following terms are defined for the purposes of this specification:
1. Access Group: A logical group of card readers (terminals) which may be connected to one or more sub-controllers and which represent a collection of readers for which a particular cardholder may have access privileges.
2. Access Mode: The mode of operation in which the security control system shall only annunciate tamper and trouble conditions at a monitored point. Alarm conditions shall not be annunciated in this mode. Also referred to as alarm shunting.
3. Acknowledge: The action taken by a security control system operator to indicate that he/she is aware of a specific alarm or tamper state.
4. Action Messages: A set of instructions automatically provided to the operator when an alarm condition is generated.
5. Advisory: A message provided by the security control system to the operator to inform him/her of a condition as reported by the security control system.
6. Alarm Condition: A change of state, as sensed by the security control system, indicating that the security control system has detected a condition which its sensors were designed to detect.
7. API Integration: a method to transfer information between two systems by means of APIs, though an Ethernet communication network.
8. Cardholder: A person who has been issued a valid access card.
9. Card Reader: A device usually located at access points, designed to decode the information contained on or within a card key credential for the purposes of making an access decision or for identity verification.
10. Clear: The action taken by a security control system operator to respond to an alarm condition or advisory so that other alarms may be serviced or so that other actions may be taken.
11. Download: To send computer data from the File Server to a controller for the purposes of making access decision without the intervention of the File Server.
12. Facility Code: A coded number, in addition to the individual card number, stored within each card key that uniquely identifies the facility at which the card is valid. This feature prevents cards from one facility from being used at another facility that has a similar access control system.
13. File Server: Primary host computer in the networked security system which maintains the access control system database.
14. Line Supervision: The monitoring of an electrical circuit via electrical and software systems to verify the electrical integrity of the supervised circuit.
15. Off-line: A condition in which a controller(s) is not in communication with the File Server. In the off-line mode, the controller continues to make access decisions and process alarms according to the information stored at its local database.
16. Password: A combination of numbers or letters unique to security control system operator which defines commands and data fields he/she may view, edit, or command.
17. Relay integration: A method to transfer signals between two systems by means of using potential free contact closures to input points.
18. Reset: A command or feedback signal that indicates that a monitored point has returned to its normal state after having transferred to the alarm or trouble state.
19. Secure Mode: The normal state of an alarm input point from which it will be monitored for change of state to either an alarm or trouble condition.
20. Secured Area: A physical location within the facility to which access is controlled by one or more card readers.

21. Secured side: Side of a security door where a higher security level needs to be granted for a user to be authorized to be in that side of the door.
22. Serial line integration: A method to transfer information between two systems by means of an RS-232/RS-422 or RS-485 line, using ASCII strings.
23. Tamper: A condition within the circuitry of a monitored point which indicates the electrical integrity of that sensing circuit has been compromised.
24. Tamper proof screws: A screw with a security hexalobular internal driving feature as described in ISO 10664. As an example, a security TORX head, as developed by Camcar LLC.
25. Time Interval: A time stamp of one start time and one stop time within a time period.
26. Time Period: A user programmable period of time made up of days of the week and hours in the day.
27. Trouble: A condition within the circuitry of a monitored point which indicates that an equipment malfunction, single break, single fault or a wire-to-wire short exists.
28. Unsecured side: Side of a security door where a lower security level needs to be granted for a user to be authorized to be in that side of the door.
29. User Definable: An attribute of a security control system function that may be easily tailored by the System Administrator.
30. Workstation: A personal computer connected to the main security control system File Server via a local area network connection for the purpose of programming the system and responding to alarms.

1.10 SYSTEM DESCRIPTION

A. The security systems primary purposes shall be to provide access control and alarm monitoring capabilities for this project. The system shall provide functionality such as the ability to regulate and control access through specific areas of the facility and integrate with other security components such as closed circuit television, alarm system, intercom and digital video recording.

B. The system must utilize a single seamlessly integrated relational database for all functionality. The operating environment shall be the fully multi-tasking multi-threading operating System.

C. In many instances the owner has facilities where the security system is critical. In such cases operation of the system shall be a key priority over many other features.

D. Alarm monitoring and administrative workstations must be able to connect to, and monitor, field hardware devices such as card readers and intelligent system controllers. Administrative tasks including defining asset information, access groups, time zones, configuring digital video devices, generating reports, creating maps, etc. shall be provided from any client workstation on the network that is licensed to do so. All systems must utilize a single database on the network and must be accessible in real time to any security workstation connected to the network. This shall allow for automatic change propagation to all client workstations as well as common database consolidation.

E. As requested by owner, real-time graphical map representing the layout of this building shall indicate if an electronically controlled door is in a secure or unsecured mode. Control modules will be required to lock, or unlock, any electronically controlled door or vehicle gate at this facility. An automatic cardholder call-up feature shall allow for the quick search and display of images in the database. A System's Operator journal shall be available to log important daily events. A trace function shall be available for System Operator's to locate and track activity on a specific cardholder or at a specific card reader. All system hardware must be controllable using a mouse to click on the associated system icon.

F. The security system shall be designed to support an advanced distributed network architecture, whereas Intelligent System Controllers do not need to be home-run wired back to the database server. All Intelligent System Controllers shall be connected to an Ethernet network via industry standard TCP/IP communication protocol. Network based Intelligent System Controllers shall be able to communicate back with the database server through industry standard network switches and routers.

G. The security system shall support a data encryption utility. In utilizing encryption technologies, data communication shall be protected between workgroups, local area network computers, domain clients and servers, branch sites which may be physically remote, extranets, roving clients, and remote administration of computers.

PART 2 - SYSTEM CHARACTERISTICS

2.1 SECURITY SYSTEM SOFTWARE

A. The SSI shall provide additional reader licenses, when applicable, for the project.

2.2 COMPUTER SYSTEM HARDWARE

A. All computer hardware for the security systems shall be provided as part of this project. All software licenses installed on those machines shall be registered to the Owner's facility manager.

2.3 INTELLIGENT SYSTEM CONTROLLER (ISC) AND OTHER HARDWARE

A. An Intelligent System Controller (ISC) and other panel hardware shall be provided for each project following these guidelines:
   1. All hardware shall be the latest generation hardware from Lenel or Honeywell.
   2. All card reader panels shall be OSDP compliant: Lenel X-series panels or Honeywell current Pro-series model (i.e. Pro4200).
   3. All panels shall be provided with the following:
      a. ISC and other panel hardware shall be installed in clusters in telecom rooms or other type of equipment room. They shall not be installed above ceilings as much as possible.
      b. At least one ISC with TCP/IP network interface shall be install with each cluster of hardware at the telecommunications room or equipment room.
      c. An ISC shall not be controlling more than 12 modules such as reader modules, input modules, output modules, etc, even though the manufactured capacity of the ISC is 32 devices. If more than 12 modules are needed another ISC shall be provided.
      d. All clusters of panels shall include a power supply for locks and a power supply for panels.
      e. All power supplies for panels or for locks shall include battery backup power.
      f. At each cluster of panels there shall be an installed spared capacity of reader ports equivalent to 5% of the total reader capacity installed but no less than two (2) spare reader ports.
      g. All ISC and panel hardware shall be installed in UL metal enclosures designed by the manufacturers for that purpose. Custom enclosures are not acceptable.

2.4 POWER SUPPLY/ENCLOSURES – ACCESS CONTROL SYSTEM

A. All ISCs and other boards part of the access control system shall be installed inside a metal enclosure with a power supply as recommended and designed by the manufacturer of the equipment.

B. The low voltage power supply shall convert a 115 VAC or 24 VAC 60 Hz input to a continuously supplied current of 12 VDC. The power supply shall be UL listed, fused protected and class 2 rated.

C. The power supply shall include a battery charger to provide backup power when main power goes down. If ISC has a battery charger and input built in, then the power supply does not need this feature.

D. Plug in transformers feeding a low voltage power supply feeding an access control panel are not allowed unless they are mounted inside another lockable enclosure. External multi-output individually fused protected outputs power supplies feeding all access control board are acceptable as long as they are located next to the access control panels.

E. Maintenance free batteries shall be provided with all power supplies or ISC and shall be mounted inside the same enclosure. Batteries shall be sized to allow at least 4 hours of power backup. All power supplies shall be monitored for low battery through the access control system.

F. All enclosures for ISCs, other electronic boards, power supplies or battery cabinets shall be UL listed NEMA 1 hinged cover enclosures when mounted indoors and in fully weatherproof NEMA 4X enclosures when located outdoors or in an exposed or covered area. All enclosure doors shall be key lockable, keyed alike, and shall include a tamper switch for monitoring by the security system. Any cabinet opening shall initiate an alarm condition to the security monitoring system.

G. Basis of design: Altronix, Life Safety Power supplies or Honeywell.

2.5 TAMPER SWITCH

A. All security enclosures, including power supplies and terminal cabinets shall include a tamper switch for direct supervision of the cabinet door. Any opening of these doors shall initiate an alarm condition to the security monitoring system. All tamper contacts shall be a reed actuated self adjusting plunger style switch. If a tamper contact is provided by the manufacturer with the enclosure this device may be used.

B. Tamper switches shall be wired as to report separate alarms to the system for each panel.

C. Basis of design: Amseco PSW-1, or built-in with access control system enclosure.

2.6 CONTACTLESS SMART CARD READER

A. The standard smart card reader for use throughout this facility shall be a switchplate style reader in low profile weatherized polycarbonate housing suitable for mounting in either an indoor or outdoor environment. The reader shall be constructed of a polycarbonate material sealed to a NEMA rating of 4X IP65. The reader shall contain an integral magnet for use with an external magnetic reed switch to provide tamper protection when connected to an external alarm. The reader shall be UL/C 294 listed and shall conform to FCC and ISO standards. The reader shall operate at a frequency of 125KHz, 13.56MHz and 2.4 Ghz. All RF data transmitted between this device and the smart card shall be encrypted for additional protection using a secure algorithm. The reader shall provide an audiovisual indication to signify access granted or access denied. This operation shall be displayed by a high intensity LED light bar which shall change from red, amber, or green based on the status of the operation. The housing shall mount on an industry standard single gang electrical junction box. It shall have a read range of 4.0 to 4.5 inches when used with a standard smart access card and 1.0 to 2.0 inches when used with a key tag.

B. The mullion style readers shall only be used where wall mounting is not possible (for example glass/aluminum store-front systems).

C. The smart card reader with keypad shall have a standard contactless smart card and shall have a twelve (12) key keypad. Readers with keypad shall be used where indicated in design drawings.

D. Communications between the readers and the ISC shall be through a OSDP interface

E. The contactless Smart Card reader shall be compatible with the following credentials:
   1. HID Seos, iClass SE, iClass SR, iClass, Mifare Classic, Mifare DESfire

2. HID Proximity, Indala Proximity, AWID Proximity and EM Proximity
3. NFC devices (HID Monile Access).

F. Basis of design selection: HID Signo™ readers.

2.7 CONTACTLESS SMART CARD

A. All credentials for Pinellas County Projects shall be purchase by Onwer, since they shall be part of the HID Corporate 1000 program with Owner's unique Facility Code.

2.8 LOCKING DEVICES – SPEICIFED UNDER DIV 8

A. The SSI shall coordinate with the door hardware installer on the placement of electronic locking hardware required for this project. The SSI shall provide all necessary wire and cable, and the low voltage power supplies for door locks. The SSI shall also be responsible for terminating all connections and interface this equipment with the integrated security system.

B. Locking electronic door hardware is not covered in this specification.

2.9 DOOR RELASE BUTTONS (REQUEST TO EXIT SWITCH/BUTTON)

A. Where indicated on the drawings, a door release button shall be provided to function as a secondary method of door release on locked doors. The door release button shall have the following specifications:
1. Button type: Illuminated.
2. Button size: two inches square
3. Lettering: "Push to Exit"
4. Box size: Single gang
5. Contacts: Momentary DPDT or (1 SPST N/O and 1 SPST N/C) 5A @ 30 VDC
6. Built-in timer: Pneumatic timer, only required when used with electromagnetic locks.
7. Finish: Bright Chrome
8. Basis of design: RCI 991-PTD or equal.

B. For applications where the door release buttons will be located under a desk a rocker switch shall be used instead of the regular exit device. The design selection for the rocker switch is the RCI 909 surface mounted.

2.10 REQUEST TO EXIT EGRESS MOTION SENSOR

A. The egress sensors shall utilize passive infrared technology to detect the motion of individuals approaching a door. Upon activation this device shall release the lock, and shunt the magnetic door position switch to allow unobstructed egress through the door. This device shall be field adjustable to fit the monitoring requirements of the location where installed.

B. All request to exit motion sensors shall be provided with a trim plate for mounting the detector over a standard single gang junction box.

C. Basis of design: Honeywell IS-310 or an approved equal

2.11 MAGNETIC DOOR POSITION SWITCH – DPS

A. The standard recessed door position switch shall be Interlogix 1078 series or approved equal. The contact and the magnet shall be hermetically sealed in a one piece, molded, flame retardant ABS plastic housing for maximum strength and durability. The contact and magnet shall snap-lock into a predrilled 3/4" or 1" diameter hole. Color of the housing shall be off white, gray, or mahogany, and shall be provided in the appropriate color to match the door and doorframe. The magnet shall be made of Alnico V.

B. The standard position switch for a roll up door shall be an Interlogix 2207AH high security contact or approved equal.

C. On banks of doors where multiple doors are being monitored, door contacts shall be wired in series. All double doors shall receive (1) magnetic door position switch on each door leaf and shall report as one alarm point.

D. On exterior doors with impact resistant listings, use only surface mounted door position switches in lieu of the standard recessed door position switches. The design selection is the Interlogix 1085T or approved equal.

2.12 SURGE PROTECTION

A. All security components mounted outside the building and wired through low voltage copper conductor back to the building shall be provided with surge and lighting protection. Provide UL listed multi-stage protection on all low voltage and signal transmission lines. All 120 VAC surge suppression devices shall be EDCO HSP121BT-1RU or an approved equal. For RS-485 or RS-422 connections provide PC642C-008LC with base PCB1B manufactured by EDCO or an approved equal.

B. For exposed Ethernet connections with PoE, use EDCO CAT6-E PoE or approved equal.

2.13 POWER SUPPLY – DOOR LOCKING HARDWARE AND SENSORS

A. Power supplies for door locks or powered sensors (i.e. request to exit motion sensors) shall be completely separate from power supplies for ISC or electronic hardware part of the card access system.

B. The power supply for door locks and powered sensors shall convert a 115 VAC 60 Hz input to a continuously supplied current of 12 or 24 VDC. The power supply shall be UL listed, NFPA compliant, and have multiple class 2 rated outputs. The power supply shall be housed in NEMA 1 hinged cover enclosures where mounted indoors and in fully weatherproof NEMA 4 enclosures when located outdoors or in an exposed or covered area. All enclosure doors shall be key lockable, keyed alike, and shall include a tamper switch for monitoring by the security system. Any cabinet opening shall initiate an alarm condition to the security monitoring system.

C. The power supply for door locks and powered sensors shall include a battery charger and a battery input to provide power to the locks after a main power system failure. The switchover to stand-by battery shall be automatic when main AC power fails.

D. Power supplies for regular locking hardware shall be installed next to access control panels

E. Maintenance free batteries shall be provided with all power supplies. Batteries shall be sized to allow at least 4 hours of power backup. All power supplies shall be monitored for low battery through the access control system.

F. The power supply for door locks and powered sensors shall have the following features:

1. Number of outputs: 16 or 8 programmable as fail-safe or fail secure individually
2. Fire alarm disconnect: Yes, latching or unlatching and individually selectable for any of the inputs.
3. Output protection: PTC for indoors use and Fused protected for outdoors.
4. Monitoring: AC fail and low battery with dry contact closure.

G. Approved Manufacturers: Altronix, Life Safety Power Supplies, Honeywell.

2.14 LOCAL ALARM

A. Local alarms shall be used as local notification devices for alarm conditions when required for the project. Not all doors in the project will require local alarms. It is mostly for delayed egress doors and unlocked doors that require security control.

B. The local alarm shall be a buzzer with strobe light that mounts in a double gang electrical box. The buzzer shall have an output capacity of 70 db @ 10 ft. from the source and. The strobe light shall radiate light at 75 cd.

C. The local alarm shall be white and shall have no lettering.

D. Basis of design: Gentex GEC3-12PWW or approved equal.

2.15 VEHICLE CARD READER, CAMERA, AND INTERCOM PEDESTAL

A. The custom pedestal shall be manufactured from 2-inch aluminum square tubing with a welded backplate and a square mounting baseplate with tapped holes. The stand shall include a fitted flange cover to conceal the mounting baseplate and associated fasteners required to secure this unit to the concrete platform. The enclosure shall be an aluminum design with a secure cover to prevent unauthorized access. This enclosure shall be weatherproof to protect electronics from environmental conditions. Dimensions and configuration of the pedestals shall be as indicated the design drawings.

2.16 EXTERIOR EQUIPMENT HOUSING

A. NEMA 4X rated stainless steel enclosures shall be provided to house electronic security equipment to all vehicle gates. The enclosure shall be constructed of 14 gauge stainless and shall have dimensions as required to hold electronics

B. All enclosures shall be provided with a pad lock and a tamper switch for direct supervision. Any door opening shall initiate an alarm condition to the security monitoring system. All cores shall be keyed alike. A grounding package shall be provided for connection to a ground rod. A #8 solid copper ground wire shall be provided and installed from the ground lug to a grounding rod installed next to the enclosure.

C. All exterior enclosures shall include a compact air condition unit, if the equipment inside does not support the temperatures above 75 deg F . The air condition unit shall be as indicated in the design drawings. All air condition units shall be monitored for proper operation through relay contacts through the access control system.

D. Basis of design: nVent Watershed, Type 4X

2.17 WIRE & CABLE

A. Cables for un-powered security sensors shall have the following specification:
   1. Minimum cable gauge: AWG 20
   2. Number of conductors: 2, stranded conductors
   3. Conductor type: Bare copper
   4. Cable insulation: Color coded PVC
   5. Conductor insulation colors: Black and red.
   6. Voltage rating: 300V
   7. Cable shield: No cable shields

B. Cables for powered security sensors shall have the following specifications:
   1. Minimum cable gauge: AWG 20
   2. Number of conductors: 4, stranded conductors
   3. Conductor type: Bare copper
   4. Cable insulation: Color coded PVC
   5. Conductor insulation colors: Black, red, white and green.
   6. Voltage rating: 300V
   7. Cable shield: No cable shields

C. Cables for access control readers shall have the following specifications:
   1. Minimum cable gauge: AWG 22
   2. Number of conductors: 6, stranded conductors
   3. Conductor type: Tinned copper
   4. Cable insulation: Color coded PVC
   5. Conductor insulation colors: Black, red, white, green, orange (or brown) and blue.
   6. Voltage rating: 300V
   7. Cable shield: Aluminum/polyester foil (overall) with a AWG 24 tinned copper drain wire

D. Cables for RS-232, RS-422 or RS-485 control lines shall have the following specifications:
   1. Minimum cable gauge: AWG 24
   2. Number of conductors: 2-paired, stranded conductors
   3. Conductor type: Tinned copper
   4. Cable insulation: Polyethylene
   5. Conductor insulation colors: White-blue, blue-white white-orange and orange-white
   6. Voltage rating: 300V
   7. Cable shield: Aluminum/polyester foil (overall), a tinned copper braid (90% coverage) and a AWG 24 tinned copper drain wire
   8. Nominal characteristic impedance: 120 Ohms
   9. Nominal capacitance: 12.8 pF/ft.
   10. Nominal delay: 1.6 ns/ft.
   11. Nominal attenuation: 0.6 dB/100 ft @ 1 MHz.

E. Cables for door locks and low voltage power supplies shall have the following specifications:
   1. Minimum cable gauge: AWG 18
   2. Number of conductors: 2, stranded conductors
   3. Conductor type: Bare copper
   4. Cable insulation: PVC
   5. Conductor insulation colors: Black and red.
   6. Voltage rating: 300V
   7. Cable shield: No cable shields

F. All UTP Category horizontal cables and fiber optic cables for the security system shall be in compliance of all requirements in specification section 271000 issued by Pinellas County BTS.

G. Cable gauge: All cable gauges shall be estimated as to allow a maximum of 5% voltage drop from the source to the load. Sizes given previously are only minimum gauges accepted. The SSI shall always estimate proper values.

H. Cable jackets: All cable jackets shall be suitable for the environment on which the cables will be installed. Use plenum rated cables when cables are installed in plenum spaces. Use riser rated cables when cables are installed through floor sleeves. Use cable jackets with water-blocking material when installed in underground conduits. All spaces above ceilings in this project shall be treated as plenum spaces. All cables with a NEC type TC shall be run fully in conduit from the panel to the device and shall be separated from other communication or Class 2 rated cables.

I. Cable jackets for this project: Except when cables are run continuously in conduit all cable jackets for access control cables shall be plenum rated.

J. All cables shall be RoHS compliant and free of VOC. The SSI shall provide proof of compliance for all cables during the submittal process.

K. Acceptable manufacturers: Belden, Alpha Wire Company, General Cable and West Penn Wire.

2.18 IDENTIFICATION AND LABELING TAGS

A. The SSI shall follow labeling materials indicated in specification section 280500 from Pinellas County BTS.

PART 3 - EXECUTION

3.1 SOFTWARE PROGRAMMING:

A. All basic software programming such as adding modules, IP address for new ISC, reader names, input/output definition and logic shall be done by the SSI or Owner. This will be defined on a project by project basis.

B. All programming associated with access rights or card holder information will be done by the owner.

3.2 INSTALLATION PRACTICES

A. General: The SSI shall follow all installation practices indicated in specification section 280500.

B. Access control panels and multi-output power supplies shall be installed as to have in any cluster of panels no less than 2 spare ports (reader ports for access control) available per cluster of panels.

C. All power supplies shall be monitored for AC failure. When power supply provides a form c relay with low battery signaling, this contact shall also be monitored. All AC fail and battery low alarms shall be monitored through individual alarm inputs. Series connections of multiple alarm points shall not be allowed.

D. As request by owner, buzzers inside card readers shall be wired as to function to alert users of different door status like (door held open alarm and door forced open alarm).

E. As requested by owner, local alarms shall be wired with separate wires for the buzzer and for the strobe, so independent use of the strobe and buzzer can be selected by the user.

3.3 WIRING METHODS

A. All proposed wire and cable shall meet or exceed the recommendations established by the equipment manufacturers, and shall comply with all state and local codes.

B. Visually inspect all wire and cable for faulty insulation prior to installation. Protect cable ends at all times with acceptable end caps.

C. Provide grommets and strain relief materials where necessary to avoid abrasion and excess tension on wire and cable.

D. All termination of UTP Category type multi pair cables shall be done in Insulation Displacement Connectors (IDC), modular plugs or connectors. The use of wire nuts or manually twisting cables and protecting them with electrical tape are not acceptable means of termination.

E. All cable with gauges larger or equal to AWG-18 and all types of stranded conductors shall be terminated on termination blocks part of an active equipment or in termination blocks supplied by the SSI. The use of wire nuts or manually twisting cables and protecting them with electrical tape are not acceptable means of termination.

F. All termination blocks shall always be mount inside a security enclosure, with a hinged cover and lock. Up to 2 conductors can be terminated in the same point in a termination block as long as the combined diameter of the conductors does not exceed the maximum cable diameter allowed by the termination block. No more than 2 conductors shall be terminated in the same point at a termination block regardless of the cable gauges.

G. Termination blocks shall be used for wire terminations next to access control panels or for termination above the security doors. Termination blocks are not required for connection to security devices at the door side.

H. When equipment supplied has wire leads instead of termination en points for connections, the only acceptable methods of connection to field wiring are insulated butt splices, quick release connectors (both ends provided) or quick lock self stripping pig tail connectors. All connectors or splices shall be selected according to the gauge of the cable to be terminated.

I. All penetrations through fire rated barriers shall be provided, by the SSI, with appropriate fire stopping materials in accordance with NFPA requirements and local fire authority having jurisdiction.

J. All cable runs shall be continuous from the device to the equipment. Cable splices shall not be allowed inside conduits, or cable trays.

K. Cables of similar signal level shall be bundled together and kept physically separate from power cords, plug strips or other circuits with different potential. Exposed wire bundles or individual cables shall be neatly secured with self-clinching nylon "TY-Raps" (Thomas & Betts or equal).

L. All cables run part of the security system in areas where ceiling is not accessible or on building exterior shall be in conduit at all times.

M. Components of the distribution system shall be installed in a neat, workmanlike manner consistent with all best practices.

N. Wiring color codes shall be strictly observed and terminations shall be uniform throughout the building.

O. Finger duct wire managers shall be used inside all equipment panels to properly dress cables.

3.4 IDENTIFICATION AND TAGGING

A. All cables, wires, wiring forms, terminal blocks, and terminals shall be clearly identified by pre-printed labels or tags. The permanent markings shall clearly indicate the function, source, and destination of all cabling, wire, and terminals. All cables shall be labeled at both ends of the cable with the same and unique identifier label.

B. Cable and equipment identifiers shall follow a standard labeling system like ANSI TIA-606. The identification system chosen by the SSI shall be submitted for approval to the A&E.

C. All access control panels, alarm panels, PLCs, or Intercom exchanges shall include a work sheet attached to the interior of the panel/ equipment in plastic envelops. This work sheet shall include the location, type of device and part number of all devices connected to the boards inside that equipment. All names used to identify devices in these worksheets shall match all names and identifiers used in the software or the user interface of the system. A second copy of this worksheet shall be delivered to as part of the as-built information.

3.5 ADDITIONAL INSTALLER RESPONSIBILITIES

A. Upon project commencement, the SSI shall provide qualified technical personnel on-site. Personnel shall be present on each consecutive working day until the system is fully functional and ready to begin the testing phase of this project.

B. During the installation process the SSI shall maintain an up-to-date set of as-built shop drawings, which shall always be available for review by the client and/or consulting engineers. This set of documents should be clearly annotated with as-built data as the work is performed. These documents will be reviewed as part of the approval process when evaluating payment request applications. At a minimum, the drawings should contain the following information:
   1. Quantity and location of all equipment installed.
   2. Cable and wire runs along with the designations tags assigned to each.
   3. Wiring diagrams that indicate terminal strip layout, identification, and terminations.

C. The SSI Project Manager shall maintain continuous coordination with the A&E. The A&E shall be kept informed of the progress and all conflicts that arise during the course of this project. Prior to the start of construction the SSI shall submit a complete plan and schedule for proposed operations. This schedule should include information relevant to number of employees assigned to the project, work hours, etc.

3.6 REQUEST OF IP ADRESSES

A. The SSI shall comply with all requirements indicated in specification section 280500 for requesting IP address for the security system.

3.7 SYSTEM WARRANTY AND SERVICE

A. General: The SSI shall follow all warranty and service requirements indicated in specification section 280500.

3.8 ENGINEER/OWNER'S FINAL ACCEPTANCE TEST

A. General: The SSI shall follow all test requirements indicated in specification section 280500.

B. Additional requirements for the system acceptance test:
   1. The day of the final acceptance test the SSI shall have at least two (2) 2-way radios to communicate between the testing groups. Cell phones are not acceptable for communication since it takes too long to establish communication, and will delay the test substantially. Radios shall be fully charged, and spare batteries shall be available for 8 hours of use.
   2. The final acceptance test will be done with two groups of people. Each group will have at least one member of each stakeholder of the project (A&E, Owner, SSI, General Installer/ Construction Manager). One group will be station in the monitoring room the other group will be going to all locations in the project where security equipment is installed.
   3. During the final acceptance test every single device in the security system will be tested for normal operation and for simulated alarm conditions at both ends (the field devices and in the monitoring room). When possible, security equipment will be tested for operation during main power failure. All features requested in this specification will be tested.

C. Testing of all structured cabling system part of the Security System shall be done in accordance of specification section 271000 issued by Pinellas County BTS

3.9 SPARE PARTS

A. The SSI shall coordinate with the Project Manager for Pinellas County if there is a need for spares for the system or not, and also agree on the quantity of spares.

3.10 TRAINING AND INSTRUCTION

A. General: The SSI shall follow all training requirements indicated in specification section 280500.

B. The SSI shall provide two (2) levels of training for this project as explained in this section.

C. USER TRAINING.
   1. User training shall be provided for security personnel interacting with the security system in areas different from the security monitoring rooms. The purpose of this training is to explain clearly how the field devices operate and what the different status indicators mean.
   2. This training shall cover operation of devices and doors like:
      a. Operation and indication of all types of readers in the project
      b. Operation of all roll-up doors.
      c. Operation of all vehicular gates.
      d. Resetting door alarms (local) for all door types.
   3. This training shall be provided by personnel working directly for the SSI.
   4. Different training sessions shall be planned with the owner.
   5. No training material is expected to be provided.

D. ADMINISTRATION AND MAINTENANCE TRAINING. The training shall be limited to the following actions:
   1. Indicate location of all power supplies and clusters of access control panels.
   2. Location of all sensors and doors.

3.11 AS-BUILT DOCUMENTS AND CLOSE OUT INFORMATION.

A. General: The SSI shall follow all as built and close out information requirements indicated in specification section 280500

B. Additional requirements for as-built documentation shall include:

1. Approved as-built drawings shall be a complete set of floor plans drawings, riser diagrams, and wiring details indicating the layout and interconnection of the system. All cable routings and elevation of each outlet, tie, and riser cable terminations shall be required.
2. The content of the as-built information shall be no less than the content provided during the shop drawings, and shall be modified as per changes done during construction.
3. Each access control panel shall include information inside the panel with the readers and doors being services by each panel. The information shall include the port# in the panel, the name of the reader sin the system, the type of locks installed at the door and all the ports used.

C. Close out information shall also include:
1. Testing reports for structured cabling system used for the Security system.

END OF SECTION 281000

SECTION 281010 - INTRUSION DETECTION SYSTEMS

PART 1 - GENERAL

1.1 PURPOSE OF THIS DOCUMENT

A. The purpose of this specification section as well as other specifications under Division 28 is to indicate to Architects & Engineers (A&E) and designers of intrusion detection systems in construction or renovation projects for Pinellas County Government what the design preference are by Pinellas County when it comes to such infrastructure. This document will be a starting point for completing a set of construction documents but it **SHALL NOT** be used unedited as a bid document.

B. This specification represents a typical system description, specific system design shall be coordinated between Owner and installer on a per project basis.

1.2 SCOPE OF WORK

A. The scope of work shall include furnishing all labor, materials, enclosures, wiring, equipment, and documentation required to provide a completely operational and working Intrusion Detection System (IDS).

B. The Intrusion Detection System Installer (IDSI) shall coordinate with other trades such as security system, CCTV, electrical system installer, the door frame installer, the door installer and the door hardware installer for all parts of this scope of work.

C. All materials and installation labor for structured wiring system (4-pair UTP cables, fiber optic cables and 24-AWG multi-pair (25 pairs or higher) backbone cables) components required for the intrusion detection system shall be in compliance with specification section 271000, as issued by Pinellas County BTS

D. See responsibility matrix in contract documents for more details about scope breakdown for this system.

E. Not included in the scope: The monitoring contract of the IDS.

1.3 RELATED DOCUMENTS

A. Supplemental: Refer to the specification sections identified below for additional requirements, which are supplemented by this section.

1. 280500 COMMON WORK RESULTS FOR SAFETY AND SECURITY SYSTEMS.
2. 281000 ELECTRONIC SECURITY SYSTEMS
3. 282000 CLOSED CIRCUIT TELEVISION-VIDEO SURVEILLANCE SYSTEM

1.4 EXISTING SYSTEMS.

A. Pinellas County Government uses IDS for securing and monitoring facilities. IDS systems are typically used in facilities that are un-attended afterhours or it could be used in facilities that have 24/7 use but specifically to monitor alarm conditions such as duress buttons or other type of alarms.

B. Currently there are different approaches for the IDS system being used by Pinellas County. Here are some of what they used.

1. For building where Pinellas County Sheriff's office has a significant presence, a custom system is used and monitored internally by PCSO. There is no 3rd party monitoring company for these systems.
2. For buildings that don't have a significant PCSO presence, and the building is not a 24/7 facility, an IDS is installed. The majority of the sites have Honeywell Vista panels, with a few other manufacturers installed. The Utilities department uses Ademco 6150 panels.
3. Not all IDS are monitored. The owner might choose not do so at a given facility, or to monitor the system internally only, without the use of a 3rd party company.
4. The most common company that monitors IDS system for Pinellas County is State Alarm (www.state-alarm.com)
5. Particular care should be taken with duress buttons. They might be part of the IDS, part of the card access or a separate system altogether.

C. NOTE TO DESIGNERS OR CONSULTANTS. The designer of the IDS shall communicate with Pinellas County Project Manager to discuss the need of this system. Once the owner agrees to have this system installed, the system shall be designed and specified. Do not assume that all buildings need an IDS. Discussions should take place with regards to duress buttons and the monitoring company.

1.5 INTRUSION DETECTION SYSTEM INSTALER QUALIFICATIONS

A. The IDSI selected for this project must be a direct manufacturer authorized representative of the product they propose to provide. All technicians assigned to install and configure this system shall be factory trained and certified for the proper installation of this equipment. The IDSI must have a minimum of 5 qualified and factory trained technicians to support this system. This company must be of established reputation and experience, regularly engaged in the supply and support of such systems for a period of at least five consecutive years under the current company name.

B. Other required IDSI qualifications are:
1. The IDSI selected for this project must be an authorized reseller of the basis of design product systems.
2. The IDSI shall agree, in writing, as part of their proposal, to provide both warranty and non-warranty service within 4 hours of notification of a problem. The IDSI shall be able to perform any and all repairs to the system within 24 hours.
3. The IDSI, as a minimum, must carry a current state issued limited energy license.

1.6 MATERIALS ALTERNATES AND SUBSTITUTIONS

A. General: See details for alternates and substitution in specification section 280500

B. Substitutions are acceptable for this system as long as the complete integration functionality described in this specification section with other systems is kept exactly as indicated in this specification.

C. Sensors such as door position switches, tamper switches, motion sensors, panic buttons allow substitutions.

1.7 SHOP DRAWINGS AND SUBMITTALS

A. The IDSI shall follow all requirements for shop drawings indicated in specification section 280500.

B. The submittal process for this scope of work will be a two stage process. The first stage is the product/installer approval. Within 30 business days of receiving contract approval and notice to proceed,

the following items shall be submitted to the A&E for review and approval, as part of the product/installer approval process.

1. Proof of Installer qualifications, addressing all requirements of paragraph 1.5 of this specification.
2. Product numbers, specifications, and data sheets for all equipment.
3. Data sheets and samples of all labeling materials and equipment to be used in the project.
4. A complete explanation of the identification method to be used for all equipment and cabling part of the IDS.
5. Data sheets of all termination blocks and mounting accessories to be used in the project. A paragraph shall be added before each data sheet indicating the intended use of each type of termination block.
6. Detailed drawings of all custom products to be used in the project.
7. Data sheets for all wire and cable to be used as part of this system. A paragraph shall be added before each data sheet indicating the intended use (to connect what type of devices) of each cable.

C. The second stage of the submittal process is the shop drawing process. Shop drawings shall only be submitted after all portions of the product/installer approval have been accepted by the A&E. The following information is required as part of the shop drawings:

1. Floor plans indication all devices to be provided and all cable runs to all devices or junction boxes. Devices for alarm systems shall indicate the zone numbers. All other devices shall have a unique identifier, as they will be programmed in the system.
2. Raceway Riser Diagrams: Detail raceway runs required for the IDS and for systems integration. Include designation of devices connected by raceway, raceway type and size, and type and size of wire and cable fill for each raceway run
3. Point to point wiring diagrams indicating all termination points for each conductor and for each device, cable types and color coding of each termination.
4. Panel schedules in a spreadsheet format, indicating all ports being used and what device is connected to each port. Panel schedules shall be submitted for all alarm panels, zone expanders, output cards, fiber optics distribution frames, Ethernet switches, control panels, termination blocks, etc.
5. Overall system diagrams indicating all head end components, their room location, and all configuration characteristics like IP addresses, serial ports used, etc.
6. Sensor detection patterns and adjustment ranges.
7. Power supply and battery calculations. The IDSI shall provide calculations of power supplies for the alarm panels and battery run time calculations for those panels. Power supplies can only be installed in telecom rooms.

1.8 ABBREVIATIONS

A. The following abbreviations are used in this document:

1.	ADA	Americans with Disabilities Act
2.	ANSI	American National Standards Institute
3.	API	Application Programming Interface
4.	ASCII	American Standard Code for Information Interchange
5.	AWG	American Wire Gauge
6.	BPS	Bits Per Second
7.	CCTV	Closed Circuit Television
8.	CPU	Central Processing Unit
9.	DIN	(German Institute of Standardization)
10.	DPS	Door Position Switch
11.	FCC	Federal Communications Commission
12.	GUI	Graphical User Interface
13.	ID	Identification
14.	IDS	Intrusion Detection System.
15.	I/O	Input /Output
16.	NEC	National Electrical Code

17. NEMA National Electrical Manufacturers Association
18. ODBC Open Database Connectivity
19. O&M Operations and Maintenance
20. PIN Personal Identification Number
21. PTZ Pan/Tilt/Zoom
22. REX Request to Exit
23. RoHS Restriction of Hazardous Substances Directive
24. SCS Security Control System
25. SDRAM Synchronized Dynamic Random Access Memory
26. STP Shielded Twisted Pair
27. UL Underwriters Laboratories, Inc.
28. UPS Uninterrupted Power Supply
29. USB Universal Serial Bus
30. UTP Unshielded Twisted Pair
31. VOC Volatile Organic Compounds

1.9 GLOSSARY OF TERMS

A. The following terms are defined for the purposes of this specification:

1. Acknowledge: The action taken by a security control system operator to indicate that he/she is aware of a specific alarm or tamper state.
2. Action Messages: A set of instructions automatically provided to the operator when an alarm condition is generated.
3. Advisory: A message provided by the security control system to the operator to inform him/her of a condition as reported by the security control system.
4. Alarm Condition: A change of state, as sensed by the security control system, indicating that the security control system has detected a condition which its sensors were designed to detect.
5. API Integration: a method to transfer information between two systems by means of APIs, though an Ethernet communication network.
6. Clear: The action taken by a security control system operator to respond to an alarm condition or advisory so that other alarms may be serviced or so that other actions may be taken.
7. Download: To send computer data from the File Server to a controller for the purposes of making access decision without the intervention of the File Server.
8. Line Supervision: The monitoring of an electrical circuit via electrical and software systems to verify the electrical integrity of the supervised circuit.
9. Off-line: A condition in which a controller(s) is not in communication with the File Server. In the off-line mode, the controller continues to make access decisions and process alarms according to the information stored at its local database.
10. Password: A combination of numbers or letters unique to security control system operator which defines commands and data fields he/she may view, edit, or command.
11. PIR: Passive infrared.
12. Protected Zone: A protected premises or an area within a protected premises that is provided with means to prevent an unwanted event.
13. Relay integration: A method to transfer signals between two systems by means of using potential free contact closures to input points.
14. Reset: A command or feedback signal that indicates that a monitored point has returned to its normal state after having transferred to the alarm or trouble state.
15. Secure Mode: The normal state of an alarm input point from which it will be monitored for change of state to either an alarm or trouble condition.
16. Secured Area: A physical location within the facility to which access is controlled by one or more card readers.
17. Secured side: Side of a security door where a higher security level needs to be granted for a user to be authorized to be in that side of the door.
18. Serial line integration: A method to transfer information between two systems by means of an RS-232/RS-422 or RS-485 line, using ASCII strings.

19. Standard Intruder: A person who weighs 100 lb (45 kg) or less and whose height is 60 inches (1525 mm) or less; dressed in a long-sleeved shirt, slacks, and shoes.
20. Standard-Intruder Movement: Any movement, such as walking, running, crawling, rolling, or jumping, of a "standard intruder" in a protected zone.
21. Systems Integration: The bringing together of components of several systems containing interacting components to achieve indicated functional operation of combined systems.
22. Tamper: A condition within the circuitry of a monitored point which indicates the electrical integrity of that sensing circuit has been compromised.
23. Tamper proof screws: A screw with a security hexalobular internal driving feature as described in ISO 10664. As an example, a security TORX head, as developed by Camcar LLC.
24. Time Interval: A time stamp of one start time and one stop time within a time period.
25. Time Period: A user programmable period of time made up of days of the week and hours in the day.
26. Trouble: A condition within the circuitry of a monitored point which indicates that an equipment malfunction, single break, single fault or a wire-to-wire short exists.
27. UPS: Uninterruptible power supply.
28. User Definable: An attribute of a security control system function that may be easily tailored by the System Administrator.
29. Workstation: A personal computer connected to the main security control system File Server via a local area network connection for the purpose of programming the system and responding to alarms.
30. Zone. A defined area within a protected premises. It is a space or area for which an intrusion must be detected and uniquely identified. The sensor or group of sensors must then be assigned to perform the detection, and any interface equipment between sensors and communication must link to master control unit

1.10 FUNCTIONAL DESCRIPTION OF SYSTEM

A. The intrusion detection systems primary purposes shall be to provide alarm monitoring capabilities for the new facility with the ability to be monitored from a third party monitoring system or a local office.

B. Description: The IDS shall be based on a Hard-wired or Multiplexed (Addressable) modular, microprocessor-based controls, intrusion sensors and detection devices, and communication links to perform monitoring, alarm, and control functions.

C. Supervision: System components shall be continuously monitored for normal, alarm, supervisory, and trouble conditions. Indicate deviations from normal conditions at any location in system. Indication includes identification of device or circuit in which deviation has occurred and whether deviation is an alarm or malfunction.
1. Alarm Signal: Display at master control unit and actuate audible and visual alarm devices.
2. Trouble Condition Signal: Distinct from other signals, indicating that system is not fully functional. Trouble signal shall indicate system problems such as battery failure, open or shorted transmission line conductors, or control-unit failure.
3. Supervisory Condition Signal: Distinct from other signals, indicating an abnormal condition as specified for the particular device or control unit.

D. System Control: Master control unit shall directly monitor intrusion detection units and connecting wiring.

E. System Control: Master control unit shall directly monitor intrusion detection devices, and connecting wiring in a multiplexed distributed control system or as part of a network.

F. System shall automatically reboot program without error or loss of status or alarm data after any system disturbance.

G. Operator Commands:
   1. Help with System Operation: Display all commands available to operator. Help command, followed by a specific command, shall produce a short explanation of the purpose, use, and system reaction to that command.
   2. Acknowledge Alarm: To indicate that alarm message has been observed by operator.
   3. Place Protected Zone in Access: Disable all intrusion-alarm circuits of a specific protected zone. Tamper circuits may not be disabled by operator.
   4. Place Protected Zone in Secure: Activate all intrusion-alarm circuits of a protected zone.
   5. Protected Zone Test: Initiate operational test of a specific protected zone.
   6. System Test: Initiate system-wide operational test.
   7. Print reports.

H. Timed Control at Master Control Unit: Allow automatically timed "secure" and "access" functions of selected protected zones.

I. Response Time: Two seconds between actuation of any alarm and its indication at master control unit.

J. Circuit Supervision: Supervise all signal and data transmission lines, links with other systems, and sensors from master control unit. Indicate circuit and detection device faults with both protected zone and trouble signals, sound a distinctive audible tone, and illuminate an LED. Maximum permissible elapsed time between occurrence of a trouble condition and indication at master control unit is 20 seconds. Initiate an alarm in response to opening, closing, shorting, or grounding of a signal or data transmission line.

K. Programmed Secure-Access Control: System shall be programmable to automatically change status of various combinations of protected zones between secure and access conditions at scheduled times. Status changes may be preset for repetitive, daily, and weekly; specially scheduled operations may be preset up to a year in advance. Manual secure-access control stations shall override programmed settings.

L. Manual Secure-Access Control: Coded entries at manual stations shall change status of associated protected zone between secure and access conditions.

PART 2 - PRODUCTS

2.1 SYSTEM COMPONENT REQUIREMNTS

A. Compatibility: Detection devices and their communication features, connecting wiring, and master control unit shall be selected and configured with accessories for full compatibility with the following equipment:
   1. Door hardware specified in Division 08 Section "Door Hardware."
   2. Door hardware specified in Division 08 Section "Door Hardware (Scheduled by Describing Products)."
   3. Other systems required to be integrated with the IDS

B. Surge Protection: Protect components from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor entry connection to components.
   1. Minimum Protection for Power Lines 120 V and More: Auxiliary panel suppressors complying with requirements in Division 26 Section "Transient-Voltage Suppression for Low-Voltage Electrical Power Circuits."
   2. Minimum Protection for Communication, Signal, Control, and Low-Voltage Power Lines: Listed and labeled by a qualified testing agency for compliance with NFPA 731.

C. Intrusion Detection Units: Listed and labeled by a qualified testing agency for compliance with UL 639.

D. Interference Protection: Components shall be unaffected by radiated RFI and electrical induction of 15 V/m over a frequency range of 10 to 10,000 MHz and conducted interference signals up to 0.25-V rms injected into power supply lines at 10 to 10,000 MHz.

E. Tamper Protection: Tamper switches on detection devices, control units, annunciators, pull boxes, junction boxes, cabinets, and other system components shall initiate a tamper-alarm signal when unit is opened or partially disassembled and when entering conductors are cut or disconnected. Master control-unit alarm display shall identify tamper alarms and indicate locations.

F. Self-Testing Devices: Automatically test themselves periodically, but not less than once per hour, to verify normal device functioning and alarm initiation capability. Devices transmit test failure to master control unit.

G. Antimasking Devices: Automatically check operation continuously or at intervals of a minute or less, and use signal-processing logic to detect blocking, masking, jamming, tampering, or other operational dysfunction. Devices transmit detection of operational dysfunction to master control unit as an alarm signal.

H. Addressable Devices: Transmitter and receivers shall communicate with a unique device identification and status reports to master control unit.

I. Remote-Controlled Devices: Individually and remotely adjustable for sensitivity and individually monitored at master control unit for calibration, sensitivity, and alarm condition.

2.2 SYSTEM ENCLOSURES

A. All electronics part of the IDS system shall be installed inside protected metallic enclosures. This enclosure shall protect against dust, falling dirt, dripping noncorrosive liquids and tampering.

B. Use NEMA 250, Type 12 enclosures when the electronic parts of the IDS will be installed at interior spaces, with temperature and humidity control.

C. Use NEMA 250, Type 4X, stainless steel enclosures when the electronic parts of the IDS will be installed at exterior spaces, without temperature and humidity control.

D. All enclosures shall have a hinged doors with key locks (all keys shall be keyed alike) and tamper switches.

E. Enclosures shall be sized by IDSI to be capable of housing all electronics, batteries, termination blocks and power supplies.

F. Design selection: as recommended by manufacturer of the intrusion detection system. For exterior enclosures the basis of design are nVent enclosures.

2.3 TAMPER SWITCH

A. All security enclosures, including power supplies or terminations shall include a tamper switch for direct supervision of the cabinet door. Any opening of these doors shall initiate an alarm condition to the security monitoring system. All tamper contacts shall be a reed actuated self adjusting plunger style switch. If a tamper contact is provided by the manufacturer with the enclosure this device may be used.

B. Tamper switches shall be wired as to report separate alarms to the system for each panel.

C. Basis of design: Amseco PSW-1, or as provided by the IDS system manufacturer.

2.4 INTRUSION ALARM PANEL

A. An intrusion alarm system shall be provided to connect, control and monitor wired duress buttons to the security system. The intrusion alarm system shall be provided with a panel, keypads, and additional system modules.

B. The Intrusion Alarm panels shall be provided with an Ethernet network card or a RS-232 communication line to integrate with the other systems.

C. Power supply: Power for the main intrusion alarm panel shall be done through multiple devices such as a transformer a power supply module/charger and batteries. All components of the power supply shall be housed in a system enclosure. Batteries shall be provided for the intrusion alarm panel with a minimum run time of 12 hours.

D. The intrusion alarm panel shall have the ability add optional modules such as:
1. Communicator module.
2. 8-Zone expansion module.
3. 8-Low current output expander module.
4. 4-High current output expander module.

E. The IDSI shall configure all modules in the selected system to accomplish the design intent described in this specification and in the design drawings. The complete configuration of the alarm system shall be submitted as part of the as built information for this specification.

F. The Intrusion Alarm System shall have the following minimum capacities:
1. Main panel with 8 on-board zones, expandable to 128 hard wired zones.
2. Zone types: 40 zones types with 14 programmable zone attributes
3. Up to 98 access codes: one master code, one installer code and one maintenance code.
4. Programmable attributes for each user code
5. Up to 4 programmable outputs (PGM)
6. A maximum of 148 programmable outputs through expansion modules
7. The system shall be capable of monitoring the following events:
    a. AC power failure
    b. Zone trouble
    c. Telephone line trouble
    d. Communicator trouble
    e. Low battery condition
    f. RF jam
    g. AUX power supply fault
    h. Failure to communicate
    i. Module fault
8. Additional features:
    a. 2-way wireless device support
    b. Visual verification
    c. Proximity tag support
    d. PGM scheduling
    e. Quick arming
    f. Up to 8 user partitions
    g. Programmable system loop response
    h. Door bell zones

i. Low battery PGM type

G. Basis of Design: Honeywell DSC or Bosch. Other intrusion detections system could be considered if the IDSI can demonstrate all functional features are equal including integration requirements with other systems.

2.5 INTRUSION ALARM KEYPAD

A. The intrusion alarm keypad shall be a single unit capable of connecting to the main panel through a serial communication line. The unit shall have the following features:
1. Global partition status
2. Up to 128 hardwired or wireless zones supported
3. Full 32-character programmable labels
4. Menu programming
5. Modern, slim-line landscape keypad
6. White backlit keys
7. Blue LCD display with 2X16 characters capacity
8. Displays outdoor temperature
9. 5 programmable function keys
10. Intuitive clock programming
11. Input/Output terminal
12. Fire, medical and panic keys
13. Adjustable backlight and keypad buzzer
14. Dual wall-mount and front cover tamper

B. Basis of design: Match manufacturer selection for Intrusion Alarm Panel.

2.6 MICROWAVE-PIR DUAL-TECHNOLOGY SENSORS

A. Description: Single unit combining a sensor that detects changes in microwave signals and a PIR sensor that detects changes in ambient level of infrared emissions caused by standard-intruder movement within detection pattern.

B. Listed and labeled by a qualified testing agency for compliance with SIA PIR-01.

C. Device Performance: An alarm is transmitted when either sensor detects a standard intruder within a period of three to eight seconds from when the other sensor detects a standard intruder.

D. Minimum Detection Pattern: A room 20 by 30 feet

E. PIR Sensor Sensitivity: Adjustable pattern coverage to detect a change in temperature of 2 deg F or less, and standard-intruder movement within sensor's detection patterns at any speed between 0.3 to 7.5 fps across two adjacent segments of detector's field of view.

F. Microwave Sensor Sensitivity: Adjustable, able to detect standard-intruder movement within sensor's detection pattern at any speed between 0.3 to 7.5 fps. Sensor sensitivity adjustments shall be accessible only when sensor housing is removed, and sensors shall comply with 47 CFR 15.

G. Activation Indicator: LED indicator shall not be visible during normal operation. Indicator shall light when sensor detects a standard intruder. Locate test enabling switch under sensor housing cover.

H. Remote Test: When initiated by master control unit, start a test sequence for each detector element that simulates standard-intruder movement within sensor's detection patterns, causing an alarm.

I. Basis of Design: Interlogix, DSC, Bosch

2.7 360 DEG MOTION SENSOR – CEILING MOUNTED

A. Description: Single unit combining a sensor that detects changes in microwave signals and a PIR sensor that detects changes in ambient level of infrared emissions caused by standard-intruder movement within detection pattern.

B. Listed and labeled by a qualified testing agency for compliance with SIA PIR-01.

C. Device Performance: An alarm is transmitted when either sensor detects a standard intruder within a period of three to eight seconds from when the other sensor detects a standard intruder.
1. Minimum Detection Pattern: A room 20 by 30 feet (6 by 9 m).
2. PIR Sensor Sensitivity: Adjustable pattern coverage to detect a change in temperature of 2 deg F (1 deg C) or less, and standard-intruder movement within sensor's detection patterns at any speed between 0.3 to 7.5 fps (0.09 to 2.3 m/s) across two adjacent segments of detector's field of view.
3. Microwave Sensor Sensitivity: Adjustable, able to detect standard-intruder movement within sensor's detection pattern at any speed between 0.3 to 7.5 fps (0.09 to 2.3 m/s). Sensor sensitivity adjustments shall be accessible only when sensor housing is removed, and sensors shall comply with 47 CFR 15.
4. Activation Indicator: LED indicator shall not be visible during normal operation. Indicator shall light when sensor detects a standard intruder. Locate test enabling switch under sensor housing cover.
5. Remote Test: When initiated by master control unit, start a test sequence for each detector element that simulates standard-intruder movement within sensor's detection patterns, causing an alarm.

D. Basis of design: Interlogix, DSC, Bosch

2.8 DOOR POSITION SWITCH - DPS

A. The IDSI shall coordinate with the door hardware installer on the placement of magnetic door position switch required for hollow metal doors for this project.

B. When the design drawings indicate a door is to get a DPS for card access and a DPS for the IDS, the IDSI shall provide a DPS with DPDT contacts to allow for one set of contacts to be wired to the card access system and the second set of contacts to be wired to the intrusion alarm panel.

C. On double doors where each leaf has a DPS, the devices shall be wired in series. Both sensors shall report alarms to the system as a single alarm point.

D. Basis of design: Interlogix 1078 series or approved equal.

2.9 ACOUSTIC-TYPE, GLASS-BREAK SENSORS

A. Listed and labeled by a qualified testing agency for compliance with SIA GB-01.

B. Device Performance: Detect unique, airborne acoustic energy spectrum caused by breaking glass.

C. Sensor Element: Microprocessor-based, digital device to detect breakage of plate, laminate, tempered, and wired glass while rejecting common causes of false alarms. Detection pattern shall be at least a 20-foot (6-m) range.

D. Hookup Cable: Factory installed, not less than 72 inches

E. Activation Indicator: LED on sensor housing that lights when responding to vibrations, remaining on until manually reset at sensor control unit or at master control unit.

F. Control Unit: Integral with sensor housing or in a separate assembly, locally adjustable by control under housing cover.

G. Glass-Break Simulator: A device to induce frequencies into protected glass pane that simulate breaking glass without causing damage to glass.

H. Basis of design. Interlogix, DCS, BOSCH

2.10 VIBRATION SENSORS

A. Listed and labeled by a qualified testing agency for compliance with SIA GB-01.

B. Description: A sensor control unit and piezoelectric crystal sensor elements that are designed to be rigidly mounted to structure being protected.

C. Device Performance: Detects high-frequency vibrations generated by use of such tools as oxyacetylene torches, oxygen lances, high-speed drills and saws, and explosives that penetrate a structure while not responding to any other mechanical vibration.

D. Circular detection pattern, with at least a 72-inch (1830-mm) radius on protected structure.

E. Hookup Cable: Factory installed, not less than 72 inches (1830 mm).

F. Control Unit: Integral with sensor housing or in a separate assembly, locally adjustable by control under housing cover.

G. Glass-Break Simulator: A device to induce frequencies to protected glass pane that simulate breaking glass without causing damage to glass.

H. Basis of design. Interlogix, DCS, BOSCH

2.11 WALL MOUNTED DURESS BUTTON

A. The wall mounted duress button shall be a mushroom type button capable of fitting in a 4”x4” electrical box with a single device adapter. The specifications of the wall mounted duress button are:
   1. Operation: push button once to engage, release by use of keyswitch.
   2. Plate construction: ¼” extruded aluminum plate with beveled edge
   3. Switch mode operation: latching maintained action.
   4. Switch configuration: 1 X SPST N/O and 1 X SPST N/C
   5. Button finish: red cap.
   6. Screws: tamper resistant.

B. All duress button keys shall be key alike.

C. Basis of design: Rutherford controls International model 920 or approved equal.

2.12 DURESS BOTTOM – UNDER DESK

A. The unit shall consist of a housing that contains the electrical circuitry and magnetic reed contact, a cover plate to protect the internal electronics and actuating lever with an Alnico-V magnet installed in the cradle lever. The alarm shall occur when the actuating lever is moved 20 to 45 degrees past the fully closed position. The unit shall feature a glowing LED for low light visibility, when powered up this shall be lighted green, when activated this light shall glow red. The unit shall be mounted in specific locations of rooms indicated on the drawings. Obtain client approval on these locations prior to locating these devices.

B. Basis of design: Interlogix 3040 series panic switch or an approved equal

2.13 MOBILE DURESS DEVICES

A. In many applications the users might require the use of mobile duress devices for some of the building occupants. The mobile duress devices are battery operated devices that communicate wirelessly to the IDS and can report a duress condition when the user presses a button in the device.

B. When mobile duress devices are used one or more compatible RF receiver shall be provided to get the signal from these devices. The quantity of receivers depends on the are being covered and the limitation of the IDS system provided.

C. Basis of design: Wireless device recommended by the IDS system manufacturer.

2.14 AUDIBLE AND VISUAL ALARM DEVICES

A. Klaxon Weatherproof Motor-Driven Hooter: UL listed, rated to produce a minimum sound output of 120 dB at 3 feet, plus or minus 3 dB, at a frequency of 470 Hz. Rated for intermittent use: two minutes on and five minutes off.
   1. Designed for use in industrial areas and in high-noise, severe-weather marine environments.

B. Basis of Design; DSC, Bosch

C. General. The siren alarm for the intrusion detection system shall be and audible and visual device designed to operate in outdoor or indoor environments. The specifications of the unit shall be:
   1. Sound pressure level: 115 dB @ 1m.
   2. Sound output: warble sound.
   3. Strobe color: Blue
   4. Strobe flash rate: 20 to 100 times per minute.
   5. Strobe candela on axis: 1.8 minimum
   6. Enclosure: Weather-resistant polycarbonate housing with dual tamper screws that mounts on a standard 4" square backbox.

D. Basis of Design: Amseco SSX-52SB.

2.15 SURGE PROTECTION

A. All security components mounted outside the building and wired through low voltage copper conductor back to the building shall be provided with surge and lighting protection. Provide UL listed multi-stage protection on all low voltage and signal transmission lines. All 120 VAC surge suppression devices shall be EDCO HSP121BT-1RU or an approved equal. For low voltage connections provide FAS-1 surge

suppressors manufactured by EDCO or an approved equal. For RS-485 or RS-422 connections provide PC642C-008LC with base PCB1B manufactured by EDCO or an approved equal.

2.16 POWER SUPPLY – FOR IDS SENSORS

A. Power supplies for IDS sensors shall be completely separate from power supplies for the main alarm control panel. A short circuit line in the power to a sensor shall not disable the operation of the main alarm control panel.

B. The power supply shall convert a 115 VAC 60 Hz input to a continuously supplied current of 12 VDC. The power supply shall also have a battery charger component and the ability to be powered from battery power. The power supply shall be UL listed, NFPA compliant, and have multiple class 2 rated outputs. The power supply shall be housed in NEMA 1 hinged cover enclosures where mounted indoors. All enclosure doors shall be key lockable, keyed alike, and shall include a tamper switch for monitoring by the security system. Any cabinet opening shall initiate an alarm condition to the security monitoring system.

C. Maintenance free batteries shall be provided with all power supplies. Batteries shall be sized to allow at least 4 hours of power backup. All power supplies shall be monitored for low battery through the access control system.

D. Basis of design: Altronix AL300ULXPD16CD or approved equal.

2.17 POWER SUPPLY – FOR IDS HARDWARE

A. Power supplies for IDS hardware shall be a plug in transformer secured to the outlet so it will not fall off from the outlet.

B. The power supply shall convert a 115 VAC 60 Hz input to a continuously supplied current of 16 VAC at 40 VA. The power supply shall be UL listed, NFPA compliant, and have a class 2 rated output. The power supply shall be housed in NEMA 1 hinged cover enclosures when mounted indoors. All enclosure doors shall be key lockable, keyed alike, and shall include a tamper switch for monitoring by the security system. Any cabinet opening shall initiate an alarm condition to the security monitoring system.

C. Basis of design: DSC. Bosch, Interlogix

2.18 WIRE & CABLE

A. Cables for un-powered security sensors shall have the following specification:
   1. Minimum cable gauge: AWG 20
   2. Number of conductors: 2, stranded conductors
   3. Conductor type: Bare copper
   4. Cable insulation: Color coded PVC
   5. Conductor insulation colors: Black and red.
   6. Voltage rating: 300V
   7. Cable shield: No cable shields

B. Cables for powered security sensors shall have the following specifications:
   1. Minimum cable gauge: AWG 20
   2. Number of conductors: 4, stranded conductors
   3. Conductor type: Bare copper
   4. Cable insulation: Color coded PVC

5. Conductor insulation colors: Black, red, white and green.
6. Voltage rating: 300V
7. Cable shield: No cable shields

C. Cables for RS-232, RS-422 or RS-485 control lines shall have the following specifications:
1. Minimum cable gauge: AWG 24
2. Number of conductors: 2-paired, stranded conductors
3. Conductor type: Tinned copper
4. Cable insulation: Polyethylene
5. Conductor insulation colors: White-blue, blue-white white-orange and orange-white
6. Voltage rating: 300V
7. Cable shield: Aluminum/polyester foil (overall), a tinned copper braid (90% coverage) and a AWG 24 tinned copper drain wire
8. Nominal characteristic impedance: 120 Ohms
9. Nominal capacitance: 12.8 pF/ft.
10. Nominal delay: 1.6 ns/ft.
11. Nominal attenuation: 0.6 dB/100 ft @ 1 MHz.

D. Cables for low voltage power supplies shall have the following specifications:
1. Minimum cable gauge: AWG 18
2. Number of conductors: 2, stranded conductors
3. Conductor type: Bare copper
4. Cable insulation: PVC
5. Conductor insulation colors: Black and red.
6. Voltage rating: 300V
7. Cable shield: No cable shields

E. All UTP Category horizontal cables and fiber optic cables for the security system shall be in compliance of all requirements in specification section 271000, as issued by Pinellas County BTS and shall be under the same warranty as all UTP category cables and fiber optic cables described in specification section 271000.

F. Cable gauge: All cable gauges shall be estimated as to allow a maximum of 5% voltage drop from the source to the load. Sizes given previously are only minimum gauges accepted. The IDSI shall always estimate proper values.

G. Cable jackets: All cable jackets shall be suitable for the environment on which the cables will be installed. Use plenum rated cables when cables are installed in plenum spaces. Use riser rated cables when cables are installed through floor sleeves. Use cable jackets with water-blocking material when installed in underground conduits.

H. All cables shall be RoHS compliant and free of VOC. The IDSI shall provide proof of compliance for all cables during the submittal process.

I. Acceptable manufacturers: Belden, Alpha Wire Company, General Cable and West Penn Wire.

2.19 IDENTIFICATION AND LABELING TAGS

A. The IDSI shall follow labeling materials indicated in specification section 280500.

PART 3 - EXECUTION

3.1 INTRUSION DETECTION SYSTEM FUNCTIONALITY

A. The purpose of the intrusion detection system is to protect the premises with additional controls beyond what the card access system will provide.

B. The IDSI shall program and install the system based on the Owner's Security Policy and Procedures Handbook. The IDSI shall coordinate with Owner all aspects of the installation of this system.

3.2 INSTALLATION PRACTICES

A. General: The IDSI shall follow all installation practices indicated in specification section 280500.

B. BACKUP POWER. All AC power shall be fed from the buildings power source supported by an emergency backup generator where applicable. The source of the AC power feed shall be identified at termination point of equipment.

C. MONITORED POWER. All power supplies shall be monitored for AC failure. When power supply provides a form c relay with low battery signaling, this contact shall also be monitored. All AC fail and battery low alarms shall be monitored through individual alarm inputs. Series connections of multiple alarm points shall not be allowed.

D. POWER DISCONNECT. All power supplies shall be installed with means of disconnect from line power. The preferable method of disconnect is through a breaker in an electrical panel.

E. NON-PARALELLING OUTPUTS. Power to sensors and other field devices shall be made from individual power supply outputs. Paralleling multiple cables feeding multiple sensors in one terminal of a power supply shall not be allowed.

F. END OF LINE RESISTORS. All inputs to access control panels and alarm panels shall be wired with end of line resistors for supervisory conditions. Supervisory conditions shall be able to uniquely identify the following conditions:
   1. Cable open
   2. Cable shorted
   3. Sensor activate
   4. Sensor inactive.

G. SINGLE DEVICE ZONES. Each zone shall be wired with only one device. Daisy chain of multiple devices in one zone shall not be allowed.

H. SPARE CAPACITY. All intrusion Alarm panels shall be provided with at least a 20% spare zone inputs capacity installed.

I. HIGH LOAD CONTACTS. When IDSI requires outputs in the IDS managing currents above the limits managed by the open collector outputs in the expansion boards, the IDS shall provide a DIN-rail Mounted relays in a panel enclosure with a power supply and all other required accessories for proper mounting

J. KEYPADS. All IDS shall be provided with at least 2 keypads. One located by the Equipment cabinet the other by an exterior door, where the users must likely will enter and exit the building.

3.3 WIRING METHODS

A. GENERAL. All proposed wire and cable shall meet or exceed the recommendations established by the equipment manufacturers, and shall comply with all state and local codes.

B. VISUAL INSPECTION. Visually inspect all wire and cable for faulty insulation prior to installation. Protect cable ends at all times with acceptable end caps.

C. GROMMETS. Provide grommets and strain relief materials where necessary to avoid abrasion and excess tension on wire and cable.

D. UTP TERMINATIONS. All termination of UTP Category type multi pair cables shall be done in Insulation Displacement Connectors (IDC), modular plugs or connectors. The use of wire nuts or manually twisting cables and protecting them with electrical tape are not acceptable means of termination.

E. AWG-18 TERMINATIONS. All cable with gauges larger or equal to AWG-18 and all types of stranded conductors shall be terminated on termination blocks part of an active equipment or in termination blocks supplied by the IDSI. The use of wire nuts or manually twisting cables and protecting them with electrical tape are not acceptable means of termination.

F. AWG-18 TERMINATIONS. All termination blocks for cables with gauges larger or equal to AWG-18 and all types of stranded conductors shall be of the captive screw type DIN rail mounted (Allen-Bradley or similar), and shall be selected for the appropriate cable gauge and number of conductors. DIN rail mounted termination blocks shall be provided with all accessories like end clamps, jumpers, end barriers, etc, and shall always be mount inside a security enclosure. Up to 2 conductors can be terminated in the same point in a termination block as long as the combined diameter of the conductors does not exceed the maximum cable diameter allowed by the termination block. No more than 2 conductors shall be terminated in the same point at a termination block regardless of the cable gauges.

G. SMALLER DIAMETER TERMINATION. Termination and splices for AWG-20 or cables with smaller gauges shall be made with compressions style connectors. Wire nuts are not acceptable.

H. WIRE LEADS. When equipment supplied has wire leads instead of termination end points for connections, the only acceptable methods of connection to field wiring are insulated butt splices, quick release connectors (both ends provided) or quick lock self stripping pig tail connectors. All connectors or splices shall be selected according to the gauge of the cable to be terminated.

I. FIRE STOPPING. All penetrations through fire rated barriers shall be provided, by the IDSI, with appropriate fire stopping materials in accordance with NFPA requirements and local fire authority having jurisdiction.

J. NO SPLICES. All cable runs shall be continuous from the device to the equipment. Cable splices shall not be allowed inside conduits, or cable trays.

K. CABLE SEPARATION. Cables of similar signal level shall be bundled together and kept physically separate from power cords, plug strips or other circuits with different potential. Exposed wire bundles or individual cables shall be neatly secured with self-clinching nylon "TY-Raps" (Thomas & Betts or equal).

L. NEAT WORK. Components of the distribution system shall be installed in a neat, workmanlike manner consistent with all best practices.

M. COLOR CODING. Wiring color codes shall be strictly observed and terminations shall be uniform throughout the building.

N. FINGER DUCT. On large enclosures (> 18” on any side) , finger duct wire managers shall be used inside all equipment panels to properly dress cables.

3.4 IDENTIFICATION AND TAGGING

A. The IDSI shall follow labeling materials indicated in specification section 280500

B. All cables shall be labeled at both ends of the cable with the same and unique identifier label.

C. Cable and equipment identifiers shall follow a standard labeling system like ANSI/TIA 606. The identification system chosen by the IDSI shall be submitted for approval to the A&E.

D. All alarm panels shall include a work sheet attached to the interior of the panel/ equipment in plastic envelops. This work sheet shall include the location, type of device and part number of all devices connected to the boards inside those equipments. All names used to identify devices in these worksheets shall match all names and identifiers used in the software or the user interface of the system. A second copy of this worksheet shall be delivered to as part of the as-built information.

3.5 INTRUSION DETECTION SYSTEM PROGRAMMING

A. Programming: It is the responsibility of the IDSI to program all requested features in the IDS as indicated below. There are different levels of programming for the IDS. This is the explanation of each level.

1. HARDWARE PROGRAMMING. On this step all hardware modules are configured, all inputs and output points are assigned names, all partitions are created, system IP addresses, keypads are assigned names, and timing for all devices is established. All this hardware related programming shall be done by the IDSI.
2. USER PROGRAMMING. On this steps access codes, schedules are established for users as well as dial-up information for the system. This user programming step shall be done by the IDSI.
3. INTEGRATION PROGRAMMING. Integration of the IDS with other system shall be done as indicated on this specification section. All integration related programming shall be done by the IDSI.

3.6 ADDITIONAL INSTALLER RESPONSIBILITIES

A. Upon project commencement, the IDSI shall provide qualified technical personnel on-site. Personnel shall be present on each consecutive working day until the system is fully functional and ready to begin the testing phase of this project.

B. During the installation process the IDSI shall maintain an up-to-date set of as-built shop drawings, which shall always be available for review by the client and/or consulting engineers. This set of documents should be clearly annotated with as-built data as the work is performed. These documents will be reviewed as part of the approval process when evaluating payment request applications. At a minimum, the drawings should contain the following information:
1. Quantity and location of all equipment installed.
2. Cable and wire runs along with the designations tags assigned to each.
3. Wiring diagrams that indicate terminal strip layout, identification, and terminations.

C. The IDSI Project Manager shall maintain continuous coordination with the A&E. The A&E shall be kept informed of the progress and all conflicts that arise during the course of this project

3.7 REQUEST OF IP ADRESSES

A. The IDSI shall comply with all requirements indicated in specification section 280500 for requesting IP address for the intrusion detection system.

3.8 SYSTEM WARRANTY AND SERVICE

A. General: The IDSI shall follow all warranty and service requirements indicated in specification section 280500.

3.9 ENGINEER'S FINAL ACCEPTANCE TEST

A. General: The IDSI shall follow all test requirements indicated in specification section 280500.

B. Additional requirements for the system acceptance test:
   1. The day of the final acceptance test the IDSI shall have at least two (2) 2-way radios to communicate between the testing groups. Cell phones are not acceptable for communication since it takes too long to establish communication, and will delay the test substantially. Radios shall be fully charged, and spare batteries shall be available for 8 hours of use.
   2. The final acceptance test will be done with two groups of people. Each group will have at least one member of each stakeholder of the project (A&E, Owner, IDSI, General Installer/ Construction Manager). One group will be station in the monitoring room the other group will be going to all locations in the project where security equipment is installed.
   3. During the final acceptance test every single device in the intrusion detection system will be tested for normal operation and for simulated alarm conditions at both ends (the field devices and in the monitoring room). When possible, security equipment will be tested for operation during main power failure. All features requested in this specification will be tested.

C. Testing of all structured cabling system part of the IDS shall be done in accordance of specification section 271000 as issued by Pinellas County BTS.

3.10 SPARE PARTS

A. The IDSI shall coordinate with the Project Manager for Pinellas County if there is a need for spares for the system or not, and also agree on the quantity of spares.

3.11 TRAINING AND INSTRUCTION

A. General: The IDSI shall follow all training requirements indicated in specification section 280500.

B. The IDSI shall provide the following levels of training for this project as explained in this section.

C. MAINTENANCE TRAINING.
   1. Maintenance training shall be provided for maintenance and IT personnel. The purpose of this training is to explain how to troubleshoot and replace all field devices and hardware.
   2. This training shall cover at least the following topics:
      a. Trouble shooting and replacement of all field devices.
      b. Installation of all field panels and settings (jumpers, dip switches, etc).
      c. Wire labeling system.
      d. Software system installation and recover from system crashes.
      e. Detail explanation on all physical keys used in security devices.
      f. Routine preventive maintenance procedures recommended by equipment manufacturers for all components of the system.
   3. This training shall be provided by personnel working directly for the IDSI or a direct employee of the manufacturer of the system.
   4. One session of this type of training shall be provided and video-taped. This session shall last no less than 2 hours, broken down into different day sessions no longer than 6 hours each.

5. Each session could have up to 5 trainees.
6. The approved O&M manuals shall be available at the time of the training.

3.12 AS-BUILT DOCUMENTS AND CLOSE OUT INFORMATION.

A. General: The IDSI shall follow all as built and close out information requirements indicated in specification section 280500.

B. Additional requirements for as-built documentation shall include:
1. Approved as-built drawings shall be a complete set of floor plans drawings, riser diagrams, and wiring details indicating the layout and interconnection of the system. All cable routings and elevation of each outlet, tie, and riser cable terminations shall be required.
2. Each sensor in the as-built drawings shall include the zone number (or address) used in the system.
3. The content of the as-built information shall be no less than the content provided during the shop drawings, and shall be modified as per changes done during construction.

C. Close out information shall also include:
1. Completed Worksheets for the programming and configuration of the IDS filled out with all the information used in the programming of the IDS.
2. Testing reports for structured cabling system used for the IDS.

END OF SECTION 281010

SECTION 282000 CLOSED CIRCUIT TELEVISION/VIDEO SURVEILLANCE SYSTEM

PART 1 - GENERAL

1.1 PURPOSE OF THIS DOCUMENT

A. The purpose of this specification section as well as other specifications under Division 28 is to indicate to Architects & Engineers (A&E) and designers of Video Surveillance Systems in construction or renovation projects for Pinellas County Government what the design preference are by Pinellas County when it comes to such infrastructure. This document will be a starting point for completing a set of construction documents, but it **SHALL NOT** be used unedited as a bid document

1.2 SCOPE OF WORK

A. The scope of work shall include furnishing all labor, all security video cameras, mounts, housings, power supply systems, cabling, connectors, and head end components, including all other hardware and software and documentation required to provide a completely operational and working Closed Circuit Television (CCTV) System.

B. All materials for the structured cabling system (4-pair UTP cables, fiber optic cables and 24-AWG multi-pair (25 pairs or higher) components required for the video surveillance system shall be in compliance with specification Section 271000, as issued by Pinellas County BTS.

C. The following parts of the system are not included in this specification, these devices are owner procured. Nevertheless, the cost of these items shall be included in the project budget:
1. All networking equipment (switches, routers, etc) for the operation of the system
2. All computers and software to run the security system.

1.3 RELATED DOCUMENTS

A. Supplemental: Refer to the specification sections identified below for additional requirements, which are supplemented by this section.
1. 280500 COMMON WORK RESULTS FOR SAFETY AND SECURITY SYSTEMS.
2. 281010 INTRUSION DETECTION SYSTEM
3. 281000 ELECTRONIC SECURITY SYSTEMS

1.4 EXISTING SYSTEMS.

A. Currently at Pinellas County Facilities there are a multitude of video surveillance systems, depending on who is managing the system. This is a list of systems currently used by different groups within the County:
1. For facilities under the control of Pinellas County Sheriff's Offfice (PCSO), Bosch Divar systems are used with a multitude of Bosch cameras.
2. For all facilities managed by Pinellas County Real Estate Management (REM), the video surveillance system is mostly Honeywell P series system with a multitude of Honeywell Cameras.
3. For all facilities managed by Pinellas County Utilities, the video surveillance system is Interlogix TVN21 with a variety of Honeywell and Bosch cameras.

1.5 NOTE TO DESIGNERS OR CONSULTANTS. The designer or consultant for each project shall communicate with the owner's Project Manager to establish what party in particular will be managing the building to determine what system needs to be specified, based on the existing systems above. No different systems than the ones mentioned above shall be installed in a new or renovated facility at Pinellas County Facilities, unless requested specifically by the Owner. Pinellas County can provide details about the latest version of the software used by each party

1.6 CCTV INSTALLER QUALIFICATIONS

A. The Video Surveillance or CCTV installer (CI) selected for this project must be a direct representative of the products they intent to provide. All technicians assigned to install and configure this system shall be factory trained. This company must be of established reputation and experience, regularly engaged in the supply and support of such systems for a period of at least five consecutive years under the current company name.

B. Other required CI qualifications are:
   1. The CI shall agree, in writing, as part of their proposal, to provide both warranty and non-warranty service within 4 hours of notification of a problem. The CI shall be able to perform any and all repairs to the system within 24 hours.
   2. The CI, as a minimum, must carry a current state issued limited energy license.
   3. The CI shall have staff trained in programming the CCTV system as described in this specification. The CI shall submit as part of the qualifications required, the resume of the programmers for the CCTV system as well as the training certificates for this staff from the manufacturer of the system.

1.7 MATERIALS ALTERNATES AND SUBSTITUTION

A. General: See details for alternates and substitution in specification section 280500

B. Due to compatibility issues with other buildings under the control of the owner, the only approved Digital Video Management System (DVMS) to be provided are expansions to the existing systems. No substitutions are accepted for this type of equipment.

1.8 SHOP DRAWINGS AND SUBMITTALS

A. The CI shall follow all requirements for shop drawings indicated in specification section 270010

B. The submittal process for this scope of work will be a two stage process. The first stage is the product/installer approval. Within 30 business days of receiving contract approval and notice to proceed, the following items shall be submitted to the Architect and Engineer (A&E) of the project for review, as part of the product/installer approval process.
   1. Proof of Installer qualifications, addressing all requirements of paragraph 1.6 of this specification.
   2. Product numbers, specifications, and data sheets for all equipment.
   3. Data sheets and samples of all labeling materials and equipment to be used in the project.
   4. A complete explanation of the identification method to be used for all equipment and cabling part of the CCTV system.
   5. Data sheets of all termination blocks and mounting accessories to be used in the project. A paragraph shall be added before each data sheet indicating the intended use of each type of termination block.
   6. Detailed drawings of all custom products to be used in the project.
   7. Data sheets for all wire and cable to be used as part of this system. A paragraph shall be added before each data sheet indicating the intended use (to connect what type of devices) of each cable.

C. The second stage of the submittal process is the shop drawing process. Shop drawings shall only be submitted after all portions of the product/installer approval have been accepted by the A&E. The following information is required as part of the shop drawings:
   1. Floor plans indication all devices to be provided and all cable runs to all devices or junction boxes. All cameras shall indicate the camera number in the system and the type of camera and mounting.
   2. Point to point wiring diagrams indicating all termination points for each conductor and for each device, cable types and color coding of each termination. These diagrams shall be submitted for each camera type.
   3. Storage calculation. The CI shall provide a spreadsheet with all the cameras in the project and the proposed recording frame rates, resolutions, retention period, activity percentages and times of recording with the total number of storage bytes per camera and a total for the system. The total storage capacity shall be indicated in Terabytes.
   4. Bandwidth calculation. The CI shall provide a network bandwidth calculation for the system. This calculation shall be presented in the form of a spreadsheet using MBPS as the units listing all cameras in the project. The spreadsheet shall have subtotals per network region associated with a storage area.
   5. Completely fill out network configuration template provided by Owner or Pinellas County BTS upon request, to explain all network devices to be used in a project and to get IP addresses from the network administrator.
   6. Video recording server assignment. A list of all the video servers to be provided in the project with a list of all cameras assigned to each server. Each server shall have a total bit rate estimated for all the cameras recorded showing that the capacity requirements of the server comply with the requirements in this specification.
   7. Panel schedules in a table format, indicating all ports being used and what device is connected to each port. Panel schedules shall be submitted for all camera power supply, multiport encoder/decoders, computer monitor outputs, fiber optics distribution frames, Ethernet switches, patch panels, termination blocks, etc.
   8. Overall system diagrams indicating all head end components, their room location, and all configuration characteristics like IP addresses, serial ports used, etc.
   9. A field of view study. This field of view is a collection of still pictures with the precise field of view for each camera to be installed in the project. The field of view shall be the same coverage as the camera specified and will be used to verify installation of the cameras and during acceptance test.
   10. Outline of the testing process.

1.9 ABBREVIATIONS

A. The following abbreviations are used in this document:
   1. API - Application Programming Interface
   2. ASCII - American Standard Code for Information Interchange
   3. BPS - Bits Per Second
   4. CIF - Common Intermediate Format (352 X 240)
   5. 2CIF - Common Intermediate Format (704 X 240)
   6. 4CIF - Common Intermediate Format (704 X 480)
   7. DVI - Digital Visual Interface
   8. FCC - Federal Communications Commission
   9. GUI - Graphical User Interface
   10. HDMI - High Definition Multimedia Interface
   11. ID - Identification
   12. I/O - Input /Output
   13. IPS - Images Per Second
   14. MBPS - Mega Bits per Second
   15. NTP - Network Time Protocol
   16. NTSC - National Television Standard Committee
   17. ODBC - Open Database Connectivity

18. ONVIF - Open Network Video Interface Forum
19. O&M - Operations and Maintenance
20. PAL - Phase Alternating Line
21. PIN - Personal Identification Number
22. PTZ - Pan/Tilt/Zoom
23. RAID - Redundant Array of Independent Disks
24. RoHS - Restriction of Hazardous Substances Directive
25. SDRAM - Synchronized Dynamic Random Access Memory
26. STP - Shielded Twisted Pair
27. TCP/IP - Transmission Control Protocol/Internet Protocol
28. UL - Underwriters Laboratories, Inc.
29. UPS - Uninterrupted Power Supply
30. USB - Universal Serial Bus
31. UTP - Unshielded Twisted Pair
32. VOC - Volatile Organic Compounds

1.10 SYSTEM DESCRIPTION

A. The CCTV system shall be a TCP/IP network-based, fully distributed digital video system. The CCTV system will utilize local area networks (LAN) as a transmission medium for video, configuration, as well as storage of all data. The CCTV system shall provide full video control at the management point indicated in the design drawings, with additional full selection capability at any point within the network from a computer workstation. The CCTV system shall provide unlimited expansion capability for the addition or modification of any video device or computer workstation.

B. The CCTV system shall permit normal and event monitoring of all secured areas on digital monitors as required or shown in the specifications and drawings. In all cases, the equipment shall be state of the art, standardized commercial off-the-shelf, and modular. In all cases, the method of communication from remote locations within the network to the central components shall be transparent to the user. Equipment shall be selected and installed so repairs may be accomplished on site by module replacement, utilizing spare components whenever possible.

C. The intent of this specification is to provide the owner with a distributed networked digital security system. Supplied by the CI, the CCTV system shall be complete and operational per the performance requirements and objectives of these specifications. The CI shall be responsible for the coordination of related work with other trades affecting his/her work or the work of others.

D. All cameras shall be connected and controlled through a CCTV workstation utilizing a standard mouse and keyboard.

PART 2 - PRODUCTS

2.1 DIGITAL VIDEO MANAGEMENT SYSTEM

A. The digital video management system shall be composed of off the shelf management servers, storage system and the DVMS Software. There are multiple options for acceptable Storage solutions. The recommended storage solution for each project needs to be discussed with the owner in a project-by-project case. Two examples of storage solutions are:
   1. The recording system shall be based on a Storage Array Network (SAN) configuration. The storage system shall be composed of DVMS management server, DVMS recording servers, storage arrays, and storage expansion units.

2. The recording system shall be based on a unified NVR composed of a complete server, storage array, storage drives and expansion modules as required.

B. The DVMS recording servers shall process all video streams for recording, live viewing, and playback for the cameras assigned to that recorder. Servers shall be provided in quantities as to not any single server being used at more than 75% of the maximum bit rate capacity of the server. Quantities of servers indicated in the drawings are preliminary and the CI shall provide calculations to the A&E of the final quantity of servers to be provided.

2.2 CCTV WORKSTATION

A. All new workstation to view the CCTV system will be owner provided, but paid by the project.

2.3 PTZ IP CAMERA

A. The PTZ IP camera dome system shall include a built-in 100Base-TX network interface or better for live streaming to a standard Web browser.

B. The PTZ IP dome camera dome system shall operate in an IP video system environment specified for this project and shall be controllable form that platform, as well as open architecture connectivity for third-party software recording solutions. The PTZ IP dome camera shall be an ONVIF compliant camera.

C. The video imager of the PTZ IP camera meet or exceed the following design and performance specifications:
1. Imager type: Progressive scan CMOS
2. Maximum Resolution: As indicated in the design drawings.
3. Frame rate: up to 50/60 frames per second @ maximum resolution.
4. Video compression: H.264 (MPEG-4 Part 10/AVC) Baseline, Main and High Profiles, H.265 (MPEG-H Part 2/HEVC) Main Profile or Motion JPEG.
5. Video streams: Multiple, individually configurable streams in H.264, H.265 and motion JPEG.
6. Minimum illumination: Color: 0.15 lux at 50 IRE, F1.6 B/W: 0.003 lux at 50 IRE, F1.6
7. Gain control: automatic
8. Audio (when required by owner): Two way, full duplex audio with a 24 bit LPCM compression system.

D. The lens of the PTZ IP camera meet or exceed the following design and performance specifications:
1. Focus: Automatic
2. Iris: auto-iris
3. Zoom: Optical zoom 40X, 32X or 30X and digital zoon of X12

E. The dome drive for the PTZ IP camera system shall meet or exceed the following design and performance specifications:
1. Pan capabilities: 360° endless
2. Tilt capabilities: 180° with auto-flip capabilities
3. Pan/Tilt Speed: Variable between 450° per second continuous pan to 0.05° per second
4. Additional PTZ drive features:
    a. Preset positions: >100 positions.
    b. Proportional Pan/Tilt Speed: Speed decreases in proportion to the increasing depth of zoom.
    c. Tour recording (max 10, 16 minutes each)
    d. Guard tour: max 100

F. The PTZ IP camera shall have the following network security features and processing abilities:

1. Security features:
    a. Password protection,
    b. IP address filtering,
    c. HTTPS encryption,
    d. IEEE 802.1x (EAP-TLS) network access control
    e. Digest authentication
    f. User access log.
    g. Centralized certificate management
    h. Brute force delay protection
2. Supported protocols: IPv4, IPv6 USGv6, HTTP, HTTPSa, SSL/TLSa, QoS Layer 3 DiffServ, FTP, SFTP, CIFS/SMB, SMTP, Bonjour, UPnP®, SNMP v1/v2c/v3 (MIB-II), DNS, DynDNS, NTP, RTSP, RTP, SRTP, TCP, UDP, IGMP, RTCP, ICMP, DHCP, ARP, SOCKS, SSH, NTCIP, LLDP, MQTT,
3. Analytics: included when required by owner
4. Included Analytics:
    a. Video motion detection.
    b. Tripp line alarms
    c. Loitering behavior.
    d. People auto-tracking
    e. Audio detection

G. The PTZ IP camera shall have these other characteristics:
1. Housing: Metal (aluminum) casing for outdoor cameras and impact resistant polycarbonate housing for interiors
2. Lower dome: acrylic clear dome
3. Power: PoE or Separate 24VDC power connector.
4. Local storage: not required
5. Operating temperature: 0 °C to 50 °C (32 °F to 122 °F)
6. Operating humidity: 10–85% RH (non-condensing)

H. Approved manufacturers: Bosch, Honeywell.

I. Design selection: The CI shall select a camera that complies with the performance requirements indicated above from the approved manufacturer's list.

2.4 FIXED IP DOME CAMERA

A. The fixed IP dome camera for this project shall be an integrated camera and dome.

B. The fixed IP dome camera shall include a built-in 100Base-TX network interface or better for live streaming to a standard Web browser.

C. The fixed IP dome camera shall operate in an IP video system environment specified for this project and shall be controllable form that platform, as well as open architecture connectivity for third-party software recording solutions.

D. The fixed IP dome camera shall meet or exceed the following design and performance specifications:
1. Image sensor type: Progressive scan RGB CMOS
2. Maximum imager resolution: As indicated in design drawings
3. Frame rate: 30 fps at the maximum resolution possible in the camera.
4. Video streaming: Multiple, individually configurable streams in H.264 and H.265
5. Video compression: H.264 (MPEG-4 Part 10/AVC) Baseline, Main and High Profiles and H.265 (MPEG-H Part 2/HEVC) Main Profile.
6. Lens: Varifocal with an ability to provide a horizontal field of view from 50° to 90°

7. Focus/zoon (back focus): Manual
8. Minimum illumination: 0.12 lux at 50 IRE
9. Camera adjustment: manual pan adjustment 360° and tilt adjustment 80°
10. Audio (When required by owner): Two way, full duplex audio with a 24 bit LPCM compression system.
11. Audio input/outpu (when required by owner)t: Input for external microphone or line-level device, Line output with automatic gain control.
12. Network security: Password protection, IP address filtering, IEEE 802.1X (EAP-TLS) network access control a , HTTPSa encryption, digest authentication, user access log, centralized certificate management, brute force delay protection, signed firmware.
13. Supported protocols: IPv4, IPv6 USGv6, HTTP, HTTPS, SSL/TLSa, QoS Layer 3 DiffServ, FTP, SFTP, CIFS/SMB, SMTP, Bonjour, UPnPTM, SNMP v1/v2c/v3 (MIB-II), DNS, DynDNS, NTP, RTSP, RTP, SFTP, TCP, UDP, IGMP, RTCP, ICMP, DHCP, ARP, SOCKS, SSH, SIP, LLDP, MQTT.
14. Analytics: included when required by owner
15. Included Analytics:
    a. Video motion detection.
    b. Tripp line alarms
    c. Loitering behavior.
    d. Audio detection
16. Casing: Polycarbonate impact resistant (IK10 rated) and weather resistant IP52 (rated).
17. Lower dome: clear.
18. Power connection: PoE IEEE 802.3af/802.3at Type 1
19. IR illumination: as requested by owner
20. Local storage: not required.
21. Operating temperature: 0° C to 50° C (32° F to 122°F)
22. Operating humidity: 10–95% RH (non-condensing)

E. Approved manufacturers: Bosch, Honeywell.

F. Design selection: The CI shall select a camera that complies with the performance requirements indicated above from the approved manufacturer's list.

2.5 PANORAMIC MULTI-IMAGER FIXED IP DOME CAMERA

A. The panoramic multi-imager fixed IP dome camera for this project shall be an integrated camera and dome.

B. The panoramic multi-imager fixed IP dome camera shall include only one built-in 100Base-TX or better network interface for live streaming to a standard Web browser.

C. The panoramic multi-imager fixed IP dome camera shall operate in an IP video system environment specified for this project and shall be controllable form that platform, as well as open architecture connectivity for third-party software recording solutions.

D. The panoramic multi-imager fixed IP dome camera shall meet or exceed the following design and performance specifications:
1. Image sensor type: Three (3) or four (4) Progressive scan RGB CMOS
2. Maximum imager resolution: As indicated in design drawings but no less than 3 MP per imager
3. Frame rate: 30 fps at all resolutions.
4. Video streaming: Multiple, individually configurable streams in H.264 and H2.265
5. Video compression: H.264 (MPEG-4 Part 10/AVC) Baseline, Main and High Profiles and H.265 (MPEG-H Part 2).
6. Lens: Fixed focus or varifocal with the ability to provide 180° or 360° field of view, as indicated in the design drawings, with all the imagers.

7. Minimum illumination: 0.3 lux at 50 IRE
8. Audio: Two way (when required by owner), full duplex audio with a 24 bit LPCM compression system.
9. Audio input/output (when required by owner): Input for external microphone or line-level device, Line output with automatic gain control.
10. Network security: Password protection, IP address filtering, IEEE 802.1X (EAP-TLS) network access control a , HTTPSa encryption, digest authentication, user access log, centralized certificate management, brute force delay protection, signed firmware.
11. IP address: One IP address for all imagers.
12. Supported protocols: IPv4, IPv6 USGv6, HTTP, HTTPS, SSL/TLSa, QoS Layer 3 DiffServ, FTP, SFTP, CIFS/SMB, SMTP, Bonjour, UPnPTM, SNMP v1/v2c/v3 (MIB-II), DNS, DynDNS, NTP, RTSP, RTP, SFTP, TCP, UDP, IGMP, RTCP, ICMP, DHCP, ARP, SOCKS, SSH, SIP, LLDP, MQTT.
13. Analytics: included when required by owner
14. Included Analytics:
    a. Video motion detection.
    b. Tripp line alarms
    c. Loitering behavior.
15. Casing: Polycarbonate impact resistant (IK9 rated or higher) and weather resistant IP66 (rated).
16. Lower dome: clear.
17. Power connection: PoE IEEE 802.3af/802.3at Type 1
18. IR illumination: when required by owner
19. Local storage: not required
20. Operating temperature: 0 °C to 50 °C (32 °F to 122 °F)
21. Operating humidity: 10–95% RH (non-condensing)

E. Approved manufacturers: Bosch, Honeywell..

F. Design selection: The CI shall select a camera that complies with the performance requirements indicated above from the approved manufacturer's list.

2.6 PANORAMIC SINGLE IMAGER FIXED IP DOME CAMERA

A. The panoramic single imager fixed IP dome camera for this project shall be an integrated camera and dome.

B. The panoramic single imager fixed IP dome camera shall include only one built-in 100Base-TX or better network interface for live streaming to a standard Web browser.

C. The panoramic single imager fixed IP dome camera shall operate in an IP video system environment specified for this project and shall be controllable form that platform, as well as open architecture connectivity for third-party software recording solutions.

D. The panoramic single imager fixed IP dome camera shall meet or exceed the following design and performance specifications:
1. Image sensor type: One (1) Progressive scan RGB CMOS
2. Maximum imager resolution: 12 MP or better
3. Frame rate: 30 fps at all resolutions.
4. Video streaming: Multiple, individually configurable streams in H.264 and Motion JPEG
5. Video compression: H.264 (MPEG-4 Part 10/AVC) Baseline, Main and High Profiles and Motion JPEG.
6. Lens: Fixed focus, fixed iris with the ability to provide 180° in the vertical and horizontal directions.
7. Minimum illumination: 0.19 lux at 50 IRE

8. Audio (when required by owner): Two way, full duplex audio with a 24 bit LPCM compression system.
9. Audio input/output (when required by owner): Input for external microphone or line-level device, Line output with automatic gain control.
10. Network security: Password protection, IP address filtering, IEEE 802.1X (EAP-TLS) network access control a , HTTPSa encryption, digest authentication, user access log, centralized certificate management, brute force delay protection, signed firmware.
11. IP address: One IP address for all imagers.
12. Supported protocols: IPv4, IPv6 USGv6, HTTP, HTTPS, SSL/TLSa, QoS Layer 3 DiffServ, FTP, SFTP, CIFS/SMB, SMTP, Bonjour, UPnPTM, SNMP v1/v2c/v3 (MIB-II), DNS, DynDNS, NTP, RTSP, RTP, SFTP, TCP, UDP, IGMP, RTCP, ICMP, DHCP, ARP, SOCKS, SSH, SIP, LLDP, MQTT.
13. Analytics: when required by onwer
14. Included Analytics:
    a. Video motion detection.
    b. Tripp line alarms
    c. Loitering behavior.
15. Casing: Polycarbonate impact resistant (IK10 rated) and weather resistant IP66 (rated).
16. Lower dome: clear.
17. Power connection: PoE IEEE 802.3af/802.3at Type 1
18. IR illumination: when required by owner
19. Local storage: not required
20. Operating temperature: 0 °C to 50 °C (32 °F to 122 °F)
21. Operating humidity: 10–95% RH (non-condensing)
22. The DVMS used in the project shall have the de-warping software required to make the video image more usable.

E. Approved manufacturers: Bosch, Honeywell..

F. Design selection: The CI shall select a camera that complies with the performance requirements indicated above from the approved manufacturer's list.

2.7 CAMERA MOUNTS AND ADAPTERS

A. All cameras shall be provided with the mounts and adapters as indicated in the floor types and mounting types indicated in part 3 of this specification. Each camera type indicated in the floor plans shall be matches to one camera type. Examples of mount and adapters include wall mount, trim rings, corner mounts, pole mounts, suspended pole mounts, etc.

B. The CI shall choose the mounts based on the equipment being supported. All mounts shall be made by the same manufacturer of the cameras. Custom made mount are not acceptable, unless approved by the A&E.

2.8 FIBER OPTIC TRANSCEIVERS

A. When wiring for cameras exceed 300 ft of wiring distance and or on a site, one of the solutions is the use of Fiber optic transceivers.

B. Fiber optic transceivers shall be available for singlemode and multimode fiber optic cable.

C. Field mounted transceivers shall be single port (RJ-45) and shall be capable of being installed inside a 12" x 12" junction box. The field mounted transceiver shall be the Comnet CNFE100 series or approved equal.

D. Where installed in a rack, provide a rack mount chassis with transceivers designed to mount in the chassis. The chassis shall include a 120 VAC power supply. If the quantity of rack mount transceivers required in an IDF is greater than 3, then a redundant 120 VAC power supply shall be provided. The three transceiver card cage shall be the Comnet C3 or approved equal. The card cage designed to house more than three transceivers shall be the Comnet C2 or approved equal.

E. Other solutions, different than fiber optics transceiver, for long reaching devices can be discuss with the owner and request specific approval.

2.9 OUTDOOR CCTV CAMERA POWER SUPPLY

A. All cameras in exterior environments connected to the system through fiber optics and installed far away from a telecommunications room shall be powered through a local outdoor CCTV camera power supply.

B. The outdoor CCTV camera power supply shall allow for a variety of configurations for powering up to four outdoor units from a single power source and shall allow for 24 VAC output for 1-4 units. The power supply shall allow the capability to handle pan/tilt, heater, and blower operation in addition to the camera; shall allow for one fused output; and be capable of handling up to 4 A (100 VA).

C. The outdoor power supply shall meet or exceed the following design and performance specifications:
1. Input Voltage 100/120/240 VAC, 50/60 Hz
2. Output Voltage 4/26/28 VAC
3. Required Input Current: 1 A
4. Output Fuse/Circuit Breaker Ratings 4 A
5. Input Connectors:Screw-type barrier strips
6. Output Connectors: Screw-type barrier strips.
7. Input Wire Size: 12-16 gauge solid wire
8. Output Wire Size 16-20 gauge solid or stranded wire
9. Environment: Outdoor
10. Operating Temperature: -50° to 122°F (-46° to 50°C)
11. Construction: Aluminum
12. Finish: Gray polyester powder coat
13. Cable Entry: Hole plugs for 0.75-inch (1.9 cm) conduit
14. Latch: Stainless steel link-lock latch; can be secured with a padlock.
15. Certifications: UL

D. Design selection: Pelco WCS1-4 or equal.

2.10 SURGE PROTECTION

A. All CCTV components mounted outside the building shall be provided with surge and lightning protection. Provide UL listed multi-stage protection on all low voltage and signal transmission lines. All 120 VAC surge suppression devices shall be EDCO HSP121BT-1RU or an approved equal.

B. For exposed Ethernet connections with PoE, use EDCO CAT6-E PoE or approved equal.

2.11 WIRE & CABLE

A. Cables for camera power supply shall have the following specifications:
1. Minimum cable gauge: AWG 18
2. Number of conductors: 2, stranded conductors
3. Conductor type: Bare copper

4. Cable insulation: PVC
5. Conductor insulation colors: Black and red.
6. Voltage rating: 300V
7. Cable shield: No cable shields

B. HDMI or DVI cables shall be factory made and tested cables. For all DVI connections use an HDMI cable with HDMI to DVI adapters. All HDMI cables shall be capable of passing a signal at 340 MHz,

C. All UTP Category horizontal cables and fiber optic cables for the CCTV system shall be in compliance of all requirements in specification section 271000 issued by Pinellas County BTS and shall be under the same warranty as all UTP category cables and fiber optic cables described in specification section 271000.

D. Cable gauge: All cable gauges shall be estimated as to allow a maximum of 5% voltage drop from the source to the load. Sizes given previously are only minimum gauges accepted. The Installer shall always estimate proper values.

E. Cable jackets: All cable jackets shall be suitable for the environment on which the cables will be installed. Use plenum rated cables when cables are installed in plenum spaces. Use riser rated cables when cables are installed through floor sleeves. Use cable jackets with water-blocking material when installed in underground conduits.

F. Cable jackets for this project: Except when cables are run continuously in conduit all cable or patch cord cables; jackets for CCTV cables shall be plenum rated.

G. All cables shall be RoHS compliant and free of VOC. The SSI shall provide proof of compliance for all cables during the submittal process.

H. Acceptable manufacturers: Belden, Alpha Wire Company, General Cable and West Penn Wire.

2.12 IDENTIFICATION AND LABELING TAGS

A. The CI shall follow labeling materials indicated in specification section 280500.

PART 3 - EXECUTION

3.1 CAMERA MOUNTING TYPES

A. GENERAL. Cameras in the project can have different mounting types depending on how they will be installed. This is regardless if the cameras are PTZ, fixed or panoramic. The mounting type definitions are all the same regardless of the imager type. The CI shall select the correct accessories for mounting the cameras according to the types indicated in the floor plan drawings.

B. TYPE 1: Ceiling recessed or semi-recessed application. This type of mount is for interiors, mostly in accessible ceiling spaces although it can be used in hard ceilings. Required accessories for this camera type:
1. Dome backbox to protect the electronics above the ceiling, allowing for flex conduit connections and the use of secondary support string if required.

C. TYPE 2: Surface mounted vertical mount. This type of mount is for interior or exterior applications, wall mounted. Required accessories for this camera type:
1. Adapter plate (if required) to mount directly into an electrical box.

2. For exterior applications, weatherproofing is required between the wall and the camera.
3. For exterior applications, the lower dome shall have a hood with the ability to provide a 180 degree protection at the top of the lower dome to prevent the camera from direct sunlight and water stains.
4. For installation directly in concrete walls, columns or other structures where recessing a box is not possible, a backbox is required to provide conduit knock-outs or fittings behind the camera.

D. TYPE 3: Wall mounted. This type of mount is for interior or exterior applications, wall mounted. Required accessories for this camera type:
1. Wall mount.
2. Only for fixed cameras: Adapter plate (if required) to mount directly into an electrical box.
3. Housing accessories required to attach the camera to the wall mount.
4. When this camera type is indicated in a building corner, a corner mount adapter shall be provided as well.

E. TYPE 4: Surface mounted horizontal mount. This type of mount is for interior or exterior applications, in hard ceiling conditions. Required accessories for this camera type:
1. Adapter plate (if required) to mount directly into an electrical box.
2. Rings or collars to protect the top part of the dome (if required).
3. For installation directly on concrete/steel decks, a camera base with conduit knockouts or conduit fittings is required.

F. TYPE 5: Suspended installation. This type of mount is for interior or exterior applications, suspended from ceiling or slab above. Required accessories for this camera type:
1. Pole mount adapter for housing.
2. Pole extension. This could be a section of steel pipe cut and threaded as required for the pole mount adapter.
3. Pole base: this is the device that attaches the pole to the structure above.
4. For installation directly on concrete/steel decks, a base with conduit knockouts or connections is required above the pole extension.

G. TYPE 7: Pole mounted. This type of mount is for exterior applications on a pole. Required accessories for this camera type:
1. Wall mount.
2. Pole mount adapter.
3. Housing accessories required to attach the camera to the wall mount.

3.2 INSTALLATION PRACTICES

A. General: The CI shall follow all installation practices indicated in specification section 280500

3.3 WIRING METHODS

A. All proposed wire and cable shall meet or exceed the recommendations established by the equipment manufacturers, and shall comply with all state and local codes.

B. Visually inspect all wire and cable for faulty insulation prior to installation. Protect cable ends at all times with acceptable end caps.

C. Provide grommets and strain relief materials where necessary to avoid abrasion and excess tension on wire and cable.

D. All penetrations through fire rated barriers shall be provided, by the CI, with appropriate fire stopping materials in accordance with NFPA requirements and local fire authority having jurisdiction.

E. All cable runs shall be continuous from the device to the equipment. Cable splices shall not be allowed inside conduits, or cable trays.

F. All cameras shall have a camera interface box with disconnect means to horizontal cabling for testing purposes and service. Camera interface boxes shall be located in accessible ceiling spaces as close as possible to the camera. Disconnect means shall be provided for UTP cables in the form of an 8-pin modular plug and receptacle. Disconnect means shall be provide for low voltage camera power cables in the form of insulated spade connectors (female connectors in load side, male connectors in camera side).

G. All video cable connectors and terminations shall be 3-way crimp-on type and shall including connector cables for 24 VAC input and video/data coax output. Twist on style connectors will not be acceptable for any terminations on this project.

H. Cables of similar signal level shall be bundled together and kept physically separate from power cords, plug strips or other circuits with different potential. Exposed wire bundles or individual cables shall be neatly secured with self-clinching nylon "TY Raps" (Thomas & Betts or equal). Lacing of cables shall not be permitted.

I. All cables run part of the CCTV system in areas where ceiling is not accessible or in building exterior shall be always in conduit

J. All termination of UTP Category type multi pair cables shall be done in Insulation Displacement Connectors (IDC), modular plugs or connectors. The use of wire nuts or manually twisting cables and protecting them with electrical tape are not acceptable means of termination.

K. Components of the distribution system shall be installed in a neat, workmanlike manner consistent with all best practices.

L. Wiring color codes shall be strictly observed and terminations shall be uniform throughout the building.

3.4 IDENTIFICATION AND TAGGING

A. All cables, wires, wiring forms, terminal blocks, and terminals shall be clearly identified by pre-printed labels or tags. The permanent markings shall clearly indicate the function, source, and destination of all cabling, wire, and terminals. All cables shall be labeled at both ends of the cable with the same and unique identifier label.

B. Cable and equipment identifiers shall follow a standard labeling system like ANSI TIA-606. The identification system chosen by the CI shall be submitted for approval to the A&E.

C. All camera power supplies, patch panels shall include a work sheet attached to the interior of the equipment cabinet in plastic envelops. This work sheet shall include the location, type of device and part number of all devices connected to the boards inside those cabinets. All names used to identify devices in these worksheets shall match all names and identifiers used in the software or the user interface of the system. A second copy of this worksheet shall be delivered to as part of the as-built information.

3.5 CCTV SYSTEM PROGRAMMING

A. IP Video Management System (IPVMS) programming: The programming responsibility shall be coordinated between owner and CI on a project by project basis. As a starting point, project where the

Pinellas County Sheriff's office is involved, programming could be done by owner. In project where the Pinellas County Sheriff's office is not involved, the programming will be by the CI.

B. The CI shall engage with the system managers for each of the groups at Pinellas County and determine the precise recording rates and resolutions for each project.

3.6 ADDITIONAL INSTALLER RESPONSIBILITIES

A. Upon project commencement, the CI shall provide qualified technical personnel on-site. Personnel shall be present on each consecutive working day until the system is fully functional and ready to begin the testing phase of this project.

B. During the installation process the CI shall maintain an up-to-date set of as-built shop drawings, which shall always be available for review by the client and/or consulting engineers. This set of documents should be clearly annotated with as-built data as the work is performed. These documents will be reviewed as part of the approval process when evaluating payment request applications. At a minimum, the drawings should contain the following information:
   1. Quantity and location of all equipment installed.
   2. Cable and wire runs along with the designations tags assigned to each.
   3. Wiring diagrams that indicate terminal strip layout, identification, and terminations.

C. The CI Project Manager shall maintain continuous coordination with the consulting engineers. The engineers shall be kept informed of the progress and all conflicts that arise during the course of this project. Prior to the start of construction the CI shall submit a complete plan and schedule for proposed operations. This schedule should include information relevant to number of employees assigned to the project, work hours, etc.

3.7 REQUEST OF IP ADRESSES

A. The CI shall comply with all requirements indicated in specification section 280500 for requesting IP address for the video surveillance system.

3.8 SYSTEM WARRANTY AND SERVICE

A. General: The CI shall follow all warranty and service requirements indicated in specification section 280500.

3.9 ENGINEER/OWNER'S FINAL ACCEPTANCE TEST

A. General: The SSI shall follow all test requirements indicated in specification section 280500.

B. Additional requirements for the system acceptance test:
   1. The day of the final acceptance test the CI shall provide 2-way communication devices for multiple testing groups at multiple locations in the same project. Communication devices shall be fully charged, and spare batteries shall be available for 8 hours of use.
   2. The final acceptance test will be done with two or more groups of people. Each group will have at least one member of each stakeholder of the project (A&E, Owner, SSI, General Installer/ Construction Manager). One group will be station in the monitoring room the other groups will be going to all locations in the project where security equipment is installed.

3. During the final acceptance test every single camera will be tested in the system. When possible, CCTV equipment will be tested for operation during main power failure. All features requested in this specification will be tested

C. Testing of all structured cabling system part of the Video Surveillance system shall be done in accordance of specification section 271000 as issued by Pinellas County BTS

3.10 SPARE PARTS

A. The CI shall coordinate with the Project Manager for Pinellas County if there is a need for spares for the system or not, and agree on the quantity of spares.

3.11 TRAINING AND INSTRUCTION

A. General: The CI shall follow all training requirements indicated in specification section 280500.

B. The CI shall provide two (2) levels of training for this project as explained in this section.

C. OPERATOR/ADMINISTRATION TRAINING.
1. Operator/Administration training shall be provided for security and IT personnel interacting with the CCTV system in all security monitoring rooms. The purpose of this training is to explain clearly how the complete system operates and what the different status indicators mean.
2. This training shall cover at least the following topics:
   a. Operation of the CCTV system software (all aspects).
   b. Alarm response and alarm reset in the security monitoring room
   c. Data backup/restore and achieving.
   d. File import/export.
   e. Creating reports and print outs.
   f. Basic system troubleshooting.
   g. Creating users and password reset.
3. This training shall be provided by personnel working directly for the CI or a direct employee of the manufacturer of the system.
4. One session of this type of training shall be provided and recorded in digital format. This session shall last no less than 6 hours, broken down into day sessions no longer than 3 hours each.
5. Each session could have up to 20 trainees.
6. The approved O&M manuals shall be available at the time of the training.

D. MAINTENANCE TRAINING.
1. Maintenance training shall be provided for maintenance and IT personnel. The purpose of this training is to explain how to troubleshoot and replace all field devices and hardware.
2. This training shall cover at least the following topics:
   a. Trouble shooting and replacement of all field devices.
   b. Installation of all cameras and their settings (jumpers, dip switches, etc).
   c. Wire labeling system.
   d. Software system installation and recover from system crashes.
   e. Routine preventive maintenance procedures recommended by equipment manufacturers for all components of the system.
3. This training shall be provided by personnel working directly for the CI or a direct employee of the manufacturer of the system.
4. One session of this type of training shall be provided and recorded in digital format. This session shall last no less than 6 hours, broken down into day sessions no longer than 3 hours each.
5. Each session could have up to 5 trainees.
6. The approved O&M manuals shall be available at the time of the training.

3.12 AS-BUILT DOCUMENTS AND CLOSE OUT INFORMATION

A. General: The CI shall follow all as built and close out information requirements indicated in specification section 280500

B. Additional requirements for as-built documentation shall include:
   1. Approved as-built drawings shall be a complete set of floor plans drawings, riser diagrams, and wiring details indicating the layout and interconnection of the system. All cable routings and elevation of each outlet, tie, and riser cable terminations shall be required.
   2. The content of the as-built information shall be no less than the content provided during the shop drawings and shall be modified as per changes done during construction.

C. Close out information shall also include:
   1. Two (2) digital backups of all configuration files and databases part of the CCTV system not earlier than the day after the final acceptance test is approved. These backups shall include a list of all the file names used and a complete description of the system that each file name belong to. The media for these backups shall be a compatible media that can be read by the computer system running the specific software program.
   2. Testing reports for structured cabling system used for the CCTV system.

END OF SECTION 282000