Police/Municipal & New Municipal Fire Station

Technology

Request For Proposal

March 18, 2014

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REQUEST FOR PROPOSAL

ADVERTISEMENT

Police/Municipal & New Municipal Fire Station Technology RFP - Project estimate is $316,025

The City of Leon Valley, Texas, will receive sealed proposals until Tuesday, April 15, 2014, at 2:00 p.m., at the Office of the Purchasing Agent of the City of Leon Valley, TX, 6400 El Verde Road, Leon Valley, TX 78238, at which time the names of proposers will be publically opened and read aloud.

Specifications and plans are available online on the City of Leon Valley's website at www.leonvalleytexas.gov. There are neither printed specifications nor plans. For assistance, call (210) 684-1391 ext. 222.

Proposals must be submitted in a sealed envelope or box and clearly endorsed **"RESPONSE TO City of Leon Valley Police/Municipal & New Municipal Fire Station Technology RFP, 04/15/14"**. Each proposal shall be accompanied by a proposal guarantee in the form of a certified check, cashier's check, or proposal bond in the amount of five percent (5%) of the total proposed price. Any proposal received after closing time will be rejected and returned unopened.

Attention is called to the fact that, pursuant to V.T.C.S. Art. 5159a, not less than the local prevailing wage rate derived from Leon Valley Ordinance #2014-02-10-02, must be paid on this locally funded project.

The successful proposer will be required to furnish a one hundred percent (100%) Performance Bond and one hundred percent (100%) Payment Bond.

The City of Leon Valley reserves the right to reject any and all proposals, to award the contract in what it deems its best interest and to waive any informality or technicality in the proposal, and agrees to take action within sixty (60) days after the closing date.

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THE CITY OF LEON VALLEY

Police/Municipal & New Municipal Fire Station

Technology

Request

For

Proposal

MAYOR

CHRIS RILEY

CITY MANAGER

MANUEL LONGORIA, JR.

CITY COUNCIL

RICARDO RUIZ

ARTHUR "ART" REYNA

ABRAHAM DIAZ

JACK DEAN

PAUL K. BIEVER

DIRECTOR OF PUBLIC WORKS

MELINDA S. MORITZ

1 GENERAL INFORMATION AND PROPOSAL SUBMISSION

1.01 important dates

Proposal Publication Date:	3/19/2014 & 3/26/2014
Non-Mandatory Vendors' Conference:	4/02/2014 at 2:00pm
Questions Due in Writing by:	4/09/2014
Proposal Due Date and Time:	4/15/2014 at 2:00pm

Public Opening to Read the names of those who submitted proposals: 4/15/2014 at 2:00pm

The city intends to award the contract within 60 days.

Intended Project Initiation Meeting:	6/03/2014
Commencement of Work:	6/03/2014

1.02 Items included in this RFP:

Proposer is expected to furnish all needed components, connectors, cables and all miscellaneous materials, plus installation (labor). Detailed descriptions are in the Technical Specifications Section.

"Turn-key" includes: provision of materials and equipment; installation; configuration; testing; provision of documentation; and training client to use, monitor, and make minor adjustments to system as needed.

1.03 Questions about this RFP

This RFP was a joint effort between Elert & Associates and the City of Leon Valley. It shall be the Vendor's responsibility to learn all aspects of the RFP requirements. Should any details necessary for a clear and comprehensive understanding be omitted or any error appear in the RFP documents, or should the Vendor note facts or conditions which, in any way, conflict with the letter or spirit of the RFP documents, it shall be the responsibility of the Vendor to obtain clarifications before submitting a proposal. Questions concerning this design/document should be directed in writing to:

Jeff Coombs, RCDD
Jeff.Coombs@Elert.com

1.04 Obtaining Documents

This document may be obtained in electronic format on the City's purchasing website: http://www.leonvalleytexas.gov/government/finance/purchasing.php

1.05 Proposal Document Submission

All responses must be received by the date and time listed in the Important Dates section of this RFP. Three (3) sealed and clearly marked copies of the proposal (one original - with original security - and two copies), appropriate proposal forms, proposal security (see below for requirements), and any other documents submitted with the proposal shall be submitted to:

One original and two copies:
Rhonda Hewitt, Purchasing Agent City of Leon Valley 6400 El Verde Road Leon Valley, TX 78238

All proposals must be clearly labeled on the outside of the envelope or box: RESPONSE TO City of Leon Valley Police/Municipal & New Municipal Fire Station Technology RFP. Proposals received after the deadline will be rejected and returned unopened.

1.06 Materials

1. Proposer must identify in the Bills of Materials the manufacturer(s) of all materials and components to be used and provide current manufacturer specification sheets in Section 5 of response.
2. All items proposed must be new and currently in manufacture.

1.07 Proposal Response Format

Each vendor must respond with its proposal organized in the following sections. Please submit responses in three-ring binders, with tabs dividing the sections:

1.07.1 Section 1 - Required Documents

a. Proposal Bond (5%) - (original - with seal - in original proposal)
b. Proof of required Insurance (certificate)
c. Cover letter - with overall price and any special conditions.
d. Technical diagrams/drawings showing design of proposed solution

1.07.2 Section 2 - Executive Summary/Overview

a. Technical summary of the system proposed including details about "improvements" over and above the base request, or if an alternate design, the reasons for the difference in design and benefits to owner.
b. Value added by the proposer.
c. Overview of installation and training.

1.07.3 Section 3 - Main Body of Response

a. Include a complete copy (all pages) of this document with all sections completed. Incomplete documents may be eliminated from consideration at the discretion of City of Leon Valley.
b. Bills of Materials in the format shown must be included in this section.

1.07.4 Section 4 - Equipment and Materials Specifications

a. Include information on extended warranty and support programs available from either the manufacturer or vendor.
b. Manufacturers' brochures and full technical specifications for all equipment and materials proposed.

Responses that fail to include technical specifications may be disqualified.

1.08 Proposal Response Clarification Questions

After reviewing all responses to this RFP, the City of Leon Valley may develop a list of clarification questions to be addressed by the Vendor. The City of Leon Valley or its agent will send these questions to the Vendor for clarification. The Vendor shall provide a response within the timeframe requested.

1.09 Performance and Payment Bonds

The successful proposer will be required to furnish performance and payment bonds per the City's direction and requirements.

1.10 Evaluation Criteria

PRICE

- **[50]** Total Possible Points for the lowest qualified cost proposal

PROPOSER

- **[25]** Total Possible Points:
  - [15] References
  - [10] Years in Business

INSTALLATION CAPABILITY

- **[25]** Total Possible Points:
  - [15] Certified Technicians
  - [10] Project Manager Qualifications

1.11 Contract Negotiations

The City of Leon Valley reserves the right to negotiate a contract after the successful proposer is selected. Selection will be based only on the proposal and subsequent interviews, if any; therefore, proposals must be complete.

1.12 Questions and Addenda

Answers to requests for clarification or information will be addressed and provided for in the form of an addendum. All addenda must be acknowledged and submitted with the proposal. Failure to do so will result in a non-compliant proposal. It is the vendor's responsibility to obtain any and all addenda which will be posted on the City's website.

2 PROPOSER'S QUALIFICATIONS AND SUPPORT CAPABILITIES

2.01 Information about the Proposer

1. Company Name _____
2. Legal Name (if different) _____
3. Years in Business ____
4. Number of years installing systems similar to this proposal _____
5. Contact Person _____
6. Full Mailing Address _____
7. Telephone Number _____
8. FAX Number _____
9. Name and phone number of Bonding company: _____
10. Number of full-time employees _____
11. Number of technical/installation personnel (minimum 2) _____
12. Names and titles of personnel who would work on this project (**attach brief experience listings** for each focusing on similar projects):

    _____

    _____

13. Name of person who would be Project Manager for this project (**attach experience listing** with similar projects):

    _____

2.02 Experience and Existing Customers

The City of Leon Valley is interested in Proposer's experiences that most closely resemble this implementation.

How many systems within 4 hours of Leon Valley has the proposer installed? How many state-wide?

Area _____ State-Wide _____

2.03 Workload

How many projects are currently underway at your company? _____

How many projects do you estimate your company will be doing concurrently with the project in this RFP? _____

2.04 Lawsuits

Are you now or have you been involved with or party to any lawsuits?

(Yes) _____ (No) _____

If yes, explain:

_____

_____

_____

_____

2.05 References

To be a qualified Proposer, the vendor must include below three references with similar equipment installed. Preference will be given to vendors with references for implementations at organizations most similar to Leon Valley. **References will be contacted - please verify information before submitting**. All references will be called. Please inform your contacts that a 15-20 minute call may be anticipated.

Reference #1

Organization Name _____

Address _____

_____

Type of Business _____

Contact Person _____

Telephone and Fax #s _____

Email _____

Secondary Contact Person _____

Secondary Contact phone and Fax #s _____

Dates of Installation _____

Description of system (include model numbers, rough quantities, total cost): _____

_____

Reference #2

Organization Name _____

Address _____

_____

Type of Business _____

Contact Person _____

Telephone and Fax #s _____

Email _____

Secondary Contact Person _____

Secondary Contact phone and Fax #s _____

Dates of Installation _____

Description of system (include model numbers, rough quantities, total cost): _____

_____

Reference #3

Organization Name _____

Address _____

_____

Type of Business _____

Contact Person _____

Telephone and Fax #s _____

Email _____

Secondary Contact Person _____

Secondary Contact phone and Fax #s _____

Dates of Installation _____

Description of system (include model numbers, rough quantities, total cost):_____

_____

2.06 Subcontractors/Partners

Every subcontractor shall be bound by the applicable terms and provisions of the contract documents. Further information about subcontractors may be requested prior to award.

Identify all subcontractors or partners used for any purposes. Failure to disclose subcontractors/partners may lead to disqualification. Include separate sheet(s) labeled "Subcontractors/Partners" if necessary.

Business Name	Years Exp.	Function
_____	_____	_____
_____	_____	_____
_____	_____	_____

2.07 References for Subcontractors/Partners

Include below two references for EACH subcontractor (duplicate this page if needed for multiple subcontractors). Again, preference will be given to vendors with references for implementations at organizations most similar to Leon Valley.

Reference #1

Organization Name _____

Address _____

Type of Business _____

Contact Person _____

Telephone and Fax #s _____

Email _____

Dates of Installation _____

Description of system (include model numbers, rough quantities, total cost): _____

_____

Reference #2

Organization Name _____

Address _____

Type of Business _____

Contact Person _____

Telephone and Fax #s _____

Email _____

Dates of Installation _____

Description of system (include model numbers, rough quantities, total cost): _____

_____

2.08 Service After Installation

1. How many service personnel trained in maintaining the proposed system are employed by proposer in Leon Valley's area or, within 2 hours thereof?

   Service Personnel (minimum 2) _____

2. List names and job titles of service personnel who would be assigned to this customer after installation

   _____

   _____

3. Provide the address of Proposer's service center(s) within 4 hours of Leon Valley:

   Company _____

   Address _____

   _____

   Phone # _____

4. Who will maintain parts inventory? At what location?

   Company _____

   Address _____

   _____

   Phone # _____

5. What critical component parts are kept in stock at this location?

   _____

   _____

7. If proposer can provide a faster response time than the minimum above, please list here:

   Phone response: _____ hours On-Site response: _____ hours

2.09 Proposal Form

A. **Base Bid #1** – Audio & Video Systems (AVS) (Section 27 41 00 and subsections thereof)

Material $_____

Labor $_____

Our total base bid for the work of this project is:

_____ DOLLARS ($_____)

1. Alternate pricing for Base Bid #1 Audio & Video Systems (AVS)

   a. Alternate # T-1: Provide a lump sum amount to furnish (13) new 22" widescreen 16:10 monitors with HDMI inputs and 1080p HD+ capable resolution. The new monitors shall be Viewsonic Professional VG2239m-LED 22" Monitors or equal. The Contractor shall remove and replace the existing 4:3 flat panel display monitors at the Dais Table, Staff Tables, and Lectern. If the Alternate #T-1 is not accepted, then as the Base Proposal Scope-of-Work the Contractor shall use the existing monitors.

      ($_____)

   b. Alternate # T-2: Provide a lump sum amount to replace the existing monitor mounts at the Dais Table with a Humanscale Model M8 mount.

      ($_____)

   c. Alternate # T-3: Provide a lump sum amount to provide the PENN-ELCOM CPU-87BLSLIM Lockable Mini-PC holder at each Dais Table and Staff Table seating position. The holder shall be placed under tabletop for Owner Provided Mini-PCs.

      ($_____)

   d. Alternate # T-4: Provide a lump sum amount to provide the complete Lectern as depicted on Drawing Sheet T5.14, complete with electronics as shown on Drawing Sheet T5.13.

      ($_____)

e. Alternate # T-5: Provide a lump sum amount to remove from the base proposal the Ashly ne.2424 DSP mixer and replace with Lectrosonics Aspen Series Digital Audio Processor.

($_____)

B. **Base Bid #2** – Overhead Paging System (OPS) (Section 27 51 13 and subsections thereof)

Material $_____

Labor $_____

Our total base bid for the work of this project is:

_____ DOLLARS ($_____)

C. **Base Bid #3** – Premise Cabling Infrastructure (27 10 00; 27 11 00; 27 13 00; 27 15 00; 27 16 00; 27 18 00):

Material $_____

Labor $_____

Our total base bid for the work of this project is:

_____ DOLLARS ($_____)

1. Unit pricing for Base Bid #1 Premise Cabling Infrastructure

a. ADD/DELETE "(1) Cat 6" Type Horizontal Outlet (Maximum length) Tested and labeled as per specifications in Section 27 10 00 & drawings

$_____

_____Each

b. ADD/DELETE "(2) Cat 6" Type Horizontal Outlet (Maximum length) Tested and labeled as per specifications in Section 27 10 00 & drawings

$_____

_____Each

c. ADD/DELETE "(3) Cat 6" Type Horizontal Outlet (Maximum length) Tested and labeled as per specifications in Section 27 10 00 & drawings

$_____

_____Each

d. Premise Cabling Hourly Rate $_____/Hour

D. **Base Bid #4** – Network and UPS Systems (27 20 00):

Material $_____

Labor $_____

Our total base bid for the work of this project is:

_____ DOLLARS ($_____)

E. **Base Bid #5** – Wireless Local Area Network (27 21 33):

Material $_____

Labor $_____

Our total base bid for the work of this project is:

_____ DOLLARS ($_____)

F. **Base Bid #6** – Video Surveillance System (27 62 00):

Material $_____

Labor $_____

Our total base bid for the work of this project is:

_____ DOLLARS ($_____)

G. **Base Bid #7** – Electronic Access Control System (27 64 00):

Material $_____

Labor $_____

Our total base bid for the work of this project is:

_____ DOLLARS ($_____)

H. **Base Bid #8** – Intrusion Detection System (27 66 00):

Material $_____

Labor $_____

Our total base bid for the work of this project is:

_____ DOLLARS ($_____)

2.10 TERMS & CONDITIONS

THE CONTRACTOR SHALL MAINTAIN THE FOLLOWING INSURANCE:

1. **Workers' Compensation Insurance Coverage**:

The insurance carrier shall be an admitted carrier in the State of Texas.

A. Definitions:

Certificate of coverage ("certificate") - A copy of a certificate of insurance, a certificate of authority to self-insure issued by the commission, or a coverage agreement (TWCC-81, TWCC-82, TWCC-83, or TWCC-84), showing statutory workers compensation insurance coverage for the person's or entity's employees providing services on a project, for the duration of the project.

Duration of the project - includes the time from the beginning of the work on the project until the contractor's/person's work on the project has been completed and accepted by the governmental entity.

Person's providing services on the project ("subcontractor" in section 406.096) - includes all persons or entities performing all or part of the services the contractor has undertaken to perform on the project, regardless of whether that person contracted directly with the contractor and regardless of whether that person has employees. This includes, without limitation, independent contractors, subcontractors, leasing companies, motor carriers, owner-operators, employees of any such entity, or employees of any entity which furnishes persons to provide services on the project.

"Services" - include, without limitation, providing, hauling, or delivering equipment or materials, or providing labor, transportation, or other service related to a project. "Services" does not include activities unrelated to the project, such as food/beverage vendors, office supply deliveries, and delivery of portable toilets.

B. The contractor shall provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, Section 401.011 (44) for all employees of the contractor providing services on the project, for the duration of the project.

C. The contractor must provide a certificate of coverage to the governmental entity prior to being awarded the contract.

D. If the coverage period shown on the contractor's current certificate of coverage ends during the duration of the project, the contractor must, prior to the end of the coverage period, file a new certificate of coverage with the governmental entity showing that coverage has been extended.

E. The contractor shall obtain from each person providing services on a project, and provide to the governmental entity:

(1) a certificate of coverage, prior to that person beginning work on the project, so the governmental entity will have on file certificates of coverage for all persons providing services on the project; and

(2) no later than seven days after receipt by the contractor, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project.

F. The contractor shall retain all required certificates of coverage for the duration of the project and for one year thereafter.

G. The contractor shall notify the governmental entity in writing by certified mail or personal delivery, within 10 days after the contractor knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the project.

H. The contractor shall post on each project site a notice, in the text, form and manner prescribed by the Texas Workers' Compensation Commission, informing all persons providing services on the project that they are required to be covered, and stating how a person may verify coverage and report lack of coverage.

I. The contractor shall contractually require each person with whom it contracts to provide services on a project, to:

(1) provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, Section 401.011 (44) for all of its employees providing services on the project, for the duration of the project;

(2) provide to the contractor, prior to that person beginning work on the project, a certificate of coverage showing that coverage is being provided services on the project for the duration of the project;

(3) provide the contractor, prior to the end of the coverage period, a new certificate of coverage showing extension of coverage showing extension of coverage, if the coverage period shown on

the current certificate of coverage ends during the duration of the project;

(4) obtain from each other person with whom it contracts, and provide to the contractor:

(a) a certificate of coverage, prior to the other person beginning work on the project; and

(b) a new certificate of coverage showing extension of coverage, prior to the end of the coverage period, if the coverage period shown on the current coverage ends during the duration of the project;

(5) retain all required certificates of coverage on file for the duration of the project and for one year thereafter;

(6) notify the governmental entity in writing by certified mail or personal delivery, within 10 days after the person knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the project; and

(7) contractually require each person with whom it contracts, to perform as required by paragraphs (1) - (7), with the certificates of coverage to be provided to the person for whom they are providing services.

J. By signing this contract or providing or causing to be a provided a certificate of coverage, the contractor is representing to the governmental entity that all employees of the contractor who will provide services on the project will be covered by workers' compensation coverage for the duration of the project, that the coverage will be based on proper reporting or classification codes and payroll amounts, and that all coverage agreements will be filed with the appropriate insurance carrier or, in the case of a self-insured, with the commission's Division of Self-Insurance Regulation. Providing false or misleading information may subject the contractor to administrative penalties, criminal penalties, civil penalties, or civil actions.

K. The contractor's failure to comply with any of these provisions is a breach of contract by the contractor which entitles the governmental entity to declare the contract void if the contractor does not remedy the breach within ten days after receipt of the notice of breach from the governmental entity.

2. **Comprehensive General Liability Insurance**

This insurance shall:

A. Be in an amount not less than $1,000,000 per occurrence, with a deductible of not more than $2,500;

B. Include coverage for the liability assumed by the Contractor under Item F. (Indemnity);

C. Include completed operation coverage which is to be kept in force by the Contractor for a period of not less than one year after the completion of the work provided for or performed under these specifications;

D. Not be subject to any of the special property damage liability exclusions commonly referred to as the XCU exclusions pertaining to blasting or explosion, collapse, or structural damage and underground property;

E. Not be subject to any exclusion of property used by the insured or property in the case, custody or control of the insured or property as to which the insured for any purpose is exercising physical control;

F. In naming the City of Leon Valley as an additional insured on your comprehensive General Liability Insurance, the following words apply:

"Contractor shall defend, indemnify and hold harmless the City of Leon Valley, its agents and employees from and against any liability, loss, cost and expense ("Liability") claimed by a third party (including reasonable attorney's fees and cost of defense) resulting from Contractor's performance of the Work to the extent that such Liability:

(1) is attributable to bodily injury, sickness, disease or death, or to the injury to or destruction of tangible personal property; and,

(2) is caused or contributed to by any neglect or fault of Contractor, its subcontractors, or their respective employees.

Where liability is attributable to the joint negligence or fault of Contractor and any other person (including Owner), Contractor's duty of indemnification shall be limited to Contractor's allocable share of such joint negligence or fault."

G. The Insurance company must have as a minimum a current A.M. Best rating of A.

3. **Comprehensive Automobile Liability in the following amounts**:

Bodily Injury	$1,000,000 per person
	$3,000,000 per accident

Property Damage $300,000 per accident

4. **General Requirements for Insurance Coverage**

A. The Certificate of Insurance furnished by the Contractor shall show by specific reference that each of the foregoing items have been provided for;

B. Certificates of Insurance required for each copy of the agreement which specifically set forth evidence of all required coverage will be filed with the City prior to the City's execution of the contract. Worker's Compensation Insurance coverage must be provided to the City prior to the City's award of the contract.

C. The Certificates of Insurance furnished by the contractor as evidence of the Insurance maintained by the contractor will include a clause obligating the Insurer to give the City of Leon Valley ten (10) days prior written notice of cancellation or any material change in the insurance coverage.

D. Waiver of Subrogation: The City of Leon Valley and the Contractor waive all rights and the rights of their respective insurance companies against each other for damages caused by fire or other perils to the extent such damages are covered by property insurance purchased by either party.

5. **Anti-Discrimination in Employment**

A. The contractor (successful bidder) and/or any subcontractor(s), if permitted, certifies complete compliance with the Federal Civil Rights Law and the Americans with Disabilities Act, agreeing to non-discrimination based on race, age, color, religion, disability, gender, ancestry, national origin, or place of birth in employment practices, programs and services shall include but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination, rates of pay or other compensation; and selection for training, including apprenticeship.

B. The contractor shall in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, age, color, religion, disability, gender, ancestry, national origin, or place of birth.

C. Upon request by the City of Leon Valley, the contractor shall furnish all information or reports required to investigate his/her payrolls and personnel records which pertain to current contract(s) with the City for purposes of ascertaining compliance with this non-discrimination certification.

6. **General Independent Contractor Clause**

This agreement does not create an employer relationship between the parties. It is the parties' intention that the contractor will be an independent contractor and not the City of Leon Valley employee for all purposes, including, but not limited to, the application of the Fair Labor Standards Act minimum wage and overtime payments, Federal Insurance Contribution Act, the Social Security Act, the Federal Unemployment Tax Act, the provisions of the Internal Revenue Code, Texas workers' compensation law and Texas unemployment insurance law. The contractor will retain sole and absolute discretion in the judgment of the manner and means of carrying out the contractor's activities and responsibilities hereunder. The contractor agrees that it is a separate and independent enterprise from the City of Leon Valley, that it has a full opportunity to find other business, that it has made its own investment in its business, and that it will utilize a high level of skill necessary to perform the work. This agreement shall not be construed as creating any joint employment relationship between the contractor and the City of Leon Valley and the City of Leon Valley will not be liable for any obligation incurred by the contractor, including but not limited to unpaid minimum wages and/or overtime premiums.

7. **Hot Goods Clause**

The bidder hereby agrees that in the execution of the work he or she will comply with all applicable provisions of Sections 6, 7, and 12 of the Fair Labor Standards Act of 1938, as amended, and that there will be no violations of the "hot goods" or "hot cargo" provisions of the Act involving restrictions on the use of underage employees.

8. **Fire Safety**

The contractor shall comply with all City regulations including those regarding Fire Safety. In this regard he shall comply with all instructions of the City Fire Marshall during the course of the work.

9. **RFP Submission**

The RFP Submission shall include the signature of a principal of the firm with the following statement: "The information provided is true and correct to the best of my knowledge. City of Leon Valley will not be responsible for any cost in preparation of this document."

10. **Hazard Communications Act**

In compliance with Article 5182b, Texas Revised Civil Statutes, all employers are required to train and educate employees on the safe use and handling of hazardous materials that employees may be exposed to in the work place. The City of Leon Valley's Fire Chief is designated as the City's HazComm Officer. Contractors of the City are also required to comply with the requirements of this Act.

Contractors are entitled to a copy of the City's workplace chemical list to which the contractor, its employees and agents may be exposed to in the workplace. Contractors are also entitled to a copy of all MSDS sheets for any hazardous chemicals which the City may have in the work place. Contractors have the obligation to inform its employees and agents of all of these requirements. Contractor shall furnish the City with the MSDS sheets for any hazardous chemical brought into the City workplace that City employees will have exposure to. Contractors shall sign the Attachment 5, "Hazard Communications Contractor Acknowledgment" certifying receipt of this information.

Hazard Communication Contractor Acknowledgment

IT IS HEREBY UNDERSTOOD AND AGREED THAT _____, a Contractor under Contract dated the _____ day of _____, 20_____, with the City of Leon Valley has received from the City notice of the Contractor's rights under the Texas Hazards Communications Act, the chemical list and material safety data sheets for hazardous chemicals that will be present in the City work area.

_____, Contractor with the City of Leon Valley, understands our obligation to inform our employees and agents of the information provided. Material safety data sheets have been received for the following chemicals.

_____

_____

_____

_____

_____

CONTRACTOR NAME: _____

NAME OF AUTHORIZED AGENT: _____

TITLE OF AUTHORIZED AGENT: _____

SIGNATURE OF AUTHORIZED AGENT: _____

DATE: _____

HAZARD COMMUNICATIONS ACKNOWLEDGMENT Page 1 of 1

Non-Collusion Affidavit of Prime Proposer

State of_____)
§
County of_____)

_____being first duly sworn, deposes and says that:

(1) He/She is _____ of _____, the Proposer that has submitted the attached Proposal;

(2) He is fully informed respecting the preparation and contents of the attached Proposal and of all pertinent circumstances respecting such Proposal;

(3) Such Proposal is genuine and is not a collusive or sham Proposal;

(4) Neither the said Proposer nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this affiant, has in any way colluded, conspired, connived or agreed, directly or indirectly with another Proposer, firm or person to submit a collusive or sham Proposal in connection with the Contract for which the attached Proposal has been submitted or to refrain from proposing in connection with such contract, or has in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other Proposer, firm or person to fix the price or prices in the attached Proposal or of any other Proposer, or to fix an overhead, profit or cost element of the Proposal price or the Proposal price of any other Proposer, or to secure through any collusion, conspiracy, connivance or unlawful agreement any advantage against the City of Leon Valley or any person interested in the proposed Contract; and

(5) The price or prices quoted in the attached Proposal are fair and proper and are not tainted by an collusion, conspiracy, connivance or unlawful agreement on the part of the Proposer or any of its agents, representatives, owners, employees, or parties in interest, including this affiant.

(Signed) _____

Title _____

Subscribed and sworn to me this _____ day of _____, 20_____.

By _____ My Commission Expires _____
Notary Public, State of Texas

(NOTARY SEAL)

Conflict of Interest Questionnaire

CONFLICT OF INTEREST QUESTIONNAIRE

FORM CIQ

For vendor or other person doing business with local governmental entity

This questionnaire reflects changes made to the law by H.B. 1491, 80th Leg., Regular Session.

This questionnaire is being filed in accordance with Chapter 176, Local Government Code by a person who has a business relationship as defined by Section 176.001(1-a) with a local governmental entity and the person meets requirements under Section 176.006(a).

By law this questionnaire must be filed with the records administrator of the local governmental entity not later than the 7th business day after the date the person becomes aware of facts that require the statement to be filed. *See* Section 176.006, Local Government Code.

A person commits an offense if the person knowingly violates Section 176.006, Local Government Code. An offense under this section is a Class C misdemeanor.

OFFICE USE ONLY

Date Received

1. Name of person doing business with local governmental entity.

2. ☐ **Check this box if you are filing an update to a previously filed questionnaire.**

(The law requires that you file an updated completed questionnaire with the appropriate filing authority not later than the 7th business day after the date the originally filed questionnaire becomes incomplete or inaccurate.)

3. Name of local government officer with whom filer has employment or business relationship.

_____

Name of Officer

This section (item 3 including subparts A, B, C & D) must be completed for each officer with whom the filer has an employment or other business relationship as defined by Section 176.001(1-a), Local Government Code. Attach additional pages to this Form CIQ as necessary.

A. Is the local government officer named in this section receiving or likely to receive taxable income, other than investment income, from the filer of the questionnaire?

☐ Yes ☐ No

B. Is the filer of the questionnaire receiving or likely to receive taxable income, other than investment income, from or at the direction of the local government officer named in this section AND the taxable income is not received from the local governmental entity?

☐ Yes ☐ No

C. Is the filer of this questionnaire employed by a corporation or other business entity with respect to which the local government officer serves as an officer or director, or holds an ownership of 10 percent or more?

☐ Yes ☐ No

D. Describe each employment or business relationship with the local government officer named in this section.

4.

_____ _____

Signature of person doing business with governmental entity Date

Leon Valley Ordinance 2014-02-10-02

ORD NO. 2014-02-10-02

AN ORDINANCE 2014-02-10-02

AMENDING ORDINANCE NUMBER 99-001 PROVIDING FOR A MINIMUM PREVAILING WAGE

WHEREAS, the Government Code Chapter 2258 requires that a municipality awarding a contract for a public work within the geographical limits of the municipality determining the general prevailing rate of per diem wages to be paid to workers on the a public work project, and

WHEREAS, City Council previously adopted Ordinance #99-001 to adopt a minimum prevailing wage for capital projects; and

WHEREAS, the City Council last reviewed and studied the local prevailing wage in 1999.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF LEON VALLEY, TEXAS:

That Ordinance Number 99-001 is hereby amended by repealing the existing Exhibit A and providing for a new Exhibit A as attached hereto.

PASSED and **APPROVED** this 10th day of February, 2014.

Chris Riley
Mayor

ATTEST:

Letitia Callanen
City Secretary

APPROVED AS TO FORM:

City Attorney

APPENDIX

Attachment A

MINIMUM WAGE RATE DETERMINATION
FOR NORTHSIDE INDEPENDENT SCHOOL DISTRICT SCHOOL FACILITIES

Pursuant to the requirements of law and in compliance with Government Code, §2258.001 et seq., the following wage determination is issued as required by law applicable to the work described. This wage determination shall be made a part of the contract for the work for which it is issued. The wage rates contained in the determination, including modifications, if any, shall be the minimum to be paid by contractors and subcontractors to each worker employed by it in the execution of the work.

The contractor shall comply with all the requirements of Government Code §2258.001 et seq.

When the contractor or subcontractor proposes to utilize a particular class of laborers or workmen not listed in the wage determination, such workman or laborer shall be classified or reclassified conformable to the wage determination and a report made in writing of such action to the Owner. When the interested parties are unable to agree on the classification or reclassification of workmen, the question with recommendations of the parties shall be submitted to the Owner for determination. The decision of the authorized representative of the Owner shall be furnished the parties and shall be binding and final.

The contractor and each subcontractor shall keep, or cause to be kept, an accurate record showing the names and occupations of all laborers, workmen and mechanics employed by him, in connection with the said public work, and showing also the actual per diem wages paid to each of such workers, which record shall be open at all reasonable hours to the inspection of the Owner, its officers and agents.

LOCATION OF PROJECT: Northside Independent School District
San Antonio, Bexar County, Texas

BUILDING CONSTRUCTION includes construction of sheltered enclosures with walk-in access for the purpose of housing persons, machinery, equipment or supplies, the installation of utilities, machinery and equipment, both above and below grade level, as well as incidental grading and paving.

1

MINIMUM HOURLY WAGE RATE

BUILDING CONSTRUCTION

Air Conditioning Mechanic	$22.96
Air Conditioning Mechanic Helper	$ 8.82
Air Conditioning Serviceman	$21.86
Air Conditioning Serviceman Helper	$10.10
Bricklayer/Stone Mason	$18.16
Carpenter, Form	$12.02
Carpenter, Trim and Finish	$14.92
Concrete Finisher	$12.47
Drywall Installer	$14.38
Electrician	$18.93
Electronic Technician	$14.45
Floor Layer, Resilient	$12.00
Glazier	$10.88
Ironworker, Reinforcing	$10.19
Ironworker, Structural	$12.50
Ironworker, Structural Helper	$11.06
Laborer, Skilled	$ 9.94
Laborer, Unskilled	$ 8.10
Operator, Crane	$15.90
Operator, Forklift	$12.50
Painter	$10.00
Pipefitter	$23.10
Pipefitter, Helper	$ 9.45
Plumber	$23.93
Plumber Helper	$ 9.65
Roofer	$ 9.95
Roofer, Helper	$ 9.01
Sheet Metal Worker, Roofing	$13.92
Sheet Metal Worker, Roofing Helper	$ 9.46
Sheet Metal Worker, Ductwork	$20.87
Sheet Metal Worker, Ductwork Helper	$ 7.99
Sprinkler System Installer (Fitter)	$18.70
Tile Installer, Ceramic	$12.15
Waterproofer Installer	$10.92
Welder, Certified Pipe	$24.14
Welder, Structural	$13.68

SITEWORK, PAVING, AND UTILITY CONSTRUCTION

Carpenter, Rough	$14.90
Laborer, Common	$ 9.93
Laborer, Utility	$ 9.50
Operator, Crane	$11.50
Operator, Front-end-Loader (<2.5c.y.)	$11.08
Operator, Motor Grader (Fine)	$14.63
Pipelayer	$ 9.30
Steelworker, Structural	$13.11
Truck Driver, Single Axle, Light	$10.51
Truck Driver, Tamdem Axle or Semi	$11.78

Any worker employed on this project shall be paid at the rate of one and a half (1-1/2) times the regular rate for every hour worked in excess of forth (40) hours per week.

2

ORD. NO. 99-001

AN ORDINANCE

ADOPTING A PREVAILING WAGE RATE FOR PUBLIC WORKS CONSTRUCTION IN THE CITY OF LEON VALLEY IN ACCORDANCE WITH CHAPTER 2258 OF THE TEXAS GOVERNMENT CODE AND ESTABLISHING PENALTIES FOR VIOLATION THEREOF

WHEREAS, Chapter 2258 of the Texas Government Code requires that a municipality awarding a contract for a public work within the geographical limits of the municipality determine the general prevailing rate of per diem wages to be paid to workers on the public work, and;

WHEREAS, the City of Leon Valley has public works contracts which require the adoption of a prevailing wage rate.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF LEON VALLEY, THAT :

1. The City of Leon Valley hereby adopts as the prevailing wage rate of per diem wages to be paid workers on its public works projects the following prevailing wage rates, terms and conditions:

Section 1

Definitions:

A. Public Work - A contract for a Public Work located within the geographical limits of the City of Leon Valley awarded by the City for construction of an improvement including a building, highway, road, excavation, and repair work or other project development or improvement, paid for in whole or in part from public funds, without regard to whether the work is done under public supervision or direction.

B. Worker - includes a laborer or mechanic.

C. Per Diem - The daily hourly rate wages and benefits paid to a worker.

D. Legal Holiday - The holidays established by the City of Leon Valley.

E. Maintenance - Work not involving substantial replacement or reconstruction. Maintenance is intended to extend the life of or protect an asset. The City of Leon Valley solely shall determine if the work performed is maintenance.

F. Overtime - As defined in the Copeland Act.

Section 2

Applicability to Public Works.

A. This ordinance applies only to the construction of a public work, including a building, highway, road, excavation, and repair work or other project development or improvement, paid for in whole or part from public funds, without regard to whether the work is done under public supervision or direction.

B. This ordinance does not apply to work done directly by a public utility company under an order of a public authority or to maintenance.

Section 3

Right to be paid Prevailing Wage Rates

A. A worker employed on a public work by or on behalf of the City of Leon Valley shall be paid:

(1) not less than the general prevailing rate of per diem wages for work of a similar character in the City of Leon Valley in which the work is performed; and

(2) not less than the general prevailing rate of per diem wages for legal holiday and overtime work.

B. Subsection A does not apply to maintenance work.

C. A worker is employed on a public work for the purpose of this section if the worker is employed by a contractor or subcontractor in the execution of a contract for a public work with the City of Leon Valley.

Section 4

Determination of Prevailing Wage Rates.

A. The City of Leon Valley shall determine the general prevailing rate of per diem wages in the locality in which the public work to be performed for each craft or type of worker needed to execute the contract and the prevailing rate for legal holiday and overtime work in accordance with the following:

(1) For 100% locally funded City Public Works Construction projects see Attachment A for building construction trades or Attachment B for heavy highway construction.

(2) For Public Works projects funded in whole or part with Federal or State funds see Attachment B.

B. The City of Leon Valley shall specify in the call for bids for the contract and in the contract itself that wage rates determined under this ordinance shall be paid and are contained in the contract documents.

C. The City of Leon Valley's determination of the general prevailing rate of per diem wages is final.

Section 5

Prevailing Wage Rates to be Paid By Contractor and Subcontractor, Penalty.

A. The contractor who is awarded a contract by the City of Leon Valley or a subcontractor of the contractor shall pay not less than the rates determined under Section 4 to a worker employed by it in the execution of the contract.

B. A contractor or subcontractor who violates this section shall pay penalties in accordance with state law.

Section 6

Records.

A. A contractor and subcontractor shall keep a record showing:

(1) the name and occupation of each worker employed by the contractor or subcontractor in the construction of the public work; and

(2) the actual per diem wages paid to each worker.

B. The record shall be open at all reasonable hours to inspection by the officers and agents of the City of Leon Valley.

Section 7

Payment greater than Prevailing Rate Not Prohibited.

This ordinance does not prohibit the payment to a worker employed on a public work an amount greater than the general prevailing rate of per diem wage.

Section 8

Reliance on Certificate of Subcontractor.

A contractor is entitled to rely on a certificate by a subcontractor regarding the payment of all sums due those working for the subcontractor until the contrary has been determined.

2. Nothing in this ordinance is intended to conflict with any state or federal laws and contractor remains bound by same.

3. This ordinance shall take effect upon passage, approval, and publication as required by law.

PASSED and **APPROVED** this the 5th day of January, 1999.

Mayor

ATTEST:

City Secretary

APPROVED AS TO FORM:

City Attorney

PREVAILING WAGE RATE DETERMINATION
BUILDING CONSTRUCTION TRADES

COUNTY NAME : BEXAR

Date Printed : April 15, 1997

CLASSIFICATION	Rate	Health	Pension	Vacation	Total Wage
ASBESTOS WORKER	$10.36	$0.89	$0.00	$0.00	$11.25
CARPENTER	$13.28	$1.17	$0.70	$0.38	$15.54
CARPET LAYER/FLOORING INSTALLER	$8.00	$0.00	$0.00	$0.00	$8.00
CONCRETE FINISHER	$9.46	$0.05	$0.01	$0.01	$9.53
DATA COMMUNICATION/TELECOM INSTALLER	$0.00	$0.00	$0.00	$0.00	$0.00
DRYWALL INSTALLER/CEILING INSTALLER	$11.16	$1.18	$0.03	$0.02	$12.39
ELECTRICIAN	$15.95	$2.15	$1.00	$0.08	$19.18
ELEVATOR MECHANIC	$17.20	$3.85	$2.19	$1.50	$24.74
FIRE PROOFING INSTALLER	$8.00	$0.00	$0.00	$0.00	$8.00
GLAZIER	$9.77	$0.58	$0.15	$0.38	$10.88
HEAVY EQUIPMENT OPERATOR	$9.06	$0.05	$0.00	$0.00	$9.12
INSULATOR	$16.28	$2.64	$2.15	$0.00	$21.07
IRON WORKER	$10.90	$0.66	$0.60	$0.33	$12.50
LABORER/HELPER	$7.58	$0.42	$0.03	$0.07	$8.10
LATHER/PLASTERER	$15.50	$0.00	$0.00	$0.00	$15.50
LIGHT EQUIPMENT OPERATOR	$6.96	$0.05	$0.00	$0.00	$7.02
MASON	$15.55	$0.00	$0.00	$0.00	$15.55
METAL BUILDING ASSEMBLER	$10.42	$0.00	$0.00	$0.00	$10.42
MILLWRIGHT	$16.01	$1.63	$1.00	$0.00	$18.64
PAINTER/WALL COVERING INSTALLER	$10.00	$0.00	$0.00	$0.00	$10.00
PIPEFITTER	$17.07	$1.48	$1.47	$0.37	$20.39
PLUMBER	$19.31	$2.17	$1.90	$0.76	$24.14
ROOFER	$9.05	$0.00	$0.00	$0.00	$9.05
SHEET METAL WORKER	$18.54	$1.62	$1.56	$0.24	$21.96
SPRINKLER FITTER	$19.75	$3.40	$2.20	$0.00	$25.35
TERRAZZO WORKER	$0.00	$0.00	$0.00	$0.00	$0.00
TILE SETTER	$14.77	$1.77	$0.00	$0.00	$16.54
WATERPROOFER/CAULKER	$10.92	$0.00	$0.00	$0.00	$10.92

* $0.00 in the rate field indicates insufficient data was received to determine a prevailing wage rate for this classification. Government Code Title 10, Section 2258.023, paragraph C states: "A contractor or subcontractor does not violate this section if a public body awarding a contract does not determine the prevailing wage rates and specify the rates in the contract as provided in Section 2258.022."

Property of General Services Commission
Based on 1996 Survey Results

Attachment A
page 1

Worker Classification Definition Sheet

Asbestos Worker	Worker who removes and disposes of asbestos materials.
Carpenter	Worker who builds wood structures, or structures of any material which has replaced wood. Includes rough and finish carpentry, hardware and trim.
Carpet Layer/Flooring Installer	Worker who installs carpet and/or floor coverings - vinyl tile.
Concrete Finisher	Worker who floats, trowels, and finishes concrete.
Data Communication/Telecom Installer	Worker who installs data/telephone and television cable and associated equipment and accessories.
Drywall Installer/Ceiling Installer	Worker who installs metal framed walls and ceilings, drywall coverings, ceiling grids and ceilings.
Electrician	Skilled craftsman who installs or repairs electrical wiring and devices. Includes fire alarm systems, and HVAC electrical controls.
Elevator Mechanic	Craftsman skilled in the installation and maintenance of elevators.
Fire Proofing Installer	Worker who sprays or applies fire proofing materials.
Glazier	Worker who installs glass, glazing and glass framing.
Heavy Equipment Operator	Includes but not limited to all Cat tractors, all derrick-powered, all power operated cranes, back hoe, back filler, power operated shovel, winch truck, all trenching machines.
Insulator	Worker who applies, sprays, or installs insulation.
Iron Worker	Skilled craftsman who erects structural steel framing and installs structural concrete Rebar.
Laborer/Helper	Worker qualified for only unskilled or semi-skilled work. Lifting, carrying materials and tools, hauling, digging, clean-up.
Lather/Plasterer	Worker who installs metal framing and lath. Worker who applies plaster to lathing and installs associated accessories.
Light Equipment Operator	Includes but not limited to air compressors, truck crane driver, flex plane, building elevator, form grader, concrete mixer (less than 14 cf), conveyer.
Mason	Craftsman who works with masonry products, stone, brick, block, or any material substituting for those materials and accessories.
Metal Building Assembler	Worker who assembles pre-made metal buildings.
Millwright	Mechanic specializing in the installation of heavy machinery, conveyance, wrenches, dock levelers, hydraulic lifts and align pumps.
Painter/Wall Covering Installer	Worker who prepares wall surfaces and applies paint and/or wall coverings, tape and bedding.
Pipefitter	Trained worker who installs piping systems, chilled water piping and hot water (boiler) piping, pneumatic tubing controls, chillers, boilers, and associated mechanical equipment.
Plumber	Skilled craftsman who installs domestic hot and cold water piping, waste piping, storm system piping, water closets, sinks, urinals and related work.
Roofer	Worker who installs roofing materials, Bitumen (asphalt and cold tar), felts, flashings, all types roofing membranes and associated products.
Sheet Metal Worker	Worker who installs sheet metal products. Roof metal, flashings, and curbs, ductwork, mechanical equipment, and associated metals.
Sprinkler Fitter	Worker who installs fire sprinkler systems and fire protection equipment.
Terrazzo Worker	Craftsman who places and finishes Terrazzo.
Tile Setter	Worker who prepares wall and/or floor surfaces and applies ceramic tiles to these surfaces.
Waterproofer/Caulker	Worker who applies water proofing material to buildings. Products include sealant, caulk, sheet membrane, liquid membranes, sprayed, rolled, or brushed on.

WR1002

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page 2

General Decision Number TX980043

Superseded General Decision No. TX970043

State: TEXAS

Construction Type:
HEAVY
HIGHWAY

County(ies):

BELL	CORYELL	TRAVIS
BEXAR	GUADALUPE	WILLIAMSON
BRAZOS	HAYS	
COMAL	MCLENNAN	

Heavy (excluding tunnels and dams) and Highway Construction Projects (does not include building structures in rest area projects). *NOT TO BE USED FOR WORK ON SEWAGE OR WATER TREATMENT PLANTS OR LIFT/PUMP STATIONS IN BELL, CORYELL, McLENNAN AND WILLIAMSON COUNTIES.

Modification Number	Publication Date
0	02/13/1998
1	05/22/1998

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page 1

COUNTY(ies):

BELL	CORYELL	TRAVIS
BEXAR	GUADALUPE	WILLIAMSON
BRAZOS	HAYS	
COMAL	MCLENNAN	

* SUTX2042A 03/26/1998

	Rates	Fringes
AIR TOOL OPERATOR	8.08	
ASPHALT HEATER OPERATOR	11.00	
ASPHALT RAKER	8.00	
ASPHALT SHOVELER	7.97	
BATCHING PLANT WEIGHER	11.00	
CARPENTER	10.80	
CONCRETE FINISHER-PAVING	9.57	
CONCRETE FINISHER-STRUCTURES	8.83	
CONCRETE RUBBER	8.52	
ELECTRICIAN	16.25	
FLAGGER	6.86	
FORM BUILDER-STRUCTURES	8.77	
FORM LINER-PAVING & CURB	8.00	
FORM SETTER-PAVING & CURB	8.68	
FORM SETTER-STRUCTURES	8.73	
LABORER-COMMON	7.12	
LABORER-UTILITY	7.99	
MECHANIC	12.15	
OILER	11.40	
SERVICER	8.44	
PAINTER-STRUCTURES	10.00	
PIPE LAYER	8.27	
ASPHALT DISTRIBUTOR OPERATOR	9.70	
ASPHALT PAVING MACHINE	9.26	
BROOM OR SWEEPER OPERATOR	7.12	
BULLDOZER	9.28	
CONCRETE CURING MACHINE	7.79	
CONCRETE FINISHING MACHINE	11.00	
CONCRETE PAVING SAW	9.79	
SLIPFORM MACHINE OPERATOR	11.15	
CRANE, CLAMSHELL, BACKHOE, DERRICK, DRAGLINE, SHOVEL	10.12	
FOUNDATION DRILL OPERATOR TRUCK MOUNTED	15.00	
FRONT END LOADER	8.86	
HOIST - DOUBLE DRUM & LESS	10.81	
MIXER	7.12	
MIXER - CONCRETE PAVING	11.00	
MOTOR GRADER FINE GRADE	12.37	
MOTOR GRADER	11.14	
PAVEMENT MARKING MACHINE	8.31	
PLANER OPERATOR	15.75	
ROLLER, STEEL WHEEL PLANT-MIX PAVEMENTS	7.73	

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Page 2

ROLLER, STEEL WHEEL OTHER FLATWHEEL OR TAMPING	7.33
ROLLER, PNEUMATIC, SELF PROPELLED	7.17
SCRAPERS	8.38
TRACTOR-CRAWLER TYPE	9.40
TRAVELING MIXER	7.92
TRENCHING MACHINE, HEAVY	9.92
WAGON-DRILL/BORING MACHINE	8.00
REINFORCING STEEL SETTER PAVING	14.50
REINFORCING STEEL SETTER STRUCTURES	10.61
STEEL WORKER-STRUCTURAL	11.73
SPREADER BOX OPERATOR	8.55
WORK ZONE BARRICADE	8.29
SIGN INSTALLER	7.97
TRUCK DRIVER-SINGLE AXLE LIGHT	8.32
TRUCK DRIVER-SINGLE AXLE HEAVY	7.954
TRUCK DRIVER-TANDEM AXLE SEMI-TRAILER	8.02
TRUCK DRIVER-LOWBOY/FLOAT	10.12
WELDER	11.02

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29 CFR 5.5(a)(1)(v)).

In the listing above, the "SU" designation means that rates listed under that identifier do not reflect collectively bargained wage and fringe benefit rates. Other designations indicate unions whose rates have been determined to be prevailing.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.)

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and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U. S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U. S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

4.) All decisions by the Administrative Review Board are final.

END OF GENERAL DECISION

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page 4

SECTION 27 00 00 – GENERAL TECHNOLOGY REQUIREMENTS

PART 1 – GENERAL

1.01 SPECIFICATION NOTE

A. All specifications herein shall be applicable to both buildings in this package (Municipal Fire Station and the Municipal Police & City Hall buildings. If there are any discrepancies over quantity of servers, panels, head-end locations, etc., the proposer shall include enough of a quantity to have each system stand alone, one per building/MDF.

1.02 RELATED DOCUMENTS

A. Documents: Provisions of General Conditions, Supplementary Conditions, and the sections included under Procurement & Contract Requirements are included as part of this section as though bound herein.

1.03 RELATED WORK

A. Section 27 10 00 – Structured Cable Infrastructure

B. Section 27 11 00 – Communications Equipment Rooms

C. Section 27 13 00 – Communications Backbone Cabling

D. Section 27 15 00 – Communications Horizontal Cabling

E. Section 27 16 00 – Communications Connecting Cords

F. Section 27 18 00 – Communications Labeling and Identification

G. Section 27 40 00 – AV/Multimedia General Requirements

H. Section 27 41 00 – Audio Visual Systems

I. Section 27 41 16 – Integrated Media Systems

J. Section 27 41 70 – Integrated Control Systems

K. Section 27 41 80 – Audio DSP Configuration

L. Section 27 51 13 – Overhead Paging System

1.04 DEFINITIONS

A. Documents: The complete package of Bid and Contract Requirements, General Technology Requirements, related Division 27 sections, drawings, schedules, and addenda that make up this Request for Bid.

B. Work: The provision of products and/or services to meet the requirements specified in these documents.

C. Owner: The party named in the Procurement and Contract Requirements as the advertising party.

D. Consultant: Elert & Associates.

E. NIC: Not in Contract. Item will be the responsibility of others.

F. Approved or Approval: Where approval is called for, only persons with the authorized authority may grant approval. Owner reserves all rights to govern over and grant approval and will appoint authority of agents acting on their behalf.

G. OFE: Owner Furnished Equipment. Item will be provided and integrated by Owner.

H. OFCI: Owner Furnished Contractor Installed. Item will be provided by Owner and installed by Contractor.

I. OFOI: Owner Furnished Owner Installed. Item will be provided and installed by Owner.

J. As Required: Contractor shall provide the quantity of said item that is necessary. Owner and Consultant reserve the right to make the final determination of necessary quantities to provide for a complete system.

1.05 REFERENCE STANDARDS

A. Standards and other procedures referenced by this bid package are as follows:

1. ADA – Americans with Disabilities Act of 2010
   U.S. Department of Justice
   950 Pennsylvania Ave., NW
   Civil Rights Division Disability Rights Section – NYA
   Washington, DC 20530
   Toll Free: (800) 514-0301 Fax: (202) 307-1197

2. AIA – American Institute of Architects
   1735 New York Avenue. N.W.
   Washington, DC 20006
   Toll free: (800) 242-3837 Local: (202) 626-7300
   Email: infocentral@aia.org

3. ANSI – American National Standards Institute
   1899 L Street, NW 11th Fl.
   Washington, DC 20036
   Phone: (202) 293-8020

4. ASTM – American Society of Testing and Materials
   100 Barr Harbor Drive
   P.O. Box C700
   West Conshohocken, PA 19428
   Phone: (610) 832-9500

5. BICSI – Building Industry Consulting Service International, Inc.
   (RCDD Standards)
   8610 Hidden River Parkway
   Tampa, FL 33637
   Phone: (813) 979-1991 or 1-800-242-7405
   Fax: (813) 971-4311
   Email: customerservice@bicsi.org

6. CFR – Code of Federal Regulations
   (Available from the Government Printing Office)
   732 N. Capitol Street, NW
   Washington, DC 20401
   Toll Free: (866) 512-1800 Local: (202) 512-1800
   (Material is usually first published in the Federal Register)

7. ECIA – Electronic Components Industry Association
   1111 Alderman Drive, Suite 400
   Alpharetta, GA 30005
   Phone: (678) 393-9990

8. IACS – International Annealed Copper Standard
   CDA – Copper Development Association
   260 Madison Avenue
   New York, NY 10016
   Phone: (212) 251-7200
   Fax: (212) 251-7234
   Email: questions@ copperalliance.us

9. IEC – International Electrotechnical Commission
   3, rue de Varembé
   P.O. Box 131
   CH – 1211 Geneva 20
   Switzerland
   Phone: 41.22.919.02.11
   Fax: 41.22.919.03.00
   Email: inmail@iec.ch

10. IEEE – Institute of Electrical and Electronics Engineers
    3 Park Ave. 17th Fl.
    New York, NY 10016
    Corporate Office: Phone: (212) 419-7900 Fax: (212) 752-4929
    Standards Activities: Phone: (732) 562-3800 Fax: (732) 562-1571

11. ISO – International Organization for Standardization
    1, ch. de la Voie-Creuse
    Case Postale 56
    CH-1211 Geneva 20
    Switzerland
    Phone: 41.22.749.01.11
    Fax: 41.22.733.34.30
    Email: central@iso.org

12. ITU-T – International Telecommunication Union – Telecommunication Standardization Bureau (TSB)
    Places des Nations
    CH-1211 Geneva 20
    Switzerland
    Phone: 41.22.730.51.11
    Fax: 41.22.733.72.56
    Email: tsbmail@itu.int

13. NEC – National Electrical Code (NFPA 70)
    maintained by NFPA – National Fire Protection Association
    1 Batterymarch Park
    Quincy, MA 02169
    Phone: (617) 770-3000
    Fax: (617) 770-0700

14. NECA – National Electrical Contractors Association
    3 Bethesda Metro Center, Suite 1100
    Bethesda, MD 20814-5372
    Phone: (301) 657-3110
    Fax: (301) 215-4500

15. NEMA – National Electrical Manufactures' Association
    1300 North 17th Street, Suite 1752
    Rosslyn, Virginia 22209 Phone: (703) 841-3200
    Fax: (703) 841-5900

16. OSHA – Occupational Safety and Health Administration
    (U.S. Department of Labor, OSHA)
    200 Constitution Avenue, NW
    Washington, DC 20210
    Toll Free: 1-800-321-6742 Local : (202) 693-1999

17. TIA – Telecommunications Industry Association
    1320 N. Courthouse Rd., Suite 200Arlington, VA 22201
    Phone: (703) 907-7700
    Fax: (703) 907-7727
    Email: standards@tiacomm.org

18. UL – Underwriters' Laboratories
    333 Pfingsten Road
    Northbrook, IL 60062-2096
    Phone: (847) 272-8800
    Fax: (847) 272-8129

B. Standards: Referenced standards and/or procedures shall be binding on the Contractor and work shall be judged against such standards and procedures unless otherwise stated in writing.

1.06 EXAMINATION OF EXISTING CONDITIONS

A. Examination: Contractor shall examine the facility and construction documents to the extent necessary to plan for efficient installation strategies prior to the delivery of materials to the site or the commencement of work. Other documents (architectural Drawings, hardware schedules…) may be made available upon request. Failure to adequately complete the examination shall not result in change order requests.

B. Acceptance of Conditions: Commencement of work by Contractor shall indicate acceptance of existing conditions, unless a written notice of exceptions has been provided to Owner prior to commencement.

C. Observation: If Contractor observes—during preliminary examinations or subsequent work—existing violations of fire stopping, electrical wiring, grounding, or other safety- or code-related issues, Contractor shall report these to Owner in a timely manner.

D. Pre-Existing Damage: If Contractor observes damage to finished surfaces before they begin installation in any area, Contractor shall document by taking digital photos of the damaged area(s) and immediately notifying Construction Manager and Consultant via email, with attached photos.

E. Damage during Installation: Any damage caused by, or reasonably believed by the Construction Manager to be caused by the Contractor shall result in back-charges for said damages.

1.07 ON-SITE CONDUCT

A. Conduct: Any demonstration of rudeness, use of profanity, or lack of respect by Contractor Personnel to a building tenant will be cause for immediate removal from the premises, and such Personnel will not be allowed to return. Contractor and Contractor's Personnel are to remain in project area.

B. Vandalism: Graffiti or vandalism will not be tolerated. Any Contractor/Personnel caught in the act shall be immediately removed from the premises and will not be allowed to return.

C. Hazardous Conditions: No one shall be allowed to endanger the building, its premises, and its occupants in any manner whatsoever. In the event that a situation occurs which threatens the building or its occupants in any manner, Contractor, Contractor Personnel, Subcontractor, etc. shall take steps to correct hazardous condition. In the event that Contractor's Personnel fail to correct hazardous condition, Owner reserves the right to immediately take steps to correct the situation at Contractor's expense.

1.08 DRAWING SYMBOLS

A. General: Work, equipment, or material delineated on any drawing in this package will be expected to be provided by Contractor unless noted otherwise.

B. Interpretation: Work shall be installed in accordance with the intent diagrammatically expressed on the drawings and described in the written specifications. Contractor shall not make limiting interpretation that provides for incomplete work or a non-functioning system.

1.09 PRODUCT STORAGE AND HANDLING REQUIREMENTS

A. Storage: Storage of materials shall remain the full responsibility of Contractor until Acceptance.

B. Protection: Contractor shall take all necessary precautions to protect materials from the following:

1. Theft
2. Vandalism/Tampering
3. Dents
4. Scratches
5. Dust
6. Temperature
7. Weather
8. Cutting
9. Paint
10. Other hazardous conditions

C. Replacement: Contractor shall replace any damaged or lost material as required by Owner or Consultant.

D. Installed Materials: Installed materials remain the responsibility of the Contractor until Acceptance. Contractor shall take necessary precautions to ensure the safety and security of installed materials.

1.10 CONTRACT MODIFICATION PROCEDURES

A. Changes: Changes to the contract may be initiated by Owner, Consultant or Contractor.

B. Request for Information (RFI): If a change originates with Contractor, the Contractor shall submit an RFI for Consultant review. If it is deemed a change is necessary, the Consultant shall issue a PR to address the change.

C. Proposal Request (PR): If a change originates with Owner or Consultant, Consultant shall issue a Proposal Request to Contractor.

D. Change Proposal (CP): If a change originates with Contractor, or if Contractor receives a Proposal Request from Consultant, Contractor shall submit a Change Proposal to Consultant to review.

   1. References: A Change Proposal shall reference the work to be performed, and shall include the cost change to the Project (if any) and the time change to the scheduled completion (if any)

E. Cost/Time Changes: A Change Proposal shall reference the work to be performed, and shall include the cost change to the project (if any) and the time change to the scheduled completion (if any).

F. Additional Information: Consultant may request additional information to be supplied with the Change Proposal for consideration.

G. Acceptance: Owner reserves the right to accept or reject Change Proposals.

H. Change Order: A Change Order is a modification of the contract:

   1. If a Change Order is approved, Owner will issue a Change Order that references PR and/or CP. Change Order is not valid until it has been signed by Owner.

   2. Work performed or equipment supplied outside of contract without a valid Change Order is done at Contractor's own risk.

1.11 OWNER-FURNISHED PRODUCTS

A. Delivery: Owner is responsible for delivery of Owner-furnished products to the project site, unless otherwise specified in this document.

B. Placement: Contractor is responsible for locating, inspecting, and moving Owner-furnished products to their final installation position.

C. Inspection: Contractor shall report any damage, discrepancies in quantity, type, or function to Owner and Consultant immediately upon discovery.

D. Warranty: Contractor assumes no responsibility for any material warranty for Owner-furnished products. Contractor shall be responsible for integrating,

cabling, and installing Owner-furnished products under the same warranty conditions as other products furnished by Contractor.

1.12 CONSTRUCTION PROGRESS MEETINGS

A. Attendance: Contractor is required to attend job progress meetings in accordance with requirements set by Owner or Consultant.

B. Additional Coordination: Contractor shall request additional job construction coordination meetings it deems to be necessary to ensure coordination of their responsibilities with other parties.

1.13 CONSTRUCTION PROGRESS DOCUMENTATION

A. Completion: Contractor shall complete and submit all construction progress documentation as requested by Owner and Consultant.

B. Failure to Complete: Failure to complete requested construction progress documentation may result in the withholding of payment by Owner.

1.14 SUBMITTAL PROCEDURES

A. Provision: Contractor shall provide submittals of any corrections or additions to Consultant prior to the procurement of equipment or commencement of work. Drawings shall be prepared and submitted on appropriately-sized sheets. Equipment lists, data sheets, etc., shall be on 8½" x 11" paper, punched and inserted in a three-ring binder.

B. Prior to Work: Submittals shall be provided to Consultant within ten (10) days after the notice to proceed. Submittals are identified in section(s) following Section 27 00 00.

C. Review: Submittals shall be received and stamped "Reviewed" by Consultant prior to the procurement of material or the commencement of work. Any procurement or work performed prior to this approval is at Contractor's own risk.

D. Project Timeline: Project timeline will not be altered due to lateness of submittals. Contractor will remain bound to deliver a timely, complete, and finished project as stipulated in their contract.

E. Failure to Provide: The failure of Contractor to provide submittals as required herein may result in the withholding of payment for work and/or the cancellation of the contract.

1.15 CLOSEOUT PROCEDURES

A. Notification: Contractor shall provide written notification to Consultant and Owner when Contractor is satisfied that the work has reached Substantial Completion and is ready for inspection.

B. Punch List: Work or materials found to be incomplete, of unsatisfactory quality, failing to meet the specifications in these documents, and/or unacceptable to Consultant or Owner shall be documented by Consultant and provided to Contractor to rectify. Contractor shall provide written notification to Consultant and Owner when all punch list items have been completed.

C. Closeout Submittals: Contractor shall provide closeout submittals to Consultant in accordance with the requirements found in these documents. Consultant shall receive the closeout submittals no less than three (3) business days prior to the scheduled Final Inspection.

D. Final Inspection: Contractor may be required to be present for the Final Inspection by Consultant.

E. Re-Inspection: If more than one (1) re-inspection is necessary, the costs of the additional travel, time, and expenses of Owner and Consultant may be deducted by Owner from the contract amount due to the Contractor.

F. Punch List Approval: Punch list shall be considered complete only after having been signed by Owner and Consultant.

G. Re-Inspection: If more than one (1) re-inspection is necessary, the costs of the additional travel, hours, and expenses of Owner and Consultant may be deducted by Owner from the contract amount due Contractor.

H. Punch List Approval: Once all punchlist items are complete, the Contractor shall return an initialed punchlist to the Consultant and Owner for verification. Punch list shall be considered complete only after having been signed by Owner and Consultant

I. Payment Authorization: Final payment will be authorized only after all closeout procedures and requirements have been followed and fulfilled by Contractor and approved in writing by Owner and Consultant, including punch list(s) and/or re-inspection(s) and delivery of closeout deliverables.

1.16 SOFTWARE

A. Versions: Consultant used the following software versions for this project:

1. Autodesk Revit MEP 2013 (floor plans)
2. Autodesk AutoCAD MEP 2013 (detail sheets)
3. Microsoft Word 2010
4. Microsoft Excel 2010
5. Microsoft Visio 2010

1.17 PROJECT MANAGEMENT

A. Project Manager: Contractor shall appoint a Project Manager who will be the main point of contact for Owner and Consultant regarding the project.

B. Responsibility: Project Manager is responsible for the following:

1. Successfully completing the contract in a timely manner.
2. Overseeing work and performance of all employees and subcontractors who have been hired by Contractor and ensuring compliance with specification.
3. Completing and submitting required documentation.
4. Attending project coordination meetings as required by Owner, Consultant, and Contractor. Contractor is responsible for taking minutes of these meetings and distributing copies to all participants.
5. Coordinating with Owner, Consultant, Architect, General Contractor, and other contractors involved in the project to ensure smooth flow of work and on-time project completion.
6. Providing a written bi-weekly progress update to the Owner and Consultant.
7. Reporting all unexpected conditions and problems that may result in delay or expense to Owner and Consultant immediately upon discovery.

C. Change of Project Manager: If Contractor seeks to change Project Manager during the course of the Project, such change is subject to prior written approval from Owner.

1.18 QUALITY ASSURANCE

A. Assurance: It is the intent of these specifications to describe and provide for a complete, professional, and reliable installation.

B. Qualifications: Contractor employees who are engaged in installation shall be properly trained in the tasks they are expected to perform.

C. Acceptability: Owner shall determine the acceptability of work.

D. Regulatory Requirements: Contractor shall comply with code requirements that apply to the work being performed.

E. Certifications: Where manufacturer certifications are required for warranty or for authorized resale, installation personnel shall have received such certification prior to the start of installation of those manufacturers' materials.

1.19 QUALITY CONTROL

A. Installation: During installation period, when connections are made to the Owner's existing infrastructure, Contractor shall use care to ensure that no negative results occur that could reduce or hamper existing systems.

PART 2 – PRODUCTS

2.01 BASIC EQUIPMENT AND MATERIALS REQUIREMENTS

A. Standards: Equipment and materials used to accomplish the goals of this project shall meet standards for good engineering practice as defined within this document.

B. Quality: Products specified in these documents are intended to establish a baseline or operational, functional, and performance-based standards that all proposed products shall meet or exceed by functionality and quality.

2.02 FACTORY-ASSEMBLED PRODUCTS

A. Manufacturer: Reference to specific equipment manufacturers does not imply that all products produced by that manufacturer meet the specification requirements.

B. Age of Equipment: Equipment shall be new and unused with full manufacturer's warranties. Contractor shall supplement such warranties as required by the specification.

C. No Modification: Where a product is available from a factory/manufacturer to meet the needs as outlined, that product shall be used without modification to ensure the full factory warranty is maintained.

D. Like Materials: Like materials used shall be of the same manufacturer, model, and quality unless otherwise specified.

E. Software/Firmware: No software or firmware is to be used unless specifically authorized by Owner or its appointed representative.

2.03 RACKS, CABINETS, HARDWARE

A. Equipment Racks and Cabinets: Provide racks and cabinets as specified herein and/or described in accompanying documents, appendices, or drawings. Verify that any existing racks and/or cabinets provided by others are complete, bringing any discrepancies to the attention of Owner and Consultant prior to beginning the installation.

B. Shelves and Mounts: Contractor shall supply necessary mounting hardware to install rack-mounted equipment. Mounting hardware shall be a product of the manufacturer of the equipment to be mounted, or manufacturer of the rack system, or approved by either for use with their product. Provide supporting

channels, shelves, rack mounts, and/or rack ears as recommended by equipment manufacturers.

C. Screws and Washers: Contractor shall provide screw head types appropriate to the level of security required for the equipment and racking. Screws shall include polyethylene or nylon washer.

1. Public Access Areas: Star post or square post security screws shall be used for hardware and equipment mounted in equipment racks and consoles in areas that are accessible to the public.

2. Restricted Access Areas: Philips head screws may be used where a secure room entrance or locked rack/console door prevents public access.

2.04 POWER DEVICES

A. Power Strips: Unless otherwise specified, power strips shall be UL listed, surface mounted, rated for 15 amp continuous electronic loads. Outlets shall be 125 volt, 15 amp, three-wire, grounded, NEMA 5-15R. Cords shall be 14/3 SJT with molded plug.

B. Power Distribution Panels: Unless otherwise provided, power distribution panels shall be UL listed, rack mounted, rated for 15 amp continuous electronic loads with switch and pilot light. Up to eight outlets shall be mounted to the back, each rated 125 volt, 15 amp, three-wire, grounded, NEMA 5-15R. Switch and pilot shall be mounted to the front. Cords shall be 14/3 SJT with molded plug.

C. Contractor shall provide acceptable power distribution units as required in order to provide sufficient outlet connectivity for Contractor-furnished and Owner-furnished equipment indicated on drawings and equipment schedules, plus up to 15% additional capacity for future growth. This may be in addition to any power distribution equipment indicated on equipment schedules.

2.05 CABLE AND CONNECTORS

A. Cable: Cable shall be selected and applied in a manner defined by signal type, consistent with best industry practices. Highest quality products shall be used with attention given to transmission characteristics, termination methods, resistive and complex impedance at operating frequencies, and insulating material characteristics. Where required by the NEC, substitutions of air handing plenum cable shall exactly match the normally applied product and shall meet the standards of UL Standard #900 and the NEC Articles 800 and 820.

B. Connectors: Highest quality products shall be used with attention given to transmission characteristics, termination methods, resistive and complex impedance at operating frequencies, and insulating material characteristics. Strain reliefs and cable clamps shall be sized for the connector and the cable.

C. Color: Cable and connector color shall be coordinated with Consultant to maintain consistency with cable and connector color schemes used by other trades.

2.06 CABLE MANAGEMENT

A. Plastic Cable Ties: Single use white nylon plastic cable ties, appropriate screw fittings, or mounting clips may be used for AC power cable management within racks and enclosures. Plastic/nylon cable ties shall not be used for signal and DC cables.

B. Velcro Cable Ties: Velcro straps shall be used for all signal and DC cables. Velcro straps shall be black, with no logo or decoration, except as authorized by Consultant.

2.07 ANCILLARY HARDWARE

A. General: Contractor shall provide ancillary and required accessory items necessary to furnish a complete and fully functional system to Owner.

B. Interpretation: Exclusion of or limitation in the language used in the drawings or specifications shall not be interpreted as meaning that ancillary or accessory items of work or equipment necessary to complete or make the installed system fully functional can be omitted.

2.08 GROUNDING HARDWARE

A. Mechanical Connectors

1. Material: Mechanical connector bodies shall be manufactured from high strength, high conductivity cast copper alloy material. Bolts, nuts, washers, and lock washers shall be made of Silicon Bronze and supplied as a part of the connector body and shall be of the two bolt type.

2. Split Bolts: Split bolt connector types are not allowed.

3. Standards: Connectors shall meet or exceed UL 467 and be clearly marked with the catalog number, conductor size, and manufacturer.

B. Compression Connectors

1. Material: Compression connectors shall be manufactured from pure wrought copper. Conductivity of this material shall be no less than 99% by IACS standards.

2. Standards: Connectors shall meet or exceed the performance requirements of IEEE 837, latest revision.

3. Installation: Installation of the connectors shall be made with a compression, tool and die system, as recommended by the manufacturer of the connectors.

4. Labeling: Connectors shall be clearly marked with manufacturer, catalog number, conductor size, and required compression tool settings.

5. Protection: Each connector shall be factory filled with an oxide-inhibiting compound.

C. Wire

1. Material: Stranded copper (aluminum not permitted). AWG #3, AWG #4 and AWG #6 as specified on Project Drawings or sections after 27 00 00.

2. Feeder and Branch Circuit Equipment Ground: Size as shown on drawings, specifications, or as required by NFPA 70, whichever is larger. Differentiate between normal ground and isolated ground when both are used on the same facility.

2.09 COMPATIBILITY OF RELATED EQUIPMENT

A. Existing Equipment: Equipment and systems specified in these documents shall be assumed to be compatible with the systems already installed at Owner site(s) and as identified in this document as related to this project.

B. Installed Equipment: Specified equipment and systems shall be compatible with all other equipment and systems as offered by Contractor, thus placing the responsibility on Contractor to ensure proper interaction.

2.10 SPARE PARTS

A. Suggested List: Contractor is requested to submit a list of suggested spare parts with an offered price, allowing Owner to select appropriate parts.

B. Means of Obtainment: Contractor shall state where spare parts can be obtained after the installation.

2.11 MAINTENANCE MANUALS

A. Contractor shall produce a maintenance manual showing interconnection of equipment and any special procedures necessary for proper operation and maintenance of the systems.

PART 3 – EXECUTION

3.01 GENERAL

A. Contractor shall provide, furnish, deliver, transport, erect, install, configure, and connect completely all of the material and equipment described herein or depicted on any bid package document or drawing, and shall leave all systems in first-class operating condition.

3.02 COORDINATION

A. General: Contractor shall cooperate with other Contractors for proper provisioning, anchorage, placement, and execution of all work. Interference between the works of various Contractors shall be resolved before installation. In the event of conflict on space requirements or location of devices, refer the matter to Owner and Consultant for decision.

B. Related Work: References to the following related work do not limit or release Contractor from the responsibility of coordination with other trades or from having the necessary knowledge of other non-referenced work.

   1. Work by General Contractor.

   2. Work by other Technology Contractors.

   3. Work by Electrical Contractor, including electrical rough-ins and surface-mounted raceway.

C. Delays: Contractor shall coordinate with all other trades to avoid causing delays in the installation schedule.

D. AC Power: Contractor shall coordinate with General Contractor its requirements for proper AC power to service all equipment installed by Contractor.

E. Low Voltage Sleeving: Contractor shall provide openings through walls as necessary, with sleeving and fire-stopping materials installed in a professional manner to meet local and national codes.

F. Grounding: Contractor shall coordinate with General Contractor its requirements for proper ground system to their equipment.

G. Surface-Mounted Raceway Coordination

   1. General and Electrical Contractors: Contractor shall coordinate with General Contractor and Electrical Contractor the installation of surface-mounted-raceway where not provided but made necessary by non-penetrable wall.

   2. Verification: Contractor shall field verify and coordinate the proposed use of surface-mounted raceway at any location with Consultant and Owner.

3.03 BASIC EXECUTION REQUIREMENTS

A. General: Contractor is responsible for following industry standards of good practice for telecommunications and networking equipment.

B. Aesthetic Factors: With the installation of equipment and cables, consideration shall be given not only to operation efficiency but also to overall aesthetic factors. Contractor shall redo, at no cost to Owner, any work deemed

by Owner to appear sloppy, hastily done, or unprofessional. Owner shall make final decision over whether work shall be redone.

C. Manufacturers' Recommendations: Manufactured items, materials, and equipment shall be applied, installed, connected, erected, used, and adjusted as recommended by the manufacturers or as indicated in their published literature unless otherwise noted herein.

D. Protection of Work Area: Work shall be properly protected during construction, including the shielding of soft or fragile materials, protecting against dust and dirt, protecting and supporting cable ends off of the floor and from other traffic, protecting floor box lids, and temporarily plugging open conduits during construction. Upon completion, installation shall be thoroughly cleaned and all tools, equipment, obstructions, or debris present as a result of work shall be removed from the premises.

E. Waste Materials: Contractor shall keep work area neat, orderly, and free from accumulation of waste materials. Remove trash and debris from the building and job site as required to maintain a clean work environment at all times. Rubbish shall be moved to a common trash point or receptacle on the job site as determined and directed by General Contractor or Owner.

F. Dumpsters: No construction debris shall be placed in building's dumpsters. Contractor shall provide a dumpster for construction waste and debris at own expense. Said dumpster shall be emptied on a regular schedule. Location of dumpster shall be arranged through Building Management.

G. Ceiling Grid: Contractor shall not hang cable supports from ceiling grid wire.

H. Roof Deck: Contractor shall not shoot into the roof deck for mounting cable hangers.

I. Mounting: Equipment and enclosures shall be mounted plumb and square in relation to the structure.

J. Raised Floor: All cabling installed below the raised floor shall be placed in the provided cable trays with appropriate means to hold cable in place. If no cable tray exists, Contractor shall provide J-hooks to hold cables in place. Sleeves shall be utilized for cable egress.

K. Motorized Furniture: Care shall be taken to properly dress all cables placed within motorized furniture and provide sufficient cable length to allow motorized elements to operate within their full range of travel.

3.04 PREPARATION

A. Existing Equipment: Prior to any installation, the contractor shall prepare the site by removing any remaining debris, leveling equipment racks (where

appropriate), and verifying information and systems stated to be in-place are ready for use.

B. Equipment for Installation: Prior to installation, Contractor shall ensure that required major equipment has been secured and is ready for installation.

3.05 CLEANING

A. Tool Clean-up: Contractor is not permitted to use restrooms for tool clean-up. A slop-sink may be provided in janitorial closet on each floor for cleaning of tools and equipment and as a source of water. Janitorial closet or maintenance area or shop shall be kept clean at all times. Contractor or Contractor's Personnel found using restrooms for clean-up or other similar purposes shall be subject to removal from building.

B. Daily: At the end of each work period or day, Contractor shall remove excess packing, drilling remnants, and other non-equipment related parts, materials, or debris to ensure a clean, safe, and professional working environment.

C. Carpet: Contractor shall ensure that no damage to carpeting occurs as a result of their work. Contractor shall cover carpets in areas of work to prevent wire debris from entering the carpet.

3.06 FIRE STOPPING

A. Contractor is responsible for applying fire-stopping material in and around all openings that it creates or are created for it, whether or not specifically indicated in specifications or project drawings, where code requires the use of fire stopping material.

B. Contractor shall ensure that all fire-stopping materials meet appropriate codes and are installed in a neat and workman like manner.

3.07 WATERPROOFING

A. Contractor is responsible for creating a waterproof seal in and around any openings to the outside environment that are created by Contractor or for systems being installed.

B. Contractor shall ensure that all waterproof materials meet appropriate codes and are applied according to good engineering practice.

3.08 RACKS, CABINETS, AND HARDWARE

A. Racks and Cabinets: Contractor shall assemble and install racks and cabinets.

B. Installation Hardware: Install hardware in a secure manner. Screws shall be tightened to a torque just sufficient to secure equipment without deforming washers beyond their original diameter.

C. Considerations: Rack mount equipment shall be secured as recommended by the manufacturer with consideration to airflow, power, and in/out connections.

D. Cross Connections: Where cross connections are required between equipment, interconnections shall be installed using cable management devices to secure cables in a neat and workmanlike manner, applying best industry practices.

3.09 GROUNDING

A. General: Install products in accordance with manufacturer's instructions. Mechanical connections shall be accessible for inspection and maintenance. No insulation shall be installed over mechanical ground connections. Ground connection surfaces shall be cleaned and all connections shall be made so that disconnection or removal is impossible.

B. Conduit Bonding: Separate ground wires shall be enclosed in rigid galvanized steel conduit and bonded at both ends to the rigid galvanized steel conduit with an approved fitting. Install conductor in separate rigid conduit. Bond conduit as described above.

3.10 CABLE

A. Cable Treatment: Cable shall be stored and handled to assure that it is not stretched, kinked, crushed, or abraded in any way. Bend radiuses shall meet manufacturer specifications and/or recommendations. Cable shall not be installed in ambient temperatures or moisture conditions above or below the rating of the manufacturer.

B. Splicing

1. Voice, data, and other UTP/ScTP/FTP cables: No splices shall be installed in any voice, data or UTP/ScTP/FTP cables.

2. Analog multimedia/video cables: No splices shall be installed in any analog multimedia/video cable less than five hundred (500) feet in length.

3. Digital multimedia/video cables: No splices are allowed in any digital multimedia/video cable.

4. Overhead paging systems: Cable splices for constant voltage overhead paging system shall occur only at speaker, amplifier or volume control knob locations.

C. Lengths

1. Variations: Where cables are to be of the same length, variations in the length shall be less than plus or minus ½ inch. Lengths of cables are based on the length of the unterminated signal conductors.

2. Labeling: Cables, regardless of length, shall be marked with a labeling scheme approved by Consultant.

3. Grouping: Cables shall be separated into like groups according to signal or power levels.
4. Power Cables: Power cables shall be grouped to one side of the equipment rack while low-level cables to the other side.
5. Equipment Racks: Equipment rack wiring and cabling shall be neatly dressed.
6. Service Loops: Cables shall have service loops.
7. Fastening: Rack cabling shall be adequately supported with Velcro wire wraps and horizontal support cable managers fastened to rack frame.
8. External Wire Support: External wire and cables shall be supported at least every 5 feet from the structure or as required to maintain not more than a 6 inch cable sag between supports and without over tensioning the cables.
9. Support Hardware: Cables shall be supported by J-hooks, cable tray, or ladder rack. Hardware shall be secured to building structure using 3/8" threaded rod supports.
10. Right Angles: Cables are to run at right angles to the structure, placed above ceiling in halls or corridors.
11. Height: Cables shall not run above red iron joist.

D. Concealment: Contractor shall make every effort to conceal wiring and other apparatus into walls, floors, and ceilings, assuming code and good engineering practice allows and suggests. Cabling systems installed in public areas shall be installed within walls, ceiling, or floors or within surface wiring pathways, as dictated by codes and good engineering practice.

E. Velcro Straps for Horizontal Cabling: Straps shall be installed snugly without deforming cable insulation. Straps shall be spaced at uneven intervals not to exceed 4 feet.

F. Cable Ties and Velcro Straps within Equipment Racks and Cabinets: Ties and straps shall be installed snugly without deforming cable insulation at uneven intervals not to exceed 8 inches. Cable ties shall only be used for non-signal carrying cables. No sharp burrs shall remain where excess length of the cable tie has been cut.

G. Obstruction: Contractor shall notify Owner immediately if any obstruction or hazard is discovered in a pathway provided by others.

3.11 CONNECTORS

A. Preparation: Cables shall be carefully prepared and connectors installed as directed by the manufacturer. Proper stripping devices and crimping tools shall be used.

B. Terminations: Connectors shall be carefully fitted to mating devices on equipment to avoid damage to mating contacts, inserts, or bodies. Specialized terminations shall be made in a neat and secure manner suited to the service of the wire and as directed by the manufacturer. Contractor shall use manufacturer specified terminations when those specifications exist.

C. Soldering: A person skilled in that practice shall execute soldered terminations. Any excessive insulation displacement resulting from soldering shall be grounds to require the Contractor to re-terminate the connector.

D. Adapters: Adapters shall be used only where the identity of the necessary type of connector is unknown at the time of installation, such as for Owner-provided equipment or in anticipation of future equipment upgrades, with Consultant's approval.

3.12 EQUIPMENT INSTALLATION

A. General: Contractor shall make system properly operational and physically secure by mounting equipment and related accessories into furniture, consoles, and racks as required. Manufacturer's guidelines for installation shall be followed. Discrepancies in installation procedure or inability to complete a given task due to a shortage of materials or malfunctioning equipment shall be reported to Consultant immediately upon discovery.

B. Equipment Placement: Contractor shall locate equipment as indicated on drawings and as specified herein. Where such information is not provided, follow industry best practices and locate operable devices at convenient positions; heat generating devices at the top and seldom-accessed equipment below.

   1. Unless otherwise specified, end user-operable devices shall be positioned within the range of front wheelchair access per ADA standards.

C. Equipment Installation: Equipment shall be installed as directed by the manufacturer using equipment manufacturer's desktop mounting frames, equipment tubs, installation hardware, and techniques. Contractor shall be responsible for moving equipment from storage and for providing necessary personnel or devices to carry and lift equipment around obstacles and into operating position.

3.13 ROUGH-IN

A. Scheduling: Contractor shall make every effort to install systems per this specification in a timely manner including rough-in of cabling and other apparatus where appropriate to stay on schedule.

B. Protection of Environment: Where cabling and/or equipment is installed prior to other trades completing their work in an area, Contractor shall take necessary precautions to cover, wrap, or otherwise protect to reduce possible damage due to plastering, painting, cleaning, or other such work.

3.14 CUTTING, DRILLING, PATCHING, AND PAINTING

A. Coordination: Contractor is responsible for coordinating the work when any cutting or drilling is required in the performance of installing the specified systems.

B. Restoration: Contractor is responsible for returning all surfaces (including walls, floors, and ceilings) to their previous condition after any cutting.

3.15 LABELING

A. General: Rack-mounted equipment and hardware shall be labeled as required herein. Connectors, jacks, receptacles, outlets, cables, cable terminations, terminal blocks, rack mounted equipment, active slots of card frame systems, etc. shall be clearly, logically, and permanently labeled in a manner acceptable to Consultant.

B. Approval: Proposed wording and/or numbering schemes for labeling shall be provided to Consultant for review and written approval prior to procurement or installation.

C. Labels used shall be permanent and secure. Provide labeling as follows unless otherwise noted in a specific section:

1. Like Size: Labels shall be sized to match other labels used for same purpose. Similarly, provide engraved labels of like size in other locations.

2. Equipment Racks: For enclosed racks containing equipment, provide labels on each equipment rack rear door or console rear panel reading “No user serviceable parts. Refer service to qualified technician.”

3. Installer and Consultant Identification: Position at the front top center section of each equipment rack a label that states the names of system Installer and Consultant.

4. Custom Panels: Custom panel nomenclature shall be engraved, etched, or screened. Markings are to be designed to ensure consistency and clarity within and without of system. Verify markings and placements by

submitting label sample layouts to Consultant for approval prior to procurement.

5. Documentation: Labeling information shall appear on the as-built drawings.

3.16 ADDITIONAL ENGINEERING SERVICES

A. General: Contractor is responsible for securing necessary engineering services where needed to meet the needs of the installation.

B. Change Orders: Only when Contractor can show that additional engineering services are needed as a result of changes to the scope of the services being requested will Owner entertain a Change Order for these services.

PART 4 – TESTING

4.01 GENERAL

A. Supplies: Contractor shall supply testing equipment needed to verify compliance with specifications found in these documents.

B. Program: Contractor shall complete required testing prior to the inspection by Owner and Consultant.

C. Data: Test data shall be properly documented and recorded so that it is available for final inspection.

D. Quality Control: Testing may be repeated during the inspection process at the request of Owner or Consultant.

4.02 TESTING

A. Prior to energizing or testing the system, ensure the following:

1. Installation: Products are installed in a proper and safe manner per the manufacturer's instructions.

2. Cleanliness: Products are neat, clean, and unmarred and parts securely attached. Dust, debris, solder, splatter, etc., is removed.

3. Cables and Connections: Cable is dressed, routed, and labeled; connections are consistent with regard to polarity.

4. Grounding: Electronic devices are properly grounded.

5. AC Power: Each AC power receptacle is tested with a circuit checker for proper hot, neutral, and ground connections prior to plugging in equipment.

4.03 GROUNDING

A. General: Inspect grounding and bonding system conductors and connections for tightness and proper installation. Use suitable test instrument to measure resistance to ground of system.

B. Manufacturer's Recommendations: Perform testing in accordance with test instrument manufacturer's recommendations using the fall-of-potential method.

C. Resistance: Measure ground resistance from system neutral connection at service entrance to convenient ground reference point using suitable ground testing equipment. Resistance shall not exceed 2 ohms.

END OF SECTION

SECTION 27 10 00 – STRUCTURED CABLING INFRASTRUCTURE

PART 1 – GENERAL

Unless noted otherwise, "Contractor" refers to the Structured Cabling Contractor.

1.01 SCOPE

A. This section describes the products and execution requirements related to furnishing and installing Category 6 Cabling and Termination Components and related subsystems as part of a Structured Cabling System.

B. Backbone system comprising copper and fiber optic cabling and horizontal (station) cabling is covered under this document.

C. Others will provide the network electronics for the LAN within the Telecom Rooms (TRs) and will be responsible for connecting the new cabling infrastructure to the LAN. This Contractor, however, shall supply the Category 6 patch cords. The Contractor shall be available on site during the crossover to assist with any cabling issues that may occur during the connection.

D. The Electrical Contractor shall install conduits and surface raceway for new technology outlet locations unless otherwise noted.

E. The Telecommunication Contractor shall provide and install all sleeves through the wall penetrations as required whether or not specifically marked on Project Drawings, unless otherwise noted.

F. All cables and related terminations support, and grounding hardware shall be furnished, installed, wired, tested, labeled, and documented by the Contractor, as detailed in the following section(s).

G. All work and materials shall conform in every detail to the rules and requirements of the National Fire Protection Association, the MN Electrical Code, and present manufacturing standards.

H. All materials shall be listed by UL and shall bear the UL label. If UL has no published standards for a particular item, then other national independent testing standards shall apply and such items shall bear those labels. Where UL has an applicable system listing and label, the entire system shall be so labeled.

1.02 CODE AND STANDARD REQUIREMENTS

A. IEEE –National Electrical Safety Code, latest version

B. NFPA 70– National Electrical Code, current version adopted by the city/county. If city/county has not adopted a version then the latest version shall be utilized.

C. ASTM B633 – Specification for Electrodeposited Coatings of Zinc on Iron and Steel

D. ASTM A653 – Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot Dip Process

E. ASTM A123 – Specification for Zinc (Hot Galvanized) Coatings on Iron and Steel

F. ASTM A510 – Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel

G. ANSI/TIA/EIA 569-C Telecommunications Pathways and Spaces

H. ANSI/TIA/EIA 568-C.0, 1, 2, 3, 4 - Commercial Building Telecommunications Standard

I. ANSI/TIA/EIA 606-B - Administration Standard for Telecommunications Infrastructure

J. ANSI-J-STD 607-B - Commercial Building Standard for Bonding and Grounding

1.03 RELATED WORK

A. Section 27 00 00 – E&A General Technology Requirements

B. Section 27 11 00 – Communications Equipment Rooms

C. Section 27 13 00 – Communications Backbone Cabling

D. Section 27 15 00 – Communications Horizontal Cabling

E. Section 27 16 00 – Communications Connecting Cords

F. Section 27 18 00 – Communications Labeling and Identification

1.04 SUBMITTALS

A. Submit one (1) set of digital shop Drawings in PDF format for all materials proposed. Submittals shall be sent to the Consultant for review and approval.

1. Detail Drawings: Detail Drawings include a complete list of equipment and material. Detail Drawings shall contain complete wiring and schematic diagrams and other details required to demonstrate that the system has been coordinated and will function properly as a system. Drawings shall include equipment rack elevation details, elevation details

of telecommunications equipment to be mounted to telecom room walls, and outlet faceplate details for all outlet configurations, sizes, and types of all cables. Drawings shall show proposed overhead telecom room layout(s), as well as equipment relationship to other parts of the work, including clearance for maintenance and operation.

B. Manufacturer's Recommendations

1. Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be provided prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received and approved.

2. A two-foot section of cables from the reel shall be sent to the Consultant for final approval. This two-foot section shall have the manufacturer's cable markings visible.

3. Work shall not proceed without the approved submittals.

1.05 FINAL CLOSE-OUT DOCUMENTATION

A. Upon completion of the installation, the Contractor shall provide three (3) full documentation sets to the Consultant for approval.

B. Close out documents shall include three (3) 3-ring binders with the following:

1. As-built drawings - Hard copy full size

2. Certificate of testing/completion

3. Data cable test results (summary sheets only, we do not want hundreds of pages of test results).

4. CD containing:

   a. As-built drawings (CAD format)

   b. As-built drawings (PDF format)

   c. Detailed test results in original tester format (Fluke Linkware)

   d. Detailed cable test results in PDF format

5. Warranty certification from connectivity manufacturer

6. Three CDs with PDF and .dwg files

7. Letter of completion

   a. Signed by an Authorized Agent

   b. Includes project description

c. Includes project completion date and warranty start/finish dates

C. All documentation, including hard copy and electronic forms, shall become the property of the Owner.

1.06 STATEMENTS

A. Ten days prior to the proposed test date, Contractor shall provide a test plan defining the tests required, ensuring that the system meets Owner operational and performance specifications. The test plan shall be approved before the start of any testing. The test plan shall identify the capabilities and functions to be tested, and shall include detailed instructions for the setup and execution of each test and procedures for evaluation and documentation of the results.

B. The test plan shall also include a sample test result for each type of media (Cat 5e/6, SM/MM fiber, coaxial…).

1.07 CERTIFICATES

A. Premises Distribution System: Written certification that the premises distribution system complies with the EIA ANSI/TIA/EIA-568-C.0,1, 2, 3, EIA ANSI/TIA/EIA-569-B, and ANSI/TIA/EIA-606-A.

B. Materials and Equipment: Where materials or equipment are specified to conform, be constructed, or be tested to meet specific requirements, certification that the items provided conforms to such requirements. Certification by a nationally recognized testing laboratory that a representative sample has been tested to meet the requirements, or a published catalog specification statement to the effect that the item meets the referenced standard, will be acceptable as evidence that the item conforms. Compliance with these requirements does not relieve the Contractor from compliance with other requirements of the specifications.

C. Installers

1. The Contractor shall have an RCDD (Registered Communication Distribution Designer) on staff assigned to manage this Project; documented proof shall accompany the proposal response.

2. All installing personnel shall have completed and be certified in manufacturer training or BICSI (Building Industry Consulting Service International) installation training for UTP infrastructure systems, or the Contractor shall contract with manufacturer for installation of all proposed components. Company Certifications shall accompany the proposal response.

3. The Contractor's technicians shall be certified and trained in the connectivity hardware that is being installed.

4. The Contractor shall submit certification that installers are factory certified to install and test the provided products. No less than half of the crew to be used for the telecommunications installation shall be trained by that manufacturer for the work.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Vendor shall be responsible for all materials until completion of Project.

B. Cable shall be stored according to manufacturer's recommendations at minimum. In addition, cable shall be stored in a location protected from vandalism and weather.

C. If cable is stored outside, it shall be covered with opaque plastic or canvas with provision for ventilation to prevent condensation and for protection from weather. If air temperature at cable storage location will be below 40 degrees Fahrenheit, the cable shall be moved to a heated (minimum 50 degrees Fahrenheit) location. If necessary, cable shall be stored off site at the Contractor's expense.

D. If the Contractor wishes to have a trailer on site for storage of materials, arrangements shall be made with the Owner.

E. Commercial off-the-shelf manuals shall be furnished for operation, installation, configuration, and maintenance for all products provided as a part of the premises distribution system. Specification sheets for all cable, connectors, and other equipment shall be provided.

1.09 WARRANTY

A. The Contractor shall provide to the Owner a manufacturer's 15 year minimum warranty certificate for all materials, equipment, etc. Upon successful completion of the installation and subsequent inspection, the Owner shall receive a numbered certificate, from the manufacturing connectivity hardware (patch panels, jacks, parch cords 110 blocks, etc.) company, registering the installation. This warranty shall include all labor, materials, and travel time.

B. The warranty shall ensure against product defects and guarantee that all approved cabling components exceed the specifications of TIA/EIA-568-C, and ISO/IEC IS 11801 for cabling links/channels, and that the installation will exceed the loss and bandwidth requirements of TIA/EIA 568-C ISO/IEC IS 11801 for fiber links/channels, for a fifteen (15) year period. The warranty shall apply to all passive structure cabling system components.

C. The warranty shall cover the failure of the wiring system to support the application that it was designed to support, as well as additional application(s) introduced in the future by recognized standards or user forums that use the TIA/EIA 568-C or ISO/IEC IS 11801 component and link/channel specifications for cabling, for a minimum of a fifteen (15) year period.

D. The warranty shall cover the replacement or repair of defective product(s) and labor for the replacement or repair of such defective products(s), labeling of the new components, and testing of the circuit(s) at no cost to the Owner.

PART 2 – PRODUCTS

2.01 FIRE STOPPING MATERIALS

A. All penetrations of walls shall be approved by the General Contractor before any penetrations are made. Should the Contractor find it necessary to penetrate any walls extending to the slab, it will be the responsibility of that Contractor to provide satisfactory sleeving and fire caulking both inside and outside of that sleeving. If existing sleeving is to be utilized, it will be the responsibility of the Contractor to fire caulk inside the sleeving.

B. The Contractor is responsible for adhering to the following standards:

1. Conduit penetrations through fire-rated or smoke walls: Completely seal around the conduit penetration with Hilti FS 601 fire-rated sealant Tremco or 3M or equal.

2. Conduit sleeves through fire-rated or smoke wall: Completely seal around the conduit penetration with Hilti FS 601 fire-rated sealant Tremco or 3M or equal. Completely seal inner opening of the conduit sleeve with fire wool packing and Hilti FS 611A intumescent firestop sealant.

3. Cable bundles through fire-rated or smoke walls (without sleeves): Completely seal openings with Hilti FS 611A intumescent firestop sealant, Tremco or 3M or equal.

4. Cable tray penetrations through fire-rated or smoke walls: Completely seal openings with Hilti FS 635 (trowelable type) Tremco or 3M or equal.

C. A submitted response to this specification assumes that all firestopping will be provided as specified. The firestop manufacturer's specifications and instructions shall be submitted with the final documentation.

PART 3– EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper and timely completion.

B. Verify cable lengths comply with published standards.

C. Notify Owner of installation that would exceed maximum lengths prior to installation of cable.

D. Contactor shall consult with Owner regarding alternative routing or location of cable.

E. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION REQUIREMENTS

A. Contractor shall furnish and install all cables, connectors, and equipment as shown on Drawings and as specified above.

B. It is the Contractor's responsibility to survey the site and include all necessary costs to perform the installation as specified. This includes any modifications required to route and conceal horizontal distribution wiring.

C. Beginning installation means Contractor accepts existing conditions.

D. Contractor shall furnish all required installation tools to facilitate cable pulling without damage to the cable jacket. Such equipment shall include, but not be limited to, sheaves, winches, cable reels, cable reel jacks, duct entrance tunnels, pulling tension gauge, and similar devices. All equipment shall be of substantial construction to allow steady progress once pulling has begun. Makeshift devices that may move or wear in a manner to pose a hazard to the cable shall not be used.

E. All cable shall be pulled by hand unless installation conditions require mechanical assistance. Where mechanical assistance is used, care shall be taken to ensure that the maximum tensile load for the cable as defined by the manufacturer is not exceeded. This may be in the form of continuous monitoring of pulling tension, use of a "break-away," or other approved method.

F. The Contractor shall be responsible for identifying and reporting to the General Contractor any existing damage to walls, flooring, tiles, and furnishings in the work area prior to start of work. All damage to interior spaces caused by the installation of cable, raceway, or other hardware shall be repaired by the Contractor.

G. Repairs shall match preexisting color and finish of walls, floors, and ceilings. Any Contractor-damaged ceiling tiles, floor, and carpet shall to be replaced to match color, size, style, and texture.

H. Where unacceptable conditions are found, the Contractor shall bring this to the attention of the construction supervisor immediately. A written resolution will follow to determine the appropriate action to be taken.

I. Qualified personnel utilizing state-of-the-art equipment and techniques shall complete all installation work. During pulling operation, an adequate number of workers shall be present to allow cable observation at all points of duct entry and exit as well as to feed cable and operate pulling machinery.

J. Cable pulling shall be done in accordance with cable manufacturer's recommendations and ANSI/IEEE C2 standards. Manufacturer's recommendations shall be a part of the cable submittal. Recommended pulling tensions and pulling bending radius shall not be exceeded. Any cable bent or kinked to radius less than recommended dimension shall not be installed.

K. All wiring shall be run "free-air," in conduit, in a secured plastic raceway or in modular furniture as designated on the Drawings. All cable shall be free of tension at both ends. PLENUM rated cable shall be used in areas used for air handling.

L. Avoid abrasion and other damage to cables during installation.

M. Pulling lubricant may be used to ease pulling tensions. Lubricant shall be of a type that is non-injurious to the cable jacket and other materials used. Lubricant shall not harden or become adhesive with age.

N. The cable system will be tested and documented upon completion of the installation as defined in the section below.

O. A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit or surface mount raceway. Should it be found by the Consultant that the materials or any portion thereof furnished and installed under this contract fail to comply with the specifications and Drawings with the respect or regard to the quality, amount of value of materials, appliances, or labor used in the work, it shall be rejected, removed, and replaced by the Contractor and all work distributed by changes necessitated in consequence of said defects or imperfections shall be corrected at the Contractor's expense.

3.03 COOPERATION

A. The Contractor shall cooperate with other trades and General Contractor's personnel in locating work in a proper manner.

B. Should it be necessary to raise, lower, or move longitudinally any part of the work to better fit the general installation, such work shall be done at no extra

cost to the Owner, provided such decision is reached prior to actual installation. The Contractor shall check location of electrical outlets with respect to other installations before installing.

3.04 TESTING AND ACCEPTANCE

A. The Contractor shall perform acceptance tests as indicated below for each subsystem (backbone, station, etc.) as it is completed.

B. The Contractor shall supply all equipment and personnel necessary to conduct the acceptance tests. Prior to testing, the Contractor shall provide a summary of the proposed test plan for each cable type, including equipment to use, setup, test frequencies or wavelengths, results format, etc. The Consultant will approve the method of testing.

C. The Contractor shall visually inspect all cabling and termination points to ensure that they are complete and conform to the wiring pattern defined herein. The Contractor shall provide the Consultant with a written certification that this inspection has been made.

D. The Contractor shall conduct acceptance testing according to a schedule coordinated with the Consultant. Representatives of the Owner may be in attendance to witness the test procedures. The Contractor shall provide a minimum of one (1) week advance notice to the Consultant and Owner to allow for such participation. The notification shall include a written description of the proposed conduct of the tests, including copies of blank test result sheets to be used.

E. Tests related to connected equipment of others shall be done only with the permission and presence of Contractor involved. The Contractor shall ascertain that testing only as required to prove the wiring connections are correct.

F. The Contractor shall provide test results and describe the conduct of the tests, including the date of the tests, the equipment used, and the procedures followed. At the request of the Consultant, the Contractor shall provide copies of the original test results.

G. All cabling shall be 100% fault free unless noted otherwise. If any cable is found to be outside the specification defined herein, that cable and the associated termination(s) shall be replaced at the Contractor's expense. The applicable tests shall then be repeated.

H. Backbone voice cables shall be free of shorts within the pairs and be verified for continuity, pair validity and polarity, and conductor position on the termination blocks (e.g., 110). Any mispositioned pairs shall be identified and corrected. The percentage of "bad" pairs shall not exceed 1% in any backbone (riser or tie) cable based on total pair count. All bad pairs shall be identified and documented.

I. The Consultant or Owner may request that a 10% random field re-test be conducted on the cable system to verify documented findings.

   1. If requested, the contractor shall test up to 10% of cable links at no cost to the owner.

   2. Tests shall be a repeat of those defined above and under Testing and Acceptance. If findings contradict the documentation submitted by the Contractor, additional testing shall be performed to the extent determined necessary by the Consultant, including a 100% re-test. This re-test shall be at no additional cost to the Owner.

3.05 DEMOLITION

A. General: Contractor shall be responsible for removal, collection, transportation, and recycling of all indicated cabling and components, including the delivery of cable to the recycling center. If material is to remain on site for more than seven days after removal, Contractor shall coordinate with Owner for acceptable storage location.

B. Verification: Contractor shall field-verify existing conditions prior to beginning demolition work. Any discrepancies between existing conditions and Owner's written instructions shall be reported to Owner prior to the start of work in order to prevent disturbance of existing installation(s). Beginning work shall indicate acceptance of existing conditions. Contractor is responsible for immediately restoring any outages caused as a result of removing or damaging adjacent cabling, systems, or services.

C. Cable Removal: Where it is not possible to remove cables without damaging other cables that are to remain, such as in a shared conduit, Contractor shall cut cables at entry and exit point of constriction, leaving a minimum of 24" of cable at each end.

D. Cover Plates: Contractor shall provide and install blank cover plates for any outlets that are to be left in place and from which all cables have been removed. Cover plates shall match the Project standard color and finish.

E. Fire-Stopping: If Contractor removes anything from an opening in a fire-rated wall, Contractor shall restore the fire-rating condition of the wall to the same condition as before Contractor started its work. Depending on the size of the opening, this may involve sheetrock patching, in addition to use of other appropriate fire-stopping materials.

3.06 FIRE STOPPING

A. Contractor shall seal any openings created for cable pass-through between floors or through fire rated walls. Sealing material and application of this material shall be accomplished in such a manner that is acceptable to the local fire and building authorities having jurisdiction over this work.

B. Creation of such openings as are necessary for cable passage between locations as shown on the Drawings shall be the responsibility of the Contractor. Any openings created by or for the Contractor and left unused shall also be sealed as part of this work.

END OF SECTION

SECTION 27 11 00 – COMMUNICATIONS EQUIPMENT ROOMS

PART 1 – GENERAL

1.01 SCOPE

A. This section describes the products and execution requirements relating to telecommunications cabling, termination components, racks, pathways, telecommunication rooms and related subsystems. Covered systems include the following:

1. Equipment room cable management system and equipment racks
2. Horizontal and backbone cable terminating equipment
3. Telecommunications grounds and related components

1.02 RELATED WORK

A. Section 27 00 00 – E&A General Technology Requirements

B. Section 27 10 00 – Structured Cable Infrastructure

C. Section 27 13 00 – Communications Backbone Cabling

D. Section 27 15 00 – Communications Horizontal Cabling

E. Section 27 16 00 – Communications Connecting Cords

F. Section 27 18 00 – Communications Labeling and Identification

1.03 REFERENCE STANDARDS

A. NFPA 70 – National Electric Code

B. NEMA, UL, TIA/EIA, and ANSI Standards, where applicable standards have been established

C. ANSI/TIA/EIA 569-C - Commercial Building Standard for Pathways and Spaces

D. ANSI/TIA/EIA 568-C.0, 1, 2, 3, 4 - Commercial Building Telecommunications Standard

E. ANSI/TIA/EIA 606-B - Administration Standard for Telecommunications Infrastructure

F. ANSI/TIA-942-A – Telecommunications Infrastructure Standard for Data Centers

PART 2 – PRODUCTS

2.01 PATCH PANELS

A. Cables shall be terminated at the telecommunication closets on high-density integrated patch panels incorporating Category 6 modules (non-keyed 8-pin), meeting the specifications for the telecommunications outlet detailed in the section above.

B. The patch panels shall have a removable 6-port design that allows a 6-port faceplate to be removed from the panel without disrupting the other ports.

C. Patch panel configuration shall be 48 ports. The patch panel shall consist of a modular to 110-type connector system.

D. The patch panel blocks shall have the ability to seat and cut 8 conductors (4 pairs) at a time and shall have the ability of terminating 22- through 26-gauge plastic insulated, solid, and stranded copper conductors. Data blocks shall be designed to maintain the cable's pair twists as closely as possible to the point of mechanical termination.

E. The patch panel shall exceed ANSI/TIA/EIA 568-C.2-1 Category 6 component compliance standard. All pair combinations shall be considered, with the worst-case measurement being the basis for compliance.

F. The patch panels shall be interoperable and backwards compatible to lower performing cabling systems.

G. Panels shall incorporate cable support and/or strain relief mechanisms to secure the horizontal cables at the termination block and to ensure that all manufacturers' minimum bend radius specifications are adhered to.

H. The patch panel shall have color-coded designation strips to identify cable count.

I. Category 6 patch panels shall be manufactured by Belden.

2.02 VOICE BACKBONE TERMINATION FIELD

A. Wall Mounted 110 Blocks

1. At the MDF room, voice "backbone" cables shall be terminated on high-density wall mounted 110 blocks.

2. The Proposer shall provide 100 pairs rack mounted 110 panels. The panel shall allow voice backbone cables to be terminated directly on the wall.

3. The panels shall incorporate the openings between rows to allow cables to be routed from behind the panel directly to the point of termination.

4. The panels shall be with cable managers and covers. Termination strips on the base shall be notched and divided into 5-pair increments.
5. The mechanical termination shall:
    a. Have the ability of terminating 22-26 AWG plastic insulated, solid, and stranded copper conductors.
    b. Provide a direct connection between the cable and jumper wires.
    c. Have less than 0.2-dB of attenuation from 1 - 100 MHz.
    d. Have less than 100 mw of DC resistance.
    e. Have less than 5 mw of resistance imbalance.
    f. Have minimal signal impairments at all frequencies up to 100 MHz.
6. Blocks shall identify pair position by a color designation: blue, orange, green, brown, and slate (backbone only).

2.03 FIBER OPTIC PATCH PANELS

A. The Contractor shall provide a fiber optic patch panel at each location where a fiber optic cable terminates.

B. All terminated fibers shall be mated to duplex LC couplings mounted on enclosed patch panels. Couplers shall be mounted on a panel that, in turn, snaps into the enclosure. The proposed enclosure shall be designed to accommodate a changing variety of connector types, including SC, ST, Fixed Shroud Duplex (e.g., "FDDI Connector"), Biconic, and FC by changing panels on which connector couplings are mounted.

C. The patch panel enclosure shall be sized to accommodate the total fiber count to be installed at each location as defined in the specifications and Drawings, including those not terminated (if applicable), PLUS 50% future growth.

D. The Contractor shall provide all required connector panels and connector couplings (sleeves, bulkheads, etc.) adequate to accommodate the number of fibers to be terminated.

E. Patch panels shall be designed for easy installation, front removal, and expansion of snap-in adapter panels.

F. Patch panels shall be enclosed assemblies affording protection to the cable subassemblies and to the terminated ends. The enclosures shall incorporate a hinged or retractable front cover designed to protect the connector couplings and fiber optic jumpers.

G. The patch panel's enclosure shall provide for strain relief of incoming cables and shall incorporate radius control mechanisms to limit bending of the fiber to the manufacturer's recommended minimums or 1.2", whichever is larger.

H. Access to the inside of the patch panel enclosure during installation shall be from the front and rear. Panels that require any disassembly of the cabinet to gain entry will not be accepted.

I. All patch panels shall provide protection to both the "facilities" and "user" side of the coupling. The patch panel enclosure shall be configured to require front access only when patching. The incoming cables (backbone, riser, etc.) shall not be accessible from the patching area of the panel. The enclosure shall provide a physical barrier to access of such cables.

J. Where singlemode fibers are installed, the fibers contained in these cables may be terminated either by (1) splicing of factory-terminated cable assemblies ("pigtails") or (2) use of a "fan-out" kit. In the latter approach, individual fibers are to be secured in a protective covering (such as an Aramid reinforced tube, for example) with connectors mated to the resulting assembly. In both instances, the proposed termination hardware shall incorporate a mechanism by which cable and subassemblies are secured to prevent damage. Splicing shall be by the "fusion" method. Individual splice loss shall not exceed 0.2 dB.

K. Fiber optic patch panels shall be Corning PCH-02 (TRs) and PCH-4U in Server Room.

L. 50-micron LC adaptor panels shall be Corning CCH-CP12-D3.

M. Single-Mode LC adaptor panels shall be Corning CCH-CP12-A7.

2.04 CABLE MANAGEMENT SYSTEM

A. The cable management system shall be used to provide a neat and efficient means for routing and protecting fiber and copper cables and patch cords on telecommunication racks and enclosures. The system shall be a complete cable management system comprising 4-post and 2-post floor mount racks, wall mount racks, and vertical and horizontal cable managers to manage cables on both the front and rear of the rack. The system shall protect network investment by maintaining system performance, controlling cable bend radius, and providing cable strain relief.

1. MDF 4-Post Equipment Rack

a. At the MDF rooms, the Contractor shall provide and install 4-post adjustable equipment racks to house cable termination components (e.g., copper data and fiber optic) and network electronics (by others). Prior to installation, the Contractor shall coordinate exact placement with Owner.

b. The 4-post rack shall conform to the following requirements:

i. Rack shall be 84" in height and shall be self-supporting.

ii. Channel uprights shall be spaced to accommodate industry standard 19" mounting.

iii. Rack shall be constructed of aluminum.

iv. Rack shall be double side drilled and tapped to accept 12-24 screws. Uprights shall also be drilled on back to accept cable brackets, clamps, power strip(s), etc. Hole pattern on rack front shall be per EIA/TIA specifications (5/8"-5/8"-1/2"). Hole pattern on the rear shall be at 3" intervals to accept cable brackets.

v. Rack shall be supplied with at least 24 spare screws.

vi. Rack shall be supplied with a ground bar and #6 AWG ground lug.

c. Equipment rack shall be Homaco 19-84-SSDA2132. Contractor shall provide 100 cage nuts and screws with each rack.

2. 2-Post Equipment Racks

a. Unless otherwise noted on the Project Drawings, at the IDF rooms the Contractor shall provide and install 2-post adjustable equipment racks to house cable termination components (e.g., copper data and fiber optic) and network electronics (by others). Prior to installation, the Contractor shall coordinate exact placement with Owner.

b. The rack shall conform to the following requirements:

i. Rack shall be 84" in height and shall be self-supporting.

ii. Channel uprights shall be spaced to accommodate industry standard 19" mounting and have pass-through holes with smooth edges to protect cables.

iii. Rack shall be constructed of aluminum.

iv. Rack shall be double side drilled and tapped to accept 12-24 screws. Uprights shall also be drilled on back to accept cable brackets, clamps, power strip(s), etc. Hole pattern on rack front shall be per EIA/TIA specifications (5/8"-5/8"-1/2"). Hole pattern on the rear shall be at 3" intervals to accept cable brackets.

v. Rack shall be supplied with at least 24 spare screws.

vi. Rack shall be supplied with a ground bar and #6 AWG ground lug.

vii. Equipment rack shall be CPI 55053-703.

B. Vertical Cable Management

1. At the telecommunication rooms, vertical cable management shall be furnished and installed to adjacent racks to organize cables on front and rear of telecommunication racks.

2. Vertical cable managers shall include components that aid in routing, managing, and organizing cable to and from equipment. Panels shall protect network equipment by controlling cable bend radius and providing cable strain relief. Panels shall be a universal design mounting to EIA 19" or 23" racks.

3. Vertical cable management system shall feature the following:

    a. Open cabling section on the rear that provides easy access and routes cable bundles feeding into the back of patch panels and 1 RMU cable guide on the front designed for fanning and managing patch cords.

    b. Edge-protected pass-through ports designed for easy routing of cable from front channel to back.

    c. Vertical slots along the center separator to allow securing cable bundles neatly with management straps.

    d. Door/cover (front only) that is easily opened from the right or left and still easily removed to allow for quick moves, adds, and changes.

    e. Movable wire retainers to retain the cables during cover removal.

4. Vertical cable management at the end of rack rows shall be CPI part # 30162-703.

5. Vertical cable management between racks shall be CPI part # 30163-703.

2.05 POWER DEVICES

A. Power Strips: Unless otherwise specified, power strips shall be UL listed, surface mounted, rated for 20 amp continuous electronic loads. Outlets shall be 125 volt, 20 amp, three-wire, grounded, NEMA 5-20R. Cords shall be 12/3 SJT with molded plug.

B. Contractor shall provide one power strip per rack/cabinet.

C. Power Strip shall be Chatsworth 12816-707.

2.06 SHALLOW WALL MOUNT CABINET

A. Where indicated on Project Drawings, the Contractor shall provide and install one (1) shallow wall mount cabinet to house cable termination panels and network electronics. The Contractor shall also provide and install one (1) ¾" plywood backboard for support when mounting cabinet.

B. The Contractor shall coordinate with General Contractor to install power outlet into cabinet.

C. Cabinets shall come with external fan.

D. Fan shall be Hubbell REKF.

E. Shallow cabinet shall be Hubbell RE4X.

2.07 WALL MOUNT EQUIPMENT CABINET

A. Where indicated on Project Drawings, the Contractor shall provide and install one (1) wall mount cabinet to house cable termination panels and network electronics. The Contractor shall also provide and install one (1) ¾" plywood backboard for support when mounting cabinet.

B. The Contractor shall coordinate with Electrical Contractor to install a power outlet into cabinet.

C. Cabinets shall come with two (2) fans and one (1) 8-outlet 20 amp rack mount power strip.

D. Fans shall be Chatsworth 12804-701.

E. Power Strip shall be Chatsworth 12820-707.

F. Cabinet shall be Chatsworth 12419-748. THIS IS 48”H x 30”D

2.08 HORIZONTAL CABLE MANAGEMENT

A. Horizontal cable managers shall include components that aid in routing, managing, and organizing cable to and from equipment. Panels shall protect network equipment by controlling cable bend radius and providing cable strain relief. Panels shall be a universal design mounting to EIA 19" racks and constructed of steel bases with PVC duct attached. The duct fingers shall include retaining tabs to retain the cables in place during cover removal. The covers shall be able to hinge from either side yet still be easily removed to allow for quick moves, adds, and changes.

B. The cable managers shall be provided with movable wire retainers to retain the cables during cover removal and #12-24 mounting screws. An integral strain relief bracket shall be provided on either end of the duct to allow for easy cover placement.

C. Double-Sided horizontal cable managers shall be placed above and below each patch panel. Double-Sided horizontal cable management shall be Chatsworth part # 30530-719.

D. The Contractor shall also supply twenty (20) additional managers for network electronics (electronics provided by others). These managers shall be Chatsworth part # 30130-719.

2.09 TELECOMMUNICATION GROUND

A. The Telecommunication Contractor is responsible for providing an appropriate ground for all racks, trays, and telecommunications equipment installed by this Contractor.

2.10 WIRE BASKET RUNWAY

A. At MER and each TR, the Contractor shall provide and install sufficient basket tray to support cable bundles from corridor to equipment racks or as shown on the Project Drawings, this Contractor shall provide and install sufficient basket tray to support cable bundles from corridor to equipment racks or cabinet.

B. The Contractor shall provide all necessary labor, supervision, materials, equipment, tests, and services to install complete wire basket runway systems in the telecommunication closet as shown on the Drawings.

C. Wire basket runway systems shall include, but are not limited to, straight sections of continuous wire mesh, field formed horizontal and vertical bends, tees, drop outs, supports, and accessories.

D. Specifications and Drawings are for assistance and guidance, but exact routing, locations, distances, and levels will be governed by actual field conditions.

E. All straight section longitudinal wires shall be straight (with no bends).

F. Wire basket runway shall be made of high strength steel wires and formed into a standard 2-inch by 4-inch wire mesh pattern with intersecting wires welded together. All wire ends along runway sides (flanges) shall be rounded during manufacturing for safety of cables and installers.

G. All fittings shall be field formed as needed.

H. All splicing assemblies shall be the bolted type using serrated flange locknuts. Hardware shall be either yellow zinc dichromate in accordance with ASTM B633 SC2 or AISI Type 304 stainless steel.

I. Straight sections shall be furnished in standard 118-inch lengths. Wire basket shall have a 4-inch usable loading depth and be 24 inches wide.

J. Cable Drop Out/Waterfall

   1. Where cables bundles transition from tray and drop into the data center cabinets, the Contractor shall provide and install a radius control device. This device shall be a waterfall or drop out device and shall be properly sized to accommodate cable bundle plus 20% future growth.

K. T-sections of tray shall be made using B-Line T-section fitting.

L. Straight section splices shall be made using B-Line FT2X4 Splice Plates.

M. Wire basket runway supports shall be trapeze hangers as manufactured by Cooper B-Line (or Consultant approved equal).

N. Trapeze hangers shall be supported by 3/8 inch diameter rods. Trapeze system shall be B-Line WB5512-3/8.

O. Tray shall be B-Line FT4X12X10 and shall have flat Black finish.

P. Accessories (connectors, splice plates…) shall be painted to match tray finish.

2.11 LADDER RACK

A. At each TR, the Contractor shall provide and install ladder rack as shown on the Project Drawings.

B. The Contractor shall provide all necessary labor, supervision, materials, equipment, tests, and services to install complete wire basket runway systems in the telecommunications room as shown on the Drawings.

C. Specifications and Drawings are for assistance and guidance, but exact routing, locations, distances, and levels will be governed by actual field conditions.

D. All splicing assemblies shall be the bolted type using serrated flange locknuts. Hardware shall be either yellow zinc dichromate in accordance with ASTM B633 SC2 or AISI Type 304 stainless steel.

E. Cable Drop Out/Waterfall

1. Where cables bundles transition from tray and drop into the racks/cabinets, the Contractor shall provide and install a radius control device. This device shall be a waterfall or drop out device and shall be properly sized to accommodate cable bundle plus 20% future growth.

F. Ladder rack kit shall be CPI 11911-712 with 12392-709 waterfall.

G. Accessories (connectors, splice plates…) shall be painted to match tray finish.

2.12 CABLE DROP OUT/WATERFALL

A. Where cables bundles with more than 10 cables transition from conduit/sleeve and drop down more than 12”, the Contractor shall provide and install a radius control device. This device shall be Panduit CWFx00 and shall be sized for the conduit/sleeve.

B. Where cables bundles with more than 10 cables transition from tray and drop down more than 12”, the Contractor shall provide and install a radius control device. This device shall be Cablofil CABLEXIT and shall be properly sized to accommodate cable bundle plus 20% future growth.

PART 3– EXECUTION

3.01 EQUIPMENT RACK

A. Prior to permanently securing racks or cabinets, the Contractor shall coordinate a walk through with the Owner to determine exact placement of racks.

B. The Contractor shall bolt the rack to the floor as recommended by the manufacturer. Multiple racks shall be joined and the ground made common on each. Rack shall also be stabilized by extending a brace extending to the wall. Alternately, overhead cable tray over which the cabling accesses the equipment rack(s) shall provide this function.

C. Where possible, a space between the rack upright and the wall (~4") shall be planned to allow for cabling in that area. The rear of the rack shall be ~40" from the wall to allow for access by maintenance personnel. In all cases, a minimum of 40" workspace in front of the rack is also required. Locations where these guidelines cannot be followed shall be brought to the attention of the Consultant for resolution prior to installation.

D. All hardware and equipment is to be mounted at least 18" above floor level. This is to afford easy access and, in the case of the lower limit, prevent damage to the components. Positioning of hardware shall be reviewed and approved by the Consultant and Site Coordinator(s) prior to installation.

E. Equipment rack shall be equipped with cable management hardware to allow an orderly and secure routing of twisted pair cabling to the data patch panels. At minimum, one such horizontal jumper management panel shall be placed below each fiber optic patch panel installed by the Contractor. Additional jumper management panels may be required pending installation of other cable types on the rack. The rack shall be grounded to the telecommunications ground (TGB) using a #6 AWG (or larger) insulated stranded copper conductor (GREEN jacket).

3.02 WIRE BASKET RUNWAY

A. When cable bundles enter telecom rooms, Contractor shall install wire basket runways as necessary to support the cable to each rack. Basket tray shall be installed in accordance with recognized industry practices, to ensure that the cable tray equipment complies with requirements of NEC and applicable portions of NFPA 70B and NECA's "Standards of Installation" pertaining to general electrical installation practices.

B. Coordinate installation of wire basket runway with other electrical work as necessary to properly interface installation of wire basket runway with other work.

C. Provide sufficient space encompassing wire basket runways to permit access for installing and maintaining cables.

D. Test wire basket runways to ensure electrical continuity of bonding and grounding connections and to demonstrate compliance with specified maximum grounding resistance. See NFPA 70B, Chapter 18, for testing and test methods.

END OF SECTION

SECTION 27 13 00 – COMMUNICATIONS BACKBONE CABLING

PART 1 – GENERAL

1.01 SCOPE

A. This section describes the products and execution requirements relating to telecommunications voice, data and video backbone cabling and termination components.

B. Backbone Cabling is the cable and hardware interconnecting telecommunication rooms (TRs), building demarcation rooms, equipment rooms and server rooms. The backbone cabling shall consist of the following cable types:

1. 50-micron Multi-Mode Fiber Optic Cable
2. Single-Mode Fiber Optic Cable
3. Multi-Pair Copper Voice Backbone Cable
4. Coaxial CATV Backbone Cable

1.02 RELATED WORK

A. Section 27 00 00 – E&A General Technology Requirements

B. Section 27 10 00 – Structured Cable Infrastructure

C. Section 27 11 00 – Communications Equipment Rooms

D. Section 27 15 00 – Communications Horizontal Cabling

E. Section 27 16 00 – Communications Connecting Cords

F. Section 27 18 00 – Communications Labeling and Identification

1.03 REFERENCE STANDARDS

A. NFPA 70 – National Electric Code

B. NEMA, UL, TIA/EIA, and ANSI Standards, where applicable standards have been established

C. ANSI/TIA/EIA 569-C - Commercial Building Standard for Pathways and Spaces

D. ANSI/TIA/EIA 568-C.0, 1, 2, 3, 4 - Commercial Building Telecommunications Standard

E. ANSI/TIA/EIA 606-B - Administration Standard for Telecommunications Infrastructure

F. ANSI/TIA/EIA-598-B – Optical Fiber Cable Color Coding

1.04 TEST DATA – FIBER OPTIC MEDIA

A. The test result information for each link shall be recorded in the memory of the field tester upon completion of the test.

B. The test result records saved by the tester shall be transferred into a Windows-based database utility that allows for the maintenance, inspection, and archiving of these test records. A guarantee shall be made that these results are transferred to the PC unaltered, i.e., "as saved in the tester" at the end of each test.

C. The database for the completed job shall be stored and delivered on CD-ROM. This CD-ROM shall include the software tools required to view, inspect, and print any selection of test reports.

D. A paper copy of the test results shall be provided that lists all the links that have been tested with the following summary information:

1. The identification of the link in accordance with the naming convention defined in the overall system documentation.

2. The overall Pass/Fail evaluation of the link-under-test including the Attenuation worst-case margin (margin is defined as the difference between the measured value and the test limit value as defined in this document).

3. The date and time the test results were saved in the memory of the tester.

E. The following general information is to be provided in the electronic database containing the test result information for each link:

1. The identification of the customer site as specified by the end user.

2. The overall Pass/Fail evaluation of the link-under-test.

3. The name of the standard selected to execute the stored test results.

4. The cable type and the value of the 'index of refraction' used for length calculations.

5. The date and time the test results were saved in the memory of the tester.

6. The brand name, model, and serial number of the tester.

7. The revision of the tester software and the revision of the test standards database in the tester.

F. The detailed test results data to be provided in the electronic database for each tested optical fiber shall contain the following information:

1. The identification of the link/fiber in accordance with the naming convention defined in the overall system documentation.

2. The insertion loss (attenuation) measured at each wavelength, the test limit calculated for the corresponding wavelength, and the margin (difference between the measured attenuation and the test limit value).

G. The link length shall be reported for each optical fiber for which the test limit was calculated.

H. Contractor shall provide accurate as-built Construction Drawings at the site during construction.

I. The Drawings are to include cable routes and outlet locations. Outlet locations shall be identified by their sequential number as defined elsewhere in this document. Numbering, icons, and drawing conventions used shall be consistent throughout all documentation provided. The Owner will provide floor plans in paper and electronic (".dwg", AutoCAD rel. 2004 and ".dxf") formats on which as-built construction information can be added. These documents will be modified accordingly by the Contractor to denote as-built information as defined above and returned to the Owner.

J. The Contractors shall annotate the base Drawings and return to the Consultant in hard copy (same plot size as originals) and electronic (AutoCAD rel. 2004 and ".dxf") form.

PART 2 – PRODUCTS

2.01 BACKBONE VOICE CABLING

A. The voice backbone cable shall link the Main Closet and Telecommunications Rooms serving the building. The cables shall be CMP rated. These cables shall be terminated on rack mounted 110 type blocks at MER and TR.

B. Voice backbone cable shall incorporate 24 AWG solid annealed copper conductors insulated with a polyvinyl chloride skin over expanded polyethylene. Conductors shall be twisted to form pairs and fully color-coded.

C. The voice backbone cable shall be sized as detailed on the Drawings.

D. Conductors shall be identified by the insulation color of each conductor. The color code shall follow the industry standard composed of ten (10) distinctive colors to identify 25 pairs in accordance with ICEA publication S-80-576-1988. Marking of each mate of the primary conductor in a pair with the color of that primary conductor is optional.

E. The voice backbone cable shall meet or exceed the EIA/TIA Category 3 performance requirements.

F. When cables of larger than 25 pairs are required, the core shall be assembled into 25-pair subunits, each color-coded in accordance with ICEA publication S-80-576-1988. Cables with over 600 pairs shall have 25-pair binder groups combined into super units. These super units shall be wrapped with a solid color thread that follows the primary color scheme of white, red, black, yellow, and violet. Binder color code integrity shall be maintained wherever cables are spliced.

G. All cables and equipment shall be furnished, installed, wired, and tested by the Contractor.

H. The cable shall be Berk-Tek, General Cable, Essex, or other equivalent products that meet these specifications.

2.02 TIGHT-BUFFERED OPTICAL FIBER CABLES FOR INDOOR DISTRIBUTION APPLICATIONS

A. General Considerations

1. The cable shall meet the requirements of the National Electrical Code (NEC) Section 770.

2. For plenum applications, the cable shall meet applicable flame tests: ANSI/UL 910 (NFPA 262-1994).

3. Cables shall be listed OFNP (OFCP).

4. Finished cables shall conform to the applicable performance requirements of Tables 8-6 and 8-7 of the Insulated Cable Consultants Association, Inc. (ICEA) *Standard for Fiber Optic Premises Distribution Cable* (ICEA S-83-596).

B. Cable Construction

1. The coated fiber shall have a layer of Teflon placed between the acrylate coating of the optical fiber and the thermoplastic buffer. The diameter of the thermoplastic buffer coating shall be 900 ±50µm. The fiber coating and buffer shall be removable with commercially available stripping tools in a single pass for connectorization or splicing.

2. Cables with 2 to 24 fibers layered aramid yarns shall serve as the tensile strength member of the cable.

3. A ripcord shall be applied between the aramid yarns and the outer jacket to facilitate jacket removal.

4. The outer jacket shall be extruded over the aramid yarns for physical and environmental protection. The jacket shall be continuous, free from pinholes, splits, blisters, or other imperfections. The jacket shall have a consistent, uniform thickness. The jacket shall be smooth, as is consistent with the best commercial practice.

5. The fibers shall be stranded around a dielectric central member.
6. For cables containing 12-24 fibers, the fibers shall be arranged in two layers.
7. The central member shall be over coated with a thermoplastic, when required, to achieve dimensional sizing to accommodate and support the 900 µm buffered fibers.
8. Cables with 24 to 60 fibers shall have unitized riser and plenum constructions.
9. The buffered fibers shall be grouped in six-fiber subunits.
10. The fibers shall be stranded around a dielectric central member in the subunit.
11. Layered aramid yarns shall serve as the tensile strength member of the subunit.
12. A ripcord may be applied between the aramid yarns and the subunit jacket to facilitate jacket removal.
13. The subunit jacket shall be extruded over the aramid yarns for physical and environmental protection. The jacket shall be continuous, free from pinholes, splits, blisters, or other imperfections .The jacket shall have a consistent, uniform thickness. The jacket shall be smooth, as is consistent with the best commercial practice.
14. The subunits shall be stranded around a dielectric central member. A ripcord shall be inserted beneath the outer jacket to facilitate jacket removal. The outer jacket shall be extruded around the subunits. The strength members shall be of a high modulus aramid yarn. The aramid yarns shall be helically stranded around the buffered fibers. Non-toxic, non-irritant talc shall be applied to the yarns to allow them to be easily separated from the fibers and the subunit jacket.

C. Outer Cable Jacket

1. The jacket shall be continuous, free from pinholes, splits, blisters, or other imperfections. The jacket shall have a consistent, uniform thickness; jackets extruded under high pressure are not acceptable. The jacket shall be smooth, as is consistent with the best commercial practice. The jacket shall provide the cable with a tough, flexible, protective coating, able to withstand stresses. The nominal thickness of the cable outer jacket shall be sufficient to provide adequate cable protection while meeting the mechanical, flammability, and environmental test requirements of this document over the life of the cable.

2. The indoor distribution cable specified herein shall have an interlocking armor made of steel or aluminum. The interlocking armor for plenum cables shall have a PVC jacket.

3. The color of the armor jacket shall match the jacket color of the optical fiber cable located inside of the armor. The armor for these cables shall be comparable to liquid tight flexible metal conduit if jacketed, or flexible metal conduit.

D. Fiber Identification

1. The individual fibers shall be color-coded for identification. The optical fiber color-coding shall be in accordance with ANSITIA/EIA-598-B "Optical Fiber Cable Color Coding." The coloring material shall be stable over the temperature range of the cable, shall not be susceptible to migration, and shall not affect the transmission characteristics of the optical fibers. Color-coded buffered fibers shall not adhere to one another.

2. When buffered fibers are grouped into individual subunits, each subunit jacket shall be numbered for identification, with the exception of filler subunits where used. The number shall be repeated at regular intervals. The subunit jacket color shall be orange for subunits containing multimode fibers, yellow for subunits containing single-mode fibers, and white for filler subunits.

3. The outer jacket for all dielectric cable shall be marked with the manufacturer name or UL file number, date of manufacture, fiber type, flame rating, listing symbol, and sequential length markings every two feet. The marking shall be in contrasting color to the cable jacket. The cable jacket color shall be orange for cables containing multimode fibers and yellow for cables containing single-mode fibers.

4. Cables with a PVC jacket over interlocking armor shall be marked with the manufacturer name, date of manufacture, fiber type, flame rating, listing symbol, and sequential length markings every two feet. The marking shall be in contrasting color to the cable jacket. The cable jacket color shall match the color of the core optical fiber cable.

E. Cable Specifications

1. Temperature Range

a. Non-Plenum Applications: The storage temperature range for the cable on the original shipping reel shall be -40 to +70ºC. The installation/operating temperature range for riser cables shall be -20 to +70 ºC. Testing shall be in accordance with FOTP-3.

b. Plenum Applications: The storage temperature range for the cable on the original shipping reel shall be -40 to +70ºC.The

installation/operating temperature range for plenum cables shall be 0 to +70ºC.Testing shall be in accordance with FOTP-3.

2. Compressive Load Resistance

   When tested in accordance with FOTP-41, Compressive Loading Resistance of Fiber Optic Cables, the cable shall withstand a minimum compressive load of 89 N/cm (50 lbf/in) applied uniformly over the length of the compression plate. While under compressive load, the fiber shall not experience an attenuation change greater than 0.4 dB at 1550 nm (single-mode) or greater than 0.6 dB at 1300 nm (multimode). After the compressive load is removed, the fibers shall not experience an attenuation change greater than 0.2 dB at 1550 nm (single-mode) or greater than 0.4 dB at 1300 nm (multimode).

3. Cyclic Flexing

   When tested in accordance with FOTP-104, Fiber Optic Cable Cyclic Flexing Test, the cable shall withstand 25 mechanical flexing cycles at a rate of 30 ± 1 cycle per minute. The fiber shall not experience an attenuation change greater than 0.2 dB at 1550 nm (single-mode) or greater than 0.4 dB at 1300 nm (multimode).

4. High and Low Temperature Bend

   When tested in accordance with FOTP-37, Fiber Optic Cable Bend Test, Low and High Temperature, the cable shall withstand four full turns around a mandrel at test temperatures of 0 ºC and +50 ºC. The fibers shall not experience an attenuation change greater than 0.2 dB at 1550 nm (single-mode) or greater than 0.5 dB at 1300 nm (multimode).

5. Impact Resistance

   When tested in accordance with FOTP-25, Repeated Impact Testing of Fiber Optic Cables and Cable Assemblies, the cable shall withstand a minimum of 20 impact cycles for riser cables and 10 impact cycles for plenum cables. The fibers shall not experience an attenuation change greater than 0.2 dB at 1550 nm (single-mode) or greater than 0.4 dB at 1300 nm (multimode).

6. Temperature Cycling

   When tested in accordance with FOTP-3, Procedure to Measure Temperature Cycling Effects on Optical Fiber, Optical Cable, and Other Passive Fiber Optic Components, the change in attenuation at extreme operational temperatures (0 to +50 ºC) shall not exceed 0.3 dB/km at 1550 nm (single-mode) or 0.6 dB/km at 1300 nm (multimode). The change in attenuation is measured with respect to the baseline values measured at room temperature before temperature cycling.

7. Twist-Bend

   When tested in accordance with FOTP-91, Fiber Optic Cable Twist-Bend Test, a length of cable no greater than 2 meters shall withstand 10 cycles of mechanical twisting and bending around a mandrel 20 times the cable outer diameter. The fibers shall not experience an attenuation change greater than 0.2 dB at 1550 nm (single-mode) or 0.4 dB at 1300 nm (multimode).

F. Multimode (50/125 µm)

1. The multimode fiber utilized in the optical fiber cable shall meet EIA/TIA-492AAAA-A-1997, Detail Specification for 50µm Core Diameter/125µm Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers (OM3 type). Cable shall have the following specifications:

   a. Core Diameter: 50 ± 3 µm

   b. Core Non-Circularity: ≤5%

   c. Cladding Diameter: 125± 2 µm

   d. Cladding Non-Circularity: <2.0%

   e. Core-to-Cladding Concentricity: ≤ 3 µm

   f. Coating Diameter: 245 ± 2 mm

   g. Refractive Index Profile: Graded index

   h. Numerical Aperture: 0.275 ± 0.015

   i. Maximum Attenuation: less than 3.0 dB/km at 850 nm and 1.0 dB/km at 1300 nm.

2. IEEE 802.3z Performance: The fiber shall support laser-based 10 Gigabit Ethernet (10GbE) operation for up to 300 meters.

3. Attenuation at the Water Peak: The attenuation coefficient at 1380 nm shall not exceed the attenuation coefficient at 1300 nm by more than 1.0 dB/km.

4. Macrobend Attenuation: The attenuation due to 100 turns of fiber around a 75-± 2 mm diameter mandrel shall not exceed 0.5 dB at 850 nm or1300 nm.

G. Single Mode

1. The single-mode fiber utilized in the optical fiber cable shall meet EIA/TIA-492CAAA, Detail Specification for Class IVa Dispersion-Unshifted Single-Mode Optical Fibers, and ITU recommendation G.652, Characteristics of Single-Mode Optical Fiber Cable. The cable shall meet the following specifications:

a. Core Diameter (Characterized): 8.3 µm

b. Cladding Diameter: 125. ±1.0µm

c. Core-to-Cladding Concentricity: ≤ 0.8 µm

d. Cladding Non-Circularity: ≤1.0 %

e. Coating Diameter: 245 ±10µm

2. Attenuation: The maximum attenuation shall be 0.5 dB/km at 1310 nm and 0.4 dB/km at 1550 nm.

3. Attenuation Uniformity: There shall be no point discontinuity greater than 0.10 dB at either 1310 nm or 1550 nm.

4. Attenuation at the Water Peak: The attenuation at 1383 ± 3 nm shall not exceed 2.1dB/km.

5. Cutoff Wavelength: The cabled fiber cutoff wavelength shall be ≤1260 nm.

6. IEEE 802.3z Performance: The fiber shall support laser-based Gigabit Ethernet (GbE) operation in the 1000BASE-LX (1300 nm) operating window at 5000 m.

7. Mode Field Diameter: The mode field diameter of the fiber shall be 9.30 ±0.50µm at 1310 nm 10.50 ±1.0µm at 1550 nm.

8. 12 Macrobend Attenuation: The attenuation due to 100 turns of fiber around a 75-± 2mm diameter mandrel shall not exceed 0.05 dB at 1310 nm and 0.10 dB at 1550 nm.

9. Zero Dispersion Wavelength (∂o): The zero dispersion wavelength of the fiber shall be 1301.5 nm ≤ ∂o ≤ 1321.5 nm.

10. Zero Dispersion Slope (So): The zero dispersion slope of the fiber shall be ≤0.092 ps/(nm•km).

11. Maximum Dispersion: The maximum dispersion shall be ≤ 3.2 ps/ (nm•km) from 1285 nm through 1330 nm and shall be ≤18 ps/ (nm•km) at 1550 nm.

H. The cable shall be Berk-Tek, Corning, General, Mohawk or other equivalent products that meet these specifications.

2.03 FIBER OPTIC CONNECTOR

A. The optical connector shall be LC-type.

B. The connector ferrule shall be ceramic or glass-in-ceramic. The optical fiber within the connector ferrule shall be secured with an adhesive.

C. The attenuation per mated pair shall not exceed 0.35 dB (individual) and 0.2 dB (average). Connectors shall sustain a minimum of 200 mating cycles per EIA/TIA-455-21 without violating specifications.

D. The connector shall meet the following performance criteria:

Test Procedure	Max. Attenuation Change
1. Cable Retention (FOTP-6)	0.2 dB
2. Durability (FOTP-21)	0.2 dB
3. Impact (FOTP-2)	0.2 dB
4. Thermal Shock (FOTP-3)	0.2 dB
5. Humidity (FOTP-5)	0.2 dB

E. Connectors shall be 3M Hot Melt or other approved connector.

PART 3 – EXECUTION

3.01 FIBER OPTIC CABLE INSTALLATION REQUIREMENTS

A. Cable slack shall be provided in each backbone fiber optic cable. This slack is exclusive of the length of fiber that is required to accommodate termination requirements and is intended to provide for cable repair and/or equipment relocation. The cable slack shall be stored in a fashion as to protect it from damage and be secured in the termination enclosure or a separate enclosure designed for this purpose. Multiple cables may share a common enclosure.

B. A minimum of 15 feet of slack cable (each cable) shall be coiled and secured at each end.

C. Exact cable termination locations shall be field verified with Owner.

3.02 FIELD TEST REQUIREMENTS FOR FIBER OPTIC CABLING SYSTEM

A. The fibers utilized in the installed cable shall be traceable to the manufacturer. Upon request by the Owner, the Contractor shall provide cable manufacturer's test report for each reel of cable provided. These test reports shall include the manufacturer's on reel attenuation test results at 850-nm and 1300-nm for each optical fiber of each reel prior to shipment from the manufacturer.

B. Factory data shall be provided upon request, showing on-the-reel bandwidth performance results as tested at the factory.

C. Every fiber optic backbone link in the installation shall be tested in accordance with the field test specifications defined by the Telecommunications Industry Association (TIA) standard ANSI/TIA/EIA-

568-C or by the appropriate network application standard(s), whichever is more demanding.

D. The test shall include the representative connector performance at the connecting hardware associated with the mating of patch cords. The test does not, however, include the performance of the connector at the interface with the test equipment.

E. 100% of the installed cabling links shall be tested and shall pass the requirements of the standards mentioned above and as further detailed in this document. Any failing link shall be diagnosed and corrected at no additional cost to the Owner. The corrective action shall be followed with a new test to prove that the corrected link meets the performance requirements. The final and passing result of the tests for all links shall be provided in the test results documentation in accordance with RFP.

F. Trained technicians who have successfully attended an appropriate training program and have obtained a certificate as proof thereof shall execute the tests. These certificates may have been issued by any of the following organizations or an equivalent organization:

   1. The manufacturer of the fiber optic cable and/or the fiber optic connectors

   2. The manufacturer of the test equipment used for the field certification

   3. Training organizations authorized by BICSI

G. Field test instruments for multimode fiber cabling shall meet the requirements of ANSI/TIA/EIA-526-14-A. The light source shall meet the launch requirements of ANSI/EIA/TIA-455-50B, Method A. This launch condition can be achieved either within the field test equipment or by use of an external mandrel wrap (as described in clause 11 of ANSI/TIA/EIA-568-C.1) with a Category 1 light source.

H. Field test instruments for single mode fiber cabling shall meet the requirements of ANSI/EIA/TIA-526-7.

I. The tester shall be within the calibration period recommended by the vendor in order to achieve the vendor-specified measurement accuracy.

J. The fiber optic launch cables and adapters shall be of high quality and the cables shall not show excessive wear resulting from repetitive coiling and storing of the tester interface adapters.

K. The Pass or Fail condition for the link-under-test is determined by the results of the required individual tests.

L. Pass or Fail result for each parameter is determined by comparing the measured values with the specified test limits for that parameter.

M. A representative of the Owner shall be invited to witness field testing. The representative shall be notified of the start date of the testing phase five business days before testing begins.

N. A representative of the Owner will select a random sample of 5% of the installed links. The results obtained shall be compared to the data provided by the installation Contractor. If more than 2% of the sample results differ in terms of the Pass/Fail determination, the installation Contractor, under supervision of the Owner representative, shall repeat 100% of the testing. The cost of retesting shall be borne by the installation Contractor.

3.03 FIBER PERFORMANCE TEST PARAMETERS

A. The link attenuation shall be calculated by the following formulas specified in ANSI/TIA/EIA standard 568-B.

1. Link Attenuation = Cable_Attn + Connector_Attn + Splice_Attn
2. Cable_Attn (dB) = Attenuation_Coefficient (dB/km) * Length (Km)

   The values for the Attenuation_Coefficient are listed in the table below:

Type of Optical Fiber	Wavelength (nm)	Attenuation_Coefficient (dB/km)
Multimode 62.5/125 µm	850	3.5
	1300	1.5
Multimode 50/125 µm	850	3.5
	1300	1.5
Single-mode (Inside plant)	1310	0.5
	1550	0.4
Single-mode (Outside plant)	1310	0.4
	1550	0.5

3. Connector_Attn (dB) = number_of_connector_pairs * connector_loss (dB)
4. Maximum allowable mated connectors_loss = 0.50 dB
5. Splice_Attn (dB) = number of splices (S) * splice_loss (dB)
6. Maximum allowable splice_loss = 0.1 dB

B. Link attenuation does not include any active devices or passive devices other than cable, connectors, and splices—i.e., it does not include such devices as optical bypass switches, couplers, repeaters, or optical amplifiers.

C. Test equipment that measures the link length and automatically calculates the link loss based on the above formulas is preferred.

D. The above link test limits attenuation are based on the use of the One Reference Jumper Method specified by ANSI/TIA/EIA-526-14A, Method B and ANSI/TIA/EIA-526-7, Method A.1. The user shall follow the procedures established by these standards or application notes to accurately conduct performance testing.

E. The backbone link (multimode/single mode) shall be tested in two directions at both operating wavelengths to account for attenuation deltas associated with wavelength.

F. Multimode backbone links shall be tested at 850 nm and 1300 nm in accordance with ANSI/EIA/TIA-526-14A.

G. Because backbone length and the potential number of splices vary depending upon site conditions, the link attenuation equation shall be used to determine limit (acceptance) values.

H. Multimode backbone links are designed to be used with network applications that use laser light sources (underfilled launch conditions). However, the link attenuation equation has been based upon the use of a light source categorized as Category 1, Overfilled.

I. Single mode backbone links shall be tested at 1310 nm and 1550 nm in accordance with ANSI/TIA/EIA-526-7, Method A.1. All single mode links shall be certified with test tools using laser light sources at 1310 nm and 1550 nm.

END OF SECTION

SECTION 27 15 00 – COMMUNICATIONS HORIZONTAL CABLING

PART 1 – GENERAL

1.01 SCOPE

A. This section describes the products and execution requirements relating to telecommunications voice, data and video horizontal (station) cabling and termination components.

B. Horizontal cabling is the cabling between the work area telecommunications outlet and the telecommunications room (TR). Horizontal cabling is often referred to as "station cabling".

C. The horizontal cabling system will consist of the following:

1. Category 6 Unshielded Twisted Pair (UTP) Cable
2. Outlet Termination Modules (jacks)
3. Outlet Termination Plates
4. Above Ceiling Cable Support Systems
5. Horizontal Cable Testing Requirements
6. Cable Pathway/Sleeve Requirements

1.02 RELATED WORK

A. Section 27 00 00 – E&A General Technology Requirements

B. Section 27 10 00 – Structured Cable Infrastructure

C. Section 27 11 00 – Communications Equipment Rooms

D. Section 27 13 00 – Communications Backbone Cabling

E. Section 27 16 00 – Communications Connecting Cords

F. Section 27 18 00 – Communications Labeling and Identification

1.03 REFERENCE STANDARDS

A. NFPA 70 – National Electric Code

B. NEMA, UL, TIA/EIA, and ANSI Standards, where applicable standards have been established

C. ANSI/TIA/EIA 569-C - Commercial Building Standard for Pathways and Spaces

D. ANSI/TIA/EIA 568-C.0, 1, 2, 3, 4 - Commercial Building Telecommunications Standard

E. ANSI/TIA/EIA 606-B - Administration Standard for Telecommunications Infrastructure

1.04 TEST DATA – COPPER MEDIA

A. The test result records saved by the tester shall be transferred into a Windows-based database utility that allows for the maintenance, inspection, and archiving of these test records. A guarantee shall be made that these results are transferred to the PC unaltered, i.e., "as saved in the tester" at the end of each test. Comma separated value (CSV) format is not acceptable.

B. The database for the completed job – including twisted-pair copper cabling links, if applicable –shall be stored and delivered on CD-ROM. This CD-ROM shall include the software tools required to view, inspect, and print any selection of test reports.

C. A paper copy of the test results shall be provided that lists all the links that have been tested with the following summary information:

1. The identification of the link in accordance with the naming convention defined in the overall system documentation.

2. The overall Pass/Fail evaluation of the copper channel-under-test, including the NEXT worst-case margin (margin is defined as the difference between the measured value and the test limit value).

3. The overall Pass/Fail evaluation of the fiber link-under-test, including the Attenuation worst-case margin (margin is defined as the difference between the measured value and the test limit value).

4. The date and time the test results were saved in the memory of the tester.

PART 2 – PRODUCTS

2.01 HORIZONTAL COPPER CABLES

A. All cables and equipment shall be furnished, tested, installed and wired by the Contractor.

1. All horizontal data cables shall terminate on modular patch panels in the telecommunications closet as specified on the Drawings.

2. This specification defines the requirements for commercially available high performance Category 6 cable.

3. This cable shall be suitable for installation free-air, in building risers, in conduit, and/or in cable tray and shall carry CMP rating.

4. The cable design described herein shall exceed transmission performance of Category 6 cables.

5. Cables shall be Underwriters Laboratory (UL) listed, comply with Article 800 (Communications Circuits) of the National Electrical Code, and meet the specifications of NEMA (low loss), UL 444, and ICEA. Conductor shall also conform to the requirements for solid annealed copper wire in accordance with ASTM B 3.

6. All cables, termination components, and support hardware shall be furnished, tested, installed, and wired by the Contractor.

7. The jacket color for data cables shall be blue.

B. IMPORTANT: Cable and termination components (jack, patch panel, wiring blocks) are specified to function as a system. The compatibility of the cable to be installed with the proposed termination components shall be recognized and documented by the termination component manufacturer.

C. Category 6 cables shall be Belden or Mohawk.

2.02 INFORMATION OUTLET

A. General

1. Station cables shall each be terminated at their designated workstation location in the connector types described in the subsections below. Included are modular jacks, faceplates, and surface mount raceway. The combined assembly is referred to as the Standard Information Outlet (SIO). These connector assemblies shall snap into a mounting frame.

2. SIOs shall be mounted (1) where existing boxes are in place, (2) on surface mount raceway typically in surface raceway with barrier, (3) on floor mount interface boxes, or (4) on power poles either currently owned or new.

3. The telecommunications outlet frame shall accommodate or incorporate the following:

   a. A minimum of four (4) modular jacks, when installed on a wall-mounted assembly.

   b. A mechanism for adjusting the surface plate to a plumb position.

4. Multiple jacks are identified in close proximity on the Drawings. The Contractor shall determine the optimum compliant configuration based on the products proposed.

5. The same orientation and positioning of jacks and connectors shall be utilized throughout the installation. Prior to installation, the Contractor

shall submit the proposed configuration for each SIO type for review by the Consultant.

B. Outlet Faceplates

1. Faceplates shall be stainless steel and incorporate recessed designation strips at the top and bottom of the frame for identifying labels. Designation strips shall be fitted with clear plastic covers.

2. Any unused jack positions shall be fitted with a removable blank inserted into the opening.

3. Modular jacks shall have capability to incorporate a dust cover that fits over and/or into the jack opening. The dust cover shall be designed to remain with the jack assembly when the jack is in use. No damage to the jack pinning shall result from insertion or removal of these covers. Dust covers that result in deformation of the jack pinning shall not be accepted.

4. Wall-mounted "voice only" outlets shall be installed where identified on the floor plan Drawings to accommodate wall-mounted telephone sets. The wall plate shall be of stainless steel construction, accommodate one (1) voice jack as defined below, mount on a standard single gang outlet box or bracket, and include mating lugs for wall phone mounting.

5. All standard information outlets and the associated jacks shall be of the same manufacturer throughout each/the building. An allowable exception, however, is the wall-mounted "voice only" outlet described above.

6. Faceplates shall be manufactured by Belden.

C. Surface Mount Interface Box

1. Low profile, surface mount boxes shall incorporate recessed designation strips at the top for identifying labels. Designation strips shall be fitted with clear plastic covers.

2. The box shall feature built-in cable management for both fiber and copper applications.

3. Any unused jack positions shall be fitted with a removable blank inserted into the opening.

4. Modular jacks shall have capability to incorporate spring-loaded shutter door for added protection from dust and other airborne contaminants. The dust cover shall be designed to remain with the jack assembly when the jack is in use.

5. The box shall have the capability to incorporate optional magnets that can be internally mounted.

6. Surface mount box shall be manufactured by Belden.

2.03 MODULAR JACK

A. Data jacks shall be non-keyed 8-pin modular jacks.

B. Termination components shall be designed to maintain the cable's pair twists as closely as possible to the point of mechanical termination.

C. Jacks shall utilize a four-layer printed circuit board to control NEXT.

D. Jack housings shall fully encase and protect printed circuit boards and IDC fields.

E. Modular jack contacts shall accept 2500 plug insertions.

F. Modular jack contacts shall be formed flat for increased surface contact with mated plugs. These contacts shall be arranged on the PC board in two staggered arrays of four to maximize contact spacing and minimize crosstalk.

G. Modular jack contacts shall be constructed of Beryllium copper for maximum spring force and resilience.

H. Contact Plating shall be a minimum of 50 micro inches of gold in the contact area over 50 micro-inch of nickel, compliant with FCC part 68.5.

I. Jack termination shall be110 IDC, integral to the jack housing, laid out in two arrays of four contacts.

J. Jacks shall utilize a paired punch down sequence. Cable pairs shall be maintained up to the IDC, terminating all conductors adjacent to its pair mate to better maintain pair characteristics designed by the cable manufacturer.

K. Jacks shall utilize tin lead plated (60% tin/40%lead) phosphor bronze 110 insulation displacement contacts.

L. Jacks shall terminate 22-26 AWG stranded or solid conductors.

M. Jacks shall terminate insulated conductors with outside diameters up to .050".

N. Jacks shall be compatible with single conductor 110 impact termination tools.

O. Jacks shall be compatible with EIA/TIA 606 color code labeling and accept snap on icons for identification or designation of applications.

P. Jacks shall be ORANGE in color.

Q. Jacks shall be marked as either T568A or T568B wiring.

R. Category 6 jacks shall be manufactured by Belden.

2.04 SURFACE RACEWAY

A. In areas where surface raceway will be used as a cable path, no exposed cable shall be permitted.

B. With the agreement of the Consultant and Owner, where telecommunications outlets are to be located in areas where the walls cannot be fished, the station wire serving these outlets shall be covered with raceways. No exposed wire shall be permitted within offices, laboratories, and conference rooms or like facilities. Contractor shall attempt to fish hollow walls, use existing conduit, or exhaust all other options to conceal cabling prior to installing surface raceway.

C. The raceway shall originate from a surface mounted box located off the floor and be attached to the wall and terminate above the ceiling. The outlet box height shall match existing electrical receptacle height. Raceway for wall-mounted phone locations shall originate from a surface mounted box with the top of the box located 48" off the floor.

D. The color of this raceway shall be electrical ivory. All fittings including but not limited to extension boxes, elbows, tees, and fixture boxes shall match the color of the raceway. Telecommunication outlet faceplates shall be gray.

E. The raceway and all system devices shall be UL listed, exhibit nonflammable self-extinguishing characteristics, tested to specifications of UL94V-0 and be Category Compliant as defined by TIA/EIA 568.

F. Minimum bend radius shall be adhered to for UTP and fiber optic cable.

G. Non-Metallic raceway systems:

1. Non-metallic surface raceway shall have an adhesive-applied base and have a hinged snap-on cover. The raceway shall be manufactured of natural PVC compounds.

2. The raceway system shall be made up of the following components:

   a. Raceway channel shall be Panduit LD5.

   b. Surface mount outlet boxes shall be Panduit JBX3510EI-A.

   c. Dropped ceiling connectors shall be Panduit DCF5EI-X or DCEFXEI-X.

   d. Right angle fittings shall be Panduit RAFC5EI-X.

   e. Coupler fittings shall be Panduit CFX5EI-X.

H. All raceway systems shall be installed complete as specified herein and in manufacturer recommendations.

2.05 CABLE PATHWAY SLEEVES

A. The Contractor shall provide all necessary wall penetration for cable pathways whether or not specifically shown on Project Drawings.

B. All wall penetrations shall have a metallic sleeve(s) as required to maintain a maximum 40% fill ration.

C. All sleeves shall be properly firestopped by this Contractor.

D. Provide all core holes, pathways and sleeves (minimum 1.25" c).

E. Install non-metallic threadless insulating bushings on end of all conduits.

F. Conduit Core Holes and Sleeves thru Floor: For all floor penetrations, provide IMC conduits with threaded steel couplings set flush with finish floor. Extend 6-feet above finish floor with IMC before any termination.

2.06 ADDITIONAL MODULES FOR COPPER CABLING

A. Additional modules for copper shall include the following:

1. 50 and 75 Ohm BNC coax coupler modules, male-male
2. F-type coax coupler module, male-male threaded
3. RCA connector modules with black, red, yellow, and white inserts
4. Solder, pass-through and punch-down termination types
5. S-Video connectors modules - coupler and punch-down termination types
6. Blank module to reserve space for future additions

B. The connectors shall be designed to allow snap-in installation into the outlet faceplates.

2.07 CABLE HOOK SYSTEMS

A. In the areas where the cables are required to be run in a “free-air” plenum, a cable hook system shall be used.

B. Cable hooks shall be capable of supporting a minimum of 30 lbs with a safety factor of 3.

C. Spring steel cable hooks shall be capable of supporting a minimum of 100 lbs with a safety factor of 3 where extra strength is required.

D. Follow manufacturer’s recommendations for allowable fill capacity for each size of cable hook.

E. Installation and configuration shall conform to the requirements of the ANSI/ EIA/TIA Standards 568A & 569, NFPA 70 (National Electrical Code), and applicable local codes.

F. Cable hooks shall:

1. Have a flat bottom and provide a minimum of 1 5/8" cable bearing surface.
2. Have 90-degree radius edges to prevent damage while installing cables.
3. Be designed so the mounting hardware is recessed to prevent cable damage.
4. Have a stainless steel cable latch retainer to provide containment of cables within the hook.
5. Have a retainer that shall be removable and reusable.
6. Be factory assembled for direct attachment to walls, hanger rods, beam flanges, purlins, strut, and floor posts, to meet job conditions.

G. Factory assembled multi-tiered cable hooks shall be used where required to provide separate cabling compartments, or where additional capacity is needed.

H. Cable hooks for non-corrosive areas shall be pre-galvanized steel, ASTM A653 G90. Where additional strength is required, cable hooks shall be spring steel with a zinc-plated finish, ASTM B633, SC3.

I. Cable hooks for corrosive areas shall be stainless steel, AISI type 304.

J. Cable hooks shall be B-Line series BCH21, BCH32 or other manufacturer that meets these specifications.

PART 3 – EXECUTION

3.01 TWISTED PAIR TEST EQUIPMENT

A. Test equipment used under this contract shall be from a manufacturer who has a minimum of five years' experience in producing field test equipment. Manufacturers shall be ISO 9001 certified.

B. All test tools of a given type shall be from the same manufacturer and have compatible electronic results output. Test adapter cable shall be approved by the manufacturer of the test equipment. Baseline accuracy of the test equipment shall exceed TIA Level III, as indicated by independent laboratory testing.

C. Test equipment shall:

1. Be capable of certifying Category 5, 5E, and 6 permanent links.
2. Have a dynamic range of at least 100dB to minimized measurement uncertainty.
3. Be capable of storing full frequency sweep data for all tests and printing color graphical reports for all swept measurements.
4. Include S-band time domain diagnostics for NEXT and return loss.
5. Be capable of running individual NEXT, return loss, etc., measurements in addition to AutoText.
6. Include a library of cable types, stored by major manufacturer.
7. Store at least 1000 Category 5e or 6 autotests in internal memory.

D. The measurement reference plane of the test equipment shall start immediately at the output of the test equipment interface connector. There shall not be a time domain dead zone of any distance that excludes any part of the link from the measurements.

E. The approved manufacturer of the test equipment is Fluke.

3.02 CABLE SUPPORT

A. J-hooks fabricated to contain data/voice and video cables may be used to support 25 or fewer cables in each hook. J-hooks are to be fastened to building steel with beam clamps, suspended from ceiling slab with threaded rod, or anchored to the wall. All J-hooks shall be hung straight and level. No other installation technique will be authorized unless pre-approved.

B. Three tiered double-sided J-hook configurations shall contain a maximum of 25 cables per hook or 150 cables. Smaller configurations may be used as bundles decrease in size, maintaining no more than 25 cables per hook.

C. Bundles surpassing 150 cables shall be supported by hangers, fabricated of 3/8" threaded rod and 24" Unistrut. Hangers shall also be installed where the installation of a three-tiered J-hook system is not appropriate for the ceiling space, or where blocked by other trades' work.

D. Cable bundles consisting of fewer than 10 cables may be supported by single J hooks.

E. All cable support in the main cable path shall be installed every four feet. Small cable bundles (under 25) not in the main path may be supported every five feet.

F. A sag shall be maintained between supports of 6", to reduce cable strain. Velcro is an appropriate method of securing cables, when properly used and not over tightened.

G. Proper cable support is extremely important to the Owner, and care shall be taken by the Contractor to provide and install the appropriate supports. Supports found to be inadequate will be replaced.

H. Cable bundles including voice/data cabling shall not have plastic cable ties.

I. All cable trunks shall have radius controlled cable waterfalls where trunk drops from conduit, sleeve or tray from horizontal path to vertical path.

3.03 STATION CABLING

A. Information outlet cables with copper media (voice & data UTP and "TV" coax) shall be located as detailed on the Project Drawings.

B. The Contractor shall utilize these documents in determining materials quantities and routing.

C. Station cables shall be run to the information outlet from the MER/TR serving each area in conduit, free-air above drop ceiling, in cable tray, and/or in modular furniture.

D. The maximum station cable drop length for UTP cables shall not exceed 295 feet (90 meters) in order to meet data communications performance specifications. This length is measured from the termination panel in the wiring closet to the outlet and shall include any slack required for the installation and termination. The Contractor shall install station cabling in a fashion to avoid unnecessarily long runs.

E. Contractor shall verify cable lengths comply with published standards; prior to installation of any horizontal cabling, this contractor shall verify cable paths and confirm no horizontal cable will exceed 295 total feet. If it is determined that the cable will exceed 295', this contractor shall route the cabling to another MER/TR or determine shorter path so cables are under 295'. If this is

not possible, the contractor shall notify the consultant prior to installation. Failure to do this step will not result in a change order from the contractor.

F. The minimum station cable drop length for UTP cables shall be no less than 60 feet. The Contractor shall install station cabling in a fashion to avoid runs less than 60 feet. If cable slack is required to accommodate the minimum length requirements, the Contractor is responsible for storing the slack in a fashion as to protect the cable from damage. The cable slack shall be secure above the ceiling tiles in a figure 8 form by means of J-hooks or D-rings anchored to the building structure. The cable slack shall be coiled to maintain from 100% to 200% of the cable recommended minimum bend radius. Multiple cables may share a common support.

G. All cables shall be installed splice-free unless otherwise specified.

H. During pulling operation, an adequate number of workers shall be present to allow cable observation at all points of duct entry and exit as well as the feed cable and operate pulling machinery.

I. Avoid abrasion and other damage to cables during installation.

J. All cable shall be free of tension at both ends. In cases where the cable shall bear some stress, Kellom grips may be used to spread the strain over a longer length of cable.

K. Where installed free-air, installation shall consider the following:

1. Cable shall run at right angles and be kept clear of other trades' work.
2. Cables shall be supported according to code, using "J-hooks" anchored to ceiling concrete, walls, piping supports, or structural steel beams.
3. Hooks shall be designed to maintain cable bend to larger than the minimum bend radius (typically 4 x cable diameter).
4. Supports shall be spaced at a maximum 4-foot interval unless limited by building construction. If cable "sag" at mid-span exceeds 6 inches, another support shall be used.

L. Cable shall never be laid directly on the ceiling grid.

M. Cables shall not be attached to existing cabling, plumbing, or steam piping, ductwork, ceiling supports, or electrical or communications conduit.

N. Manufacturers' minimum bend radius specifications shall be observed in all instances. Use of plastic cable ties is not acceptable. Cable bundles shall be neatly dressed with use of Velcro type straps.

O. Cable sheaths shall be protected from damage from sharp edges. Where a cable passes over a sharp edge, a bushing or grommet shall be used to protect the cable.

P. A coil of one foot in each cable shall be placed in the ceiling at the last support (e.g., J-hook) before the cables enter a fishable wall, conduit, surface raceway, or box. At any location where cables are installed into movable partition walls or modular furniture via a service pole, approximately 15 feet of slack shall be left in each station cable under 250 feet in length to allow for change in the office layout without re-cabling. These "service loops" shall be secured at the last cable support before the cable leaves the ceiling and shall be coiled from 100% to 200% of the cable recommended minimum bend radius.

Q. To reduce or eliminate EMI, the following minimum separation distances from ≤480V power lines shall be adhered to:

1. Twelve (12) inches from power lines of <5-kVa
2. Eighteen (18) inches from high voltage lighting (including fluorescent)
3. Thirty-nine (39) inches from power lines of 5-kVa or greater
4. Thirty-nine (39) inches from transformers and motors

R. All openings shall be sleeved and firestopped per prevailing code requirements upon completion of cable installation.

3.04 INFORMATION OUTLET

A. Information outlets shall be flush mounted on wall-mounted boxes, in floor-mounted boxes, on surface raceway, or on modular furniture.

B. Any outlets to be added where these conditions are not met shall be positioned at a height matching that of existing services or as directed otherwise by the Site Coordinator and the Consultant. Nominal height (from finished floor to center line of outlet) in new installation shall be as follows:

1. Standard Voice & Data Outlet (SIO) shall match adjacent electrical outlets.
2. Wall-Mounted Telephone Outlet (Standard Voice only) shall meet ADA requirements.

C. The Contractor shall coordinate the style of the telecommunication outlets to be installed in the floor mount boxes and surface mount raceways with the Owner.

3.05 CABLE TERMINATION

A. At the telecommunication closet, all data and voice cables shall be positioned on termination hardware in sequence of the outlet ID, starting with the lowest number.

B. Termination hardware (blocks and patch panels) positioning and layout will be reviewed and approved by the Consultant prior to construction. The review does not exempt the Contractor from meeting any of the requirements stated in this document.

C. Cable Termination – Data/Voice UTP

1. Data/voice patch panels shall be designed and installed in a fashion as to allow future station cabling to be terminated on the panel without disruption to existing connections.

2. Data patch panels shall be sized to accommodate a minimum of 20% growth in the quantity of stations relative to the initial installation.

3. At information outlets and data/voice patch panels, the installer shall ensure that the twists in each cable pair are preserved to within 0.5 inch of the termination for data/voice cables. The cable jacket shall be removed only to the extent required to make the termination.

D. Cable Termination – Fiber Optic

1. All fibers shall be terminated using the specified connector type.

2. All terminated fibers at the telecommunications closets shall be mated to couplings mounted on patch panels. Couplings shall be mounted on a panel that, in turn, snaps into the housing assembly. Any unused panel positions shall be fitted with a blank panel inhibiting access to the fiber optic cable from the front of the housing.

3. All couplings shall be fitted with a dust cap.

4. Fibers from multiple locations may share a common enclosure, but they shall be segregated on the connector panels and clearly identified. Fibers from multiple destinations may be secured in a common enclosure, provided they are clearly identified as such. Fibers from different locations shall not share a common connector panel (e.g., “insert”).

5. Slack in each fiber shall be provided as to allow for future re-termination in the event of connector or fiber end-face damage. Adequate slack shall be retained to allow termination at a 30” high workbench positioned adjacent to the termination enclosure(s). A minimum of one meter (~39”) of slack shall be retained regardless of panel position relative to the potential work area.

6. Contractor shall install a plastic twist-on bushing on each end of interlocking armored fiber to protect cable from sharp edges of the armor.

3.06 SURFACE RACEWAY SYSTEM

A. In areas where surface raceway will be used as a cable path, no exposed cable shall be permitted.

B. With the agreement of the Consultant and Owner, if a telecommunications outlet is required in an area where the walls cannot be fished, the station cable serving these outlets shall be covered with raceway. No exposed cable shall be permitted within offices, laboratories, and conference rooms, or like facilities. Contractor shall attempt to fish hollow walls, use existing conduit, or exhaust all other options to conceal cabling prior to installing surface raceway.

C. The raceway shall originate from a surface mounted box located off the floor and be attached to the wall and terminate above the ceiling. The outlet box height shall match existing electrical receptacle height. Raceway for a wall-mounted location shall originate from a surface mounted box with the top of the box located 48" off the floor.

D. Minimum bend radius shall be adhered to for UTP and fiber optic cable.

E. Where raceway is to be installed on painted, smooth, finished surfaces, the Contractor shall clean surface prior to installing raceway.

F. Where non-metallic raceway is to be installed on non-smooth surfaces such as wallpaper, unpainted brick, concrete, etc., the Contractor shall use flat-head screws in addition to the adhesive backing to fasten channel to surfaces.

G. Where Contractor is required to install metallic raceway, the raceway base shall be installed using flat-head screws and following all manufacturer's recommendations.

H. Where new outlet locations are indicated on Project Drawings as having existing Wiremold™ type raceway, the Contractor shall remove existing raceway from wall and install new specified raceway to cover any damage or markings caused from removing existing raceway product.

I. All surface raceway shall be mounted level and plumb. Where the Owner considers raceway channels to be installed unsatisfactorily, the Contractor shall remove and replace necessary channels at no additional cost to the Owner.

J. Suitable insulating bushings and inserts shall be used at connections to outlets and corner fittings. Dropped ceiling end fittings shall be utilized where raceway channel connects to dropped accessible ceiling tile. In rooms with drywall ceilings, open ceilings, or non-accessible ceilings, the Contractor shall

extend raceway to the nearest location, hallway, or corridor that has accessible ceiling cavity. All cables shall be concealed.

3.07 COPPER STATION CABLES

A. Station cabling testing shall be from the jack at the outlet in the work area to the termination block on which the cables are terminated at the MDF or IDF.

B. Testing shall be of the permanent link. Contractor shall warrant performance, however, based on channel performance and provide patch cords that meet channel performance criteria. All cabling not tested strictly in accordance with these procedures shall be retested at no cost to the Owner.

C. Testing shall be from the jack at the SIO to the patch panel on which the cables are terminated at the wiring hub.

D. Horizontal "station" cables shall be free of shorts within the pairs and shall be verified for continuity, pair validity and polarity, and wire map (conductor position on the modular jack). Any defective, split, or mispositioned pairs shall be identified and corrected.

E. Testing of the cabling systems rated at TIA Category 6 and above shall be performed to confirm proper functioning and performance.

F. Testing of the transmission performance of station cables (Category 6) shall include the following:

1. Length
2. Attenuation
3. Pair to Pair NEXT
4. ACR
5. PSNEXT Loss
6. Return Loss
7. Pair to Pair ELFEXT Loss (Equal Level Far End Cross-Talk)
8. PSEFEXT Loss
9. Propagation Delay
10. Delay Skew
11. Return Loss

G. Worst case performance at 20°C, based on a horizontal cable length of 90 meters and equipment cord length of 4 meters, shall be as follows:

CATEGORY 6 (Permanent LINK)

Frequency (MHz)	Insertion Loss (Maximum dB)	NEXT Loss Pair to Pair (dB)	PS-NEXT Loss (dB; Worst Case)	ELFEXT Loss Pair to Pair (dB)	PSELFEXT loss (dB)
1.0	1.9	65.0	62.0	64.2	61.2
4.0	3.5	64.1	61.8	52.1	49.1
8.0	5.0	59.4	57.0	46.1	43.1
10.0	5.6	57.8	55.5	44.2	41.2
16.0	7.0	54.6	52.2	40.1	37.1
20.0	7.9	53.1	50.7	38.2	35.2
25.0	8.9	51.5	49.1	36.2	33.2
31.25	10.0	50.0	47.5	34.3	31.3
62.5	16.0	45.1	42.7	28.3	25.3
100.0	18.5	41.8	39.3	24.2	21.2
200.0	27.1	36.9	34.3	18.2	15.2
250.0	30.7	35.3	32.7	16.2	13.2

H. In the event results of the tests are not satisfactory, the Contractor shall make adjustments, replacements, and changes as necessary and shall then repeat the test or tests that disclosed faulty or defective material, equipment, or installation method. The Contractor shall make additional tests as the Engineer deems necessary at no additional expense to the Owner or Consultant.

I. All data shall indicate the worst-case result, the frequency at which it occurs, the limit at that point, and the margin. These tests shall be performed in a swept frequency manner from 1 MHz to highest relevant frequency, using a swept frequency interval that is consistent with TIA and ISO requirements. Information shall be provided for all pairs or pair combination and in both directions when required by the appropriate standards.

J. Cables shall be tested to the maximum frequency defined by the standards covering that performance category. Transmission Performance Testing shall be performed using a test instrument designed for testing to the specified frequencies. Test records shall verify “PASS” on each cable and display the specified parameters—comparing test values with standards-based “templates” integral to the unit.

END OF SECTION

SECTION 27 16 00 – COMMUNICATIONS CONNECTING CORDS

PART 1 – GENERAL

1.01 SCOPE

A. This section describes the products relating to high quality category 6 voice and data patch cords.

B. In this section the term patch cords refers to the cords that connect Owner provided data network electronics to the horizontal cable infrastructure.

C. It is important that the horizontal cable system and the provided patch cords work as one complete system for guaranteed channel performance. Patch cords shall be manufactured by the same manufacturer as the jack and patch panels.

D. The Contractor shall provide and deliver all cords as listed in this section. The Owner will be responsible for installation of cords.

1.02 RELATED WORK

A. Section 27 00 00 – E&A General Technology Requirements

B. Section 27 10 00 – Structured Cable Infrastructure

C. Section 27 11 00 – Communications Equipment Rooms

D. Section 27 13 00 – Communications Backbone Cabling

E. Section 27 15 00 – Communications Horizontal Cabling

F. Section 27 18 00 – Communications Labeling and Identification

PART 2 – PRODUCTS

2.01 CATEGORY 6 PATCH CORDS

A. The Owner has the right to determine the final length of the patch cords after the contract is awarded.

B. All Category 6 UTP patch cords shall be round and consist of eight insulated 23 AWG, stranded copper conductors, arranged in four color-coded twisted pairs within a flame retardant jacket and be backwards compatible with lower performing categories. Modular patch cords shall utilize ISO termination method that is designed to reduce and control near-end cross talk (NEXT) and far end cross talk (FEXT) without compromising signal impedance.

C. Both ends of the cord shall be equipped with modular 8-position (RJ45 style) plugs wired straight through with standards compliant wiring. All modular

plugs shall exceed FCC CFR 47 part 68 subpart F and IEC 603.7 specifications, and have 50 micro inches of gold plating over nickel contacts. Cable shall be label-verifiable. Cable jacket shall be factory marked at regular intervals indicating verifying organization and performance level. Category 6 cords shall have color-coded insert molded strain relief boot with a latch guard to protect against snagging. Additional color-coding shall be available by the use of snap-in icons.

D. Patch cords shall be wired straight through. Pin numbers shall be identical at each end and shall be paired to match T568B patch panel jack wiring per ANSI/TIA/EIA-568-B. Patch cords shall be unkeyed.

E. **The manufacturer of the cords shall be the same as the manufacturer for UTP termination hardware (jacks & patch panels). Cords shall be highest quality Category 6 cords available by connectivity manufacturer.**

F. This Contractor shall provide the following patch cords (for pricing purposes only; see section 3.01 below):

Qty	Length	Notes
100	3 feet	Non-Plenum
300	5 feet	Non-Plenum
70	7 feet	Plenum – Ceiling Access Points & IP Cameras
100	7 feet	Non-Plenum
80	10 feet	Non-Plenum
50	14 feet	Non-Plenum

2.02 FIBER OPTIC PATCH CORDS

A. The Owner has the right to determine the final length of the patch cords after the contract is awarded.

B. All fiber optic patch cords shall:

1. Be duplex 2-3mm tight buffer design with Aqua jacket.
2. Have LC-LC connectors with straight thru connectors (A-A Polarity).
3. Have 50-micron OM3 core.

C. This Contractor shall provide the following patch cords (for pricing purposes only; see section 3.01 below):

Qty	Length	Notes

24	3 meter	Non-Plenum

PART 3 – EXECUTION

3.01 ORDERING AND DELIVERY

A. Prior to ordering patch cords the Contractor shall schedule meeting with Owner and Consultant to verify patch cord lengths, colors and quantities.

B. Contractor shall coordinate delivery of patch cords with Owner. Contractor shall have list of delivered cords and shall have Owner sign delivery sheet at time of delivery.

END OF SECTION

SECTION 27 18 00 – COMMUNICATIONS LABELING AND IDENTIFICATION

PART 1 – GENERAL

1.01 SCOPE

A. This section describes the products and execution requirements relating to labeling of telecommunications cabling, termination components, and related subsystems. Covered systems include the following:

1. Equipment room backboards and equipment racks
2. Station cable and terminating equipment
3. Telecommunications grounds and related components

1.02 RELATED WORK

A. Section 27 00 00 – E&A General Technology Requirements

B. Section 27 10 00 – Structured Cable Infrastructure

C. Section 27 11 00 – Communications Equipment Rooms

D. Section 27 13 00 – Communications Backbone Cabling

E. Section 27 15 00 – Communications Horizontal Cabling

F. Section 27 16 00 – Communications Connecting Cords

1.03 REFERENCE STANDARDS

A. NFPA 70 – National Electric Code

B. NEMA, UL, TIA/EIA, and ANSI Standards, where applicable standards have been established

C. ANSI/TIA/EIA-606-B – Administration Standard for Telecommunications Infrastructure

1.04 SUBMITTALS

A. Submit in accordance with provisions of Section 17000 and shop Drawings of all materials proposed.

B. Prior to installation, the Contractor shall provide samples of all label types planned for the Project. These samples shall include examples of the lettering to be used. Samples shall be mounted on 8 1/2” x 11” sheets annotated explaining their proposed use.

PART 2 – PRODUCTS

2.01 LABELS

A. All labels shall be permanent and be machine generated (e.g., Brady or Panduit). No handwritten or non-permanent labels shall be allowed. Labels shall be Brady "I.D. Pro" or XC-Plus or equivalent. Labeling on backboards and/or equipment racks may be pre-cut adhesive type.

B. Characters on all labels shall be black printed on a white background.

C. Label size shall be appropriate to the cable size(s), outlet faceplate layout, patch panel design, or other related equipment sizes and layouts.

D. All labels to be used on cables shall be self-laminating, white/transparent vinyl, and be wrapped around the cable sheath. The labels shall be of adequate size to accommodate the circumference of the cable being labeled and properly self-laminated over the full extent of the printed area of the label.

E. Labels used to identify innerduct carrying fiber optic cable shall be labeled with a durable yellow polyethylene tag that reads "CAUTION Fiber Optic Cable" and includes blank spaces for adding (1) fiber count and (2) destination information. An example of a compliant product is VIP Products' "Caution Write-On Coverall Tag."

PART 3 – EXECUTION

3.01 GENERAL

A. Clean surfaces before attaching labels.

B. Install all labels firmly. Labels attached to terminating equipment such as backboards, faceplates, 110 blocks, and patch panels shall be installed plumb and neatly on all equipment.

3.02 LABELING OF CABLING AND TERMINATION COMPONENTS

A. Backboard and Equipment Racks

1. Backboards and equipment racks shall be labeled by the Contractor identifying the telecommunication room. Additionally, equipment racks shall have an alpha character after the room number unique to that particular communications closet. For example, TR1-A would be the first rack in TR1.

2. Character height shall be 1-inch (minimum).

B. Cabling

1. Horizontal cables shall have a machine generated wrap around cable label within 4" of each end of the cable. Label shall be clearly legible and meet TIA-EIA 606 standards. Character height shall be .25" (minimum).

2. Voice/data/video backbone cables shall have a machine generated wrap around cable label within 12" of each end of the cable. Label shall be clearly legible and meet TIA-EIA 606 standard. Character height shall be .5" (minimum).

3.03 FIBER OPTIC BACKBONE, RISER CABLES, AND TERMINATION COMPONENTS

A. All fiber optic backbone and copper (inter-building, riser, and tie) cables shall be identified AT BOTH ENDS with a designation that identifies where the opposite end of the same cable terminates (e.g., equipment room or telecommunications room I.D.). In addition, labeling of all fiber optic cables shall include the number of fibers in the cable.

B. Each fiber optic termination panel shall be clearly labeled indicating the destination of the cable(s) and the fiber number of each fiber position. The cable identifiers are to be secured to (1) the side and (2) the front cover of the panel enclosure.

3.04 STANDARD INFORMATION OUTLET (SIO) FACEPLATES

A. All faceplates shall be clearly labeled indicating the destination of the cable(s) (telecommunication room number), the data patch panel(s) letter designation, the data port number(s) on the data patch panel(s), and the voice cable number(s).

B. Telecommunications outlets are to be labeled (1) on the cover of the assembly and (2) on each cable terminated at that location.

C. Station cables shall be labeled within two inches of the cable end.

3.05 DATA PATCH PANELS

A. All data patch panels shall be clearly labeled indicating the telecommunication room number, the data patch panel letter designation, and the data port number on the data patch panel (ports 1 through 48). Each telecommunication room shall start with data patch panel 'A' and continue through the alphabet.

B. A data port schedule for each telecommunication room shall be created in spreadsheet format (Excel) with the telecommunication room number, data patch panel letter designations, data port numbers, and room numbers identified in the spreadsheet. In addition, for each data patch panel port, a field shall be provided in the spreadsheet for the Owner to manage the cabling infrastructure by recording the device and any special notes pertaining to the room utilizing the data cable terminated to the port.

C. Refer to Telecommunication "T" Series Project Drawings for standard information outlet faceplate and data & voice patch panel labeling scheme requirements. A sample of the data and voice port schedules is to be provided to the Owner, in the cable record book and in electronic format (Excel spreadsheet), with final documents provided on the Project Drawings.

3.06 FIBER OPTIC CABLES AND TERMINATION COMPONENTS

A. All fiber optic cables, termination enclosures and connector panels, and splice closures shall be clearly labeled.

B. In addition, labeling of all fiber optic cables shall include the number of fibers in the cable.

C. Each fiber optic termination panel shall be clearly labeled indicating (1) the destination(s) of the cable(s) and (2) fiber number of each fiber position. The cable identifiers are to be secured to (1) the side and (2) the front cover of the panel enclosure.

3.07 GROUND SYSTEM LABELING

A. All grounds shall be labeled as close as practical to the point of termination (for ease of access to read the label). Labels shall be nonmetallic and include the following statement: "WARNING: If this connector or cable is loose or must be removed, please call the building telecommunications manger." Refer to ANSI/TIA/EIA 606 for additional labeling requirements.

END OF SECTION

SECTION 27 20 00 – NETWORK AND UPS SYSTEMS

PART 1 – GENERAL

1.01 QUALIFICATIONS

A. Contractor and/or its subcontractors shall be fully authorized/certified to supply, upgrade, install, configure, provide warranty service, and troubleshoot the proposed equipment.

1.02 DEFINITIONS

B. Network Contractor (also referred to as Contractor within this section): The entity contracted by the City to provide and implement the systems specified within this Section.

1.03 REFERENCE

C. The provisions of Section 17 00 00 – E&A General Technology Requirements are included as a part of this section as though bound herein.

1.04 STANDARDS

A. These standards shall govern the work, as well as the standards, organizations, and sources referenced in Section 17 00 00 – E&A General Technology Requirements.

1. IEEE 802.3 (all letter suffixes)
2. ISO/IEC-11801 (all updates)
3. TIA/EIA 568A & 568B
4. TIA/EIA 569
5. ANSI TP-PMD

1.05 SUBMITTALS FOR NETWORK SYSTEMS

A. Contractor must provide the following submittals within 10 working days of Notice to Proceed:

1. Project Schedule including dates for progress meetings, and showing milestone dates for delivery and installation for each of the systems included in this RFP.
2. Name of and contact information for Contractor's Project Manager
3. Network diagram showing how all network electronics are inter-connected.

B. Work shall not proceed without approval of submittals.

1.06 BASE BID - SCOPE OF SERVICES

A. All network electronics and UPS systems will be supplied and installed by Contractor.

B. Network Contractor Responsibilities

1. Provide and install network electronics, as specified within this section.
2. Provide and implement uninterruptible power supply (UPS) systems, as specified within this section.
3. Supply all materials and labor necessary to mount network devices and UPS units in racks or locations as directed by Owner or Consultant.
4. Configure all network electronics and UPS systems as specified within this section and as shown on the technology drawings.

1.07 PROJECT MANAGER

A. The Network Contractor shall appoint a Project Manager who shall be the main point of contact regarding the project for the City. The Project Manager is responsible for the following:

1. Ensuring the contract is completed successfully in a timely manner.
2. Guaranteeing the work and performance of all employees and subcontractors that have been hired by the Contractor.
3. Completing and submitting all required submittals and documentation.
4. Attending all project coordination and/or construction meetings as required by the City.
5. Providing written status reports to the City Project Manager monthly.
6. Informing the City of all unexpected conditions and problems that may result in delay or expense. The Contractor must report issues immediately upon discovery and must provide the City with the option(s) for resolving them.
7. If the Contractor seeks to change the Project Manager during the course of the project, such change is subject to prior written approval from the City.
8. The City reserves the right to request a new Project Manager during the course of the project if the Project Manager does not perform to the City's satisfaction.

1.08 WARRANTY PERIOD

A. The Contractor, by entering into a contract with the City, warrants and represents that all materials, equipment, and services delivered to the City pursuant to the contract conforms to all of the specifications contained or referred herein. The Contractor further guarantees to replace all materials, equipment, or services that may be rejected by the City due to defective materials or workmanship for a minimum of one year

following acceptance. Failure or neglect of the City to require compliance with any term or condition of the contract specifications shall not be deemed a waiver of such term or condition.

PART 2 – PRODUCTS

2.01 GENERAL PRODUCT REQUIREMENTS

A. Refer to Section 17 00 00 – E&A General Technology Requirements.

2.02 NETWORK EQUIPMENT GENERAL REQUIREMENTS

A. All devices must be installed with the most current software version, unless otherwise requested by Owner.

B. All installation services must be warranted by the Network Contractor for 12 months.

C. All network and UPS equipment must be rack mounted. Racks provided by Cabling Contractor.

D. External transceivers or media converters shall not be used.

E. Announced, but not yet shipping equipment will be considered, providing: 1) that the announced delivery date is on or before the installation dates of this project and 2) that the contractor allows a 60-day test period to ensure that equipment performs according to specifications.

F. All provided systems must be new and currently in manufacture.

G. All components must be "UL" approved and FCC certified.

H. All network equipment must be rack mounted.

I. Proposal must include all software updates and upgrades for twelve (12) months after completion. Any cost for such must be included in the base proposal.

2.03 REQUIREMENTS FOR ALL ETHERNET SWITCHES

A. All switches must be installed with the most current software version, unless otherwise requested by Owner.

B. Identical software images must be loaded on all switches of the same type (e.g., all access switches must have the same software load.)

C. All switches shall have the proper licensing to insure that all RFP requirements are met.

D. All switch devices must be capable of supporting IPv6

E. All switch devices must be support 802.1p and 802.1Q, to provide standards-based traffic prioritization and VLANs.

F. Switches must support a minimum of 256 VLANs.

G. All switches must support a minimum of four (4) classes of QoS.

H. All switches must support IGMP snooping.

I. All switches must support SNMPv3 and RMON Statistics, Alarms, Events, and History at a minimum.

J. All switches must enable network manager to mirror traffic on any port to another port for analysis by a sniffer or RMON probe.

K. Switch devices proposed must support 802.3ad link aggregation ("trunking") of multiple Gigabit Ethernet connections to aggregate bandwidth.

L. When Power over Ethernet (PoE) is called for, it is required to be a minimum of IEEE 802.3af (802.3at Type 1).

M. All stacking cable connections shall be 10 Gbps, at minimum.

N. All stacked switch configuration shall perform and be managed as one device.

O. All switches must have the capability of adding 10 Gigabit uplinks.

2.04 ETHERNET SWITCHES

A. Reference LAN diagram in the technology drawings for switch inter-connection schematic.

B. Municipal Building:

1. (2) 24-port 10/100/1000 Mbps, PoE switches

   a. These core switches shall be layer 3.

   b. Switches shall be configured to be redundant of each other.

   c. Each 24-port switch shall have the capability of supporting (4) 1 Gbps SFP uplink modules (minimum)

2. (4) 48-port 10/100/1000 Mbps, PoE switches

   a. Layer 2

   b. Configured in a stack as one device

   c. Redundant 1000BASE-SX (or equivalent) connectivity to core switches

3. Contractor to supply all power supplies and necessary mounting hardware for all switches.

C. Fire Station:

1. (2) 48-port 10/100/1000 Mbps, PoE switches

a. Layer 2

b. Configured in a stack as one device

c. Redundant 1000BASE-LX connectivity to core switches in Municipal Building.

2. Contractor to supply all power supplies and necessary mounting hardware for all switches.

2.05 UNINTERRUPTIBLE POWER SUPPLY (UPS) DEVICES

A. UPS systems shall be implemented to provide temporary power to components specified as part of this RFP in the event of an electrical power outage, but also to level out power sags (brownouts), spikes and surges in order to protect the network devices.

B. Include all necessary hardware and software for use with SNMP.

C. Each UPS shall include an environmental sensor for detecting environmental conditions (temp, humidity, etc.) around each UPS unit.

D. UPS systems shall protect against spikes, surges, power sags (brownouts) and blackouts. (Fully "online".)

E. UPS devices shall be rack mounted. Include in pricing all labor and necessary materials to rack mount all UPS devices. All necessary hardware shall be provided to accommodate whether a UPS unit is installed in a 2-post, 4-post, wall/floor rack, or wall/floor cabinet.

F. Contractor is responsible to select appropriate manufacturer/model(s) based on the power draw you calculate. Proposer must determine the capacity needed in each MER and TR based on the equipment you propose as well as the following information.

1. Every MER and TR shall be provided with a UPS system that is capable of supporting all the network switches (and wireless controllers, if included in design) within that room. No more than two (2) UPS devices may be used per room.

2. In the Municipal Building MER the UPS must also provide additional capacity for other common devices in the room. The Contractor shall add an additional 1000 watts to account for these systems.

3. UPS system in the MER and TRs must supply power for 30 minutes. Contractor to calculate PoE load based on quantity of phones, access points, and security cameras connecting to the network. Contractor must show math of how calculations were derived in proposal.

G. Technical specifications/data sheets for the UPS models proposed must be included in your response.

H. UPS models and type of electrical outlets required (amperage and connector type) shall be included in all proposals.

PART 3 - EXECUTION

3.01 COORDINATION

A. Refer to Section 17 00 00 – E&A General Technology Requirements.

B. The Contractor shall re-verify MDF/IDF locations with the Owner's Project Manager prior to installation.

C. Prior to ordering, furnishing, or installing any equipment, written approval of equipment, locations, layout, and installation shall be obtained from the Owner.

D. Coordinate the installation of the switches with the Cable Contractor to insure horizontal cable management is installed correctly in and around the data switches.

E. Network Contractor shall coordinate the installation of the rack/cabinet PDUs with the Cable Contractor to insure that they are installed in a proper position on the rack or cabinet.

F. If there appears to be insufficient space in any rack for installation of devices, the Network Contractor must notify the Owner's Project Manager immediately and wait for a decision before proceeding with installation at that location.

3.02 INSTALLATION REQUIREMENTS

A. The Contractor shall be responsible for installation of all network electronics and UPS components into provided racks. The Contractor shall power-up electronics, install all patch cables, and configure all data network electronics and UPS equipment.

1. Work with City to understand its IP addressing scheme and to implement this scheme in the furnished devices, and ensure network visibility of those devices.

2. Work with City to understand its VLAN scheme and to implement this scheme in the furnished system.

3. Work with the City to develop SNMP configurations, community strings, and passwords for all devices and to implement these in the furnished system.

4. Work with the City to implement security features as required by the City.

5. Work with the City to ensure the proper QoS configurations are implemented to support all applications provided under this RFP.

6. Learn and understand the City's device naming convention, and implement appropriate device names on all new devices.

7. Label all equipment and cables as required by the City.

B. The Contractor shall unpack equipment from shipping material and organize equipment. This includes checking to ensure that all equipment is complete and fully functional. Empty boxes and packaging shall be neatly organized per the City's instructions and removed if requested.

C. The Contractor shall make the components physically secure by mounting equipment and related accessories into racks as required. Manufacturer's guidelines for installation shall be followed.

D. All rack-mount equipment shall be secured as recommended by the manufacturer with consideration to airflow, power, and patch cable connections.

E. Network Contractor shall neatly dress all power cables and secure with Velcro tie wraps between devices and PDUs or UPS systems.

F. Systems described in this document shall be delivered to the installation location and installed by the Contractor without any additional cost or expense to the City, and the City shall not be deemed to have accepted any equipment until the date of acceptance.

G. All rubbish, debris, and dirt resulting from the Network Contractor's work shall be cleaned up and removed from the buildings daily. The premises shall at all times be kept in a clean, safe, and professional manner.

H. Work shall be performed during normal hours of operation for the building where the work is taking place. Any deviations must be discussed with and approved by the City's Project Manager prior to work occurring.

I. UPS unit delivery directly to the MER and TRs and labor to install the UPS devices shall be included in the proposal cost.

J. Supply, install, connect, and configure a network card in each UPS unit.

3.03 PROJECT CLOSEOUT AND ACCEPTANCE

A. Punch List – Work or materials found to be incomplete, of unsatisfactory quality, failing to meet the specifications in the RFP package and resulting contract, and/or unacceptable to the City shall be documented in a punch list by the City and provided to the Contractor to rectify.

B. Punch List Approval – The punch list shall be considered complete only after having been signed by the City.

C. Documentation – The Contractor shall provide the City logical diagrams showing all equipment installed per MDF and IDF. All addressing and naming conventions shall be shown on the drawings. Contractor shall supply (2) electronic copies of all documentation.

D. Acceptance – Acceptance shall occur after all of the following conditions have been met:

1. All items/systems have been delivered and properly installed.
2. All of the work has been completed in accordance with the contract and RFP specifications.
3. All outstanding punch list items have been completed.
4. The Contractor has certified in writing to the City that the system is installed in accordance with these specifications and is ready for use.
5. The City or the City's designated representative has inspected the installation and provided written approval.

   At this time, upon the City's written acceptance, operational control becomes the responsibility of the City. This constitutes Date of Acceptance. The warranty for the entire system and all components begins as of this date.

END OF SECTION

SECTION 27 21 33 – WIRELESS LOCAL AREA NETWORK

PART 1 - GENERAL

1.01 BASE BID - SCOPE OF SERVICES

A. All wireless local area network electronics will be supplied, installed, and configured by Contractor.

B. Base bid scope shall cover:

1. Wireless access points
2. Wireless LAN controllers (if part of design)
3. Equipment/materials used for mounting access points
4. Enclosures for access points wall-mounted in garage areas.
5. Installation labor for mounting access points and any protective enclosures
6. Access point licensing
7. Configuration
8. Site survey/system testing
9. System documentation

1.02 QUALIFICATIONS

A. Contractor and/or its subcontractors shall be fully authorized/certified to supply, upgrade, install, configure, provide warranty service, and troubleshoot the proposed wireless LAN equipment.

1.03 RELATED WORK

A. Section 17 00 00 – General Technology Requirements

1.04 REFERENCE STANDARDS

A. ANSI/NFPA – National Electric Code

B. NEMA, UL, TIA/EIA, and ANSI Standards, where applicable standards have been established

C. IEEE 802.11 wireless standards

1.05 SUBMITTALS

A. Submit in accordance with provisions of Section 17 00 00 and shop Drawings of all materials proposed.

PART 2 - PRODUCTS

2.01 EQUIPMENT

A. All provided systems must be new and currently in manufacture.

B. All wireless access points shall meet the following requirements:

1. Support WPA2 and 802.11i

2. Must be IEEE 802.11n compliant
3. Must support both 2.4 GHz and 5 GHz radio bands
4. 2x2 MIMO, at minimum
5. Dual radio with both radios supporting 802.11n
6. Internal antennas are preferred.
7. Shall be powered by PoE (802.3af).
8. Shall have, at minimum, one 10/100/1000 Mbps PoE Ethernet port
9. Support WiFi Multimedia (WMM)
10. Adjustable transmit power on both radios

C. Any access point mounted in air plenum spaces must be plenum-rated or enclosed in a plenum rated enclosure.

D. Contractor shall include all necessary licensing for the quantity of access points installed.

E. Contractor shall include 2 spare access points beyond the quantity shown on the floor plans.

F. The WLAN Contractor shall include plastic enclosures for mounting access points in areas where they may be potentially damaged (garage, etc.). Cost to mount the enclosure with associated access point should be included in the cost of the enclosure. Enclosures should meet the following requirements:

1. Be made of high impact plastic
2. Be moisture resistant
3. Sized to fully conceal the access point and antennas
4. Have sealed grommets for external cable access

G. Wireless controller/management systems:

1. System shall have interference detection and avoidance
2. Controller should be capable of and configured for dynamic channel assignment and dynamic radio power adjustment.
3. Wireless system should be capable of and configured for dynamically shifting wireless users to adjacent access points to better distribute users on the wireless system.
4. Products must include the most recent management software with appropriate licensing for three (3) simultaneous users.
5. Controller-less systems must meet these performance requirements and capabilities.

H. Include all necessary power supplies, memory, cables, connectors, licensing, and other items needed for a fully functional WLAN system.

I. System must be LDAP compliant.

J. The Contractor will supply all hardware and software necessary to implement a wireless authentication solution.

2.02 MOUNTING HARDWARE

A. WLAN Contractor shall supply all required access point mounting hardware for all access points no matter what surface or ceiling type the access point is mounted.

PART 3 - EXECUTION

3.01 GENERAL

A. The WLAN work shall include all installation/patching of all access points.

B. The Contractor shall install access points as shown on the technology drawings.

C. Prior to the installation of any access points, the WLAN Contractor shall mount one access point for each mounting situation (drop ceiling (all types), hard ceiling, wall-mount, enclosure-mount, etc.) to get City approval before proceeding with installation of all access points.

D. Cabling to which the APs will be connected will be provided by another contractor. If cabling needs to be moved or added to accommodate proper positioning of access points, the WLAN Contractor must provide a written notice to the Owner for each instance. It will be the Owner's sole discretion whether and how to act upon such notifications.

E. Patch cords to connect the access point to the access point outlet will be provided by the City and installed by the WLAN Contractor.

F. Pricing for wireless LAN system must include shipping and delivery.

G. Contractor shall review the City's equipment labeling scheme and label all wireless LAN components as required by the City.

H. Physical installation of access points by the WLAN Contractor at all buildings must be included in pricing. Installation includes securely affixing the APs to ceilings or walls as appropriate. All final mounting positions shall be reviewed and approved by the Owner prior to installation of any access points.

I. All rubbish, debris, and dirt resulting from the WLAN Contractor's work shall be cleaned up and removed from the buildings daily. The premises shall at all times be kept in a clean, safe, and professional condition.

3.02 WLAN CONFIGURATION

A. Contractor shall configure all wireless access points for a fully functional wireless LAN.

B. The Contractor shall work with the Owner to insure that the wireless system integrates with all IP addressing, VLAN, QoS, and security configurations.

C. The Contractor, at minimum, shall configure wireless access levels for 1) employees, and 2) guest access. The Contractor will work with the City to setup this access and the appropriate security measures for each access group to insure they only reach areas on the network authorized only for that specific

group. The Contractor shall work with the City to implement the wireless authentication scheme.

3.03 TESTING

A. Contractor shall perform a wireless site survey after the system is live to verify wireless coverage throughout all spaces.

3.04 WLAN DOCUMENTATION

A. Contractor shall provide network diagrams showing the integration of the WLAN with the LAN.

B. Wireless heat maps showing wireless coverage and the location of all access points shall be provided to the Owner.

C. All maps and diagrams shall display the equipment labeling scheme of all equipment as deployed in the field.

END OF SECTION

SECTION 27 40 00 – AV/MULTIMEDIA GENERAL REQUIREMENTS

PART 1 – GENERAL

1.01 REFERENCE

A. Provisions of Section 27 00 00 and Construction Documents are included as a part of this section as though bound herein.

1.02 SCOPE SUMMARY

A. This section contains general requirements for AV/Multimedia technology provision, installation, configuration, and documentation. Requirements apply to all following sections unless specifically noted.

1.03 DEFINITIONS

A. HDCP: High-Bandwidth Digital Content Protection, or a security protocol designed to limit unauthorized use of protected content. Where applicable, HDCP compliant devices shall be utilized per design specifications. Use of HDCP compliant systems designed herein are the responsibility of the end user and compliance with owner's Fair Use policies.

1. EDID: Extended Display Information Data, or a data structure that resides in a display or specialized audiovisual device – commonly referred to as sinks – describing the capabilities of the sink to a connected source.

2. E-EDID: Enhanced EDID, or the version of EDID utilized in electronic equipment for the HDMI interface.

1.04 REFERENCE STANDARDS

A. As listed in Section 27 00 00.

B. Giddings, G. H. Philip. *Audio Systems – Design and Installation*.
Focal Press, 1990.
Focal Press, Elsevier Inc.
30 Corporate Drive, Suite 400
Burlington, MA 01803
Phone: (781) 221-2212
Fax: (781) 221-1615

C. *AV Installation Handbook, Second Edition.* InfoComm International, 2009.
11242 Waples Mill Road, Ste. 200
Fairfax, VA 22030
Phone: (703) 273-7200
Fax: 703-278-8082

D. Cable Products Guide #01-03 68-554-01 (latest revision)
Extron Electronics

1025 E. Ball Road
Anaheim, CA 92805
Phone: (714) 491-1500 Toll Free: (800) 633-9876
Fax: (714) 491-1517

1.05 SUBMITTALS

A. General Information: As required by Section 27 00 00.

B. There are three types of submittals required:

1. Preconstruction Submittals, including shop drawings.

2. Progress Submittals, including progress reports, work plans, and completion schedules.

3. Closeout Submittals, including as-built drawings, equipment manuals, quick reference guides, and custom software programming/configurations.

C. Preconstruction Submittals: Exact copies of original specification drawings are not acceptable as preconstruction submittal drawings. Submittals shall show the following:

1. Block Diagrams: Interconnection diagrams, including cable identification detail, notes to installers, and specific input/output port identification.

2. Mounted Elements: Structurally mounted elements, including but not limited to monitors, projectors, and loudspeakers. This shall include both plan view of placement, as well as detail of structural mounting techniques to be used.

3. Identification: Layout and labeling/engraving of custom products, including wall plates and interconnection panels.

4. Cable: Make and model of bulk cable and connectors, cable labels and connector detail.

5. Changes: Proposed changes to block diagrams and elevations provided with the Bid documents. Required changes are detailed in Section(s) to follow.

D. Progress Submittals: Submittals shall include the following:

1. Weekly Report: Weekly written report to be submitted to Consultant via email by 5 PM each Monday, outlining progress from previous week, plans for progress in the current week, and any coordination issues that may require Consultant or Owner attention.

E. Closeout Submittals: Shall include the following:

1. Binders: A complete set of equipment manuals shall be kept and organized in 3-ring binder(s) for each room system.

2. Quick Reference: Contractor shall write a quick-reference guide covering normal system operation and basic troubleshooting procedures for each room. Guide shall be a maximum of 1 page; front and back (may include pictures/illustrations). Subject to Consultant review/approval at least 3 days prior to final submittal.

3. Serial Numbers: Contractor shall also include a list of serial numbers for all supplied components which have serial numbers and a unit price more than $99.00. These will be provided on a per-room and per-system basis.

F. As-Built Drawings: Contractor shall compile a set of as-built drawings, with all changes clearly marked in red.

G. Additional Submittals: Contractor shall supply additional submittals, as required by subsequent sections.

1.06 CORRECTION PERIOD

A. Length of Period: Contractor shall offer a one year correction period to Owner for this system. Contractor shall repair all equipment and cabling problems at no additional cost to Owner during the correction period.

B. Commencement: Correction period shall begin at date of Final Acceptance.

C. Final Acceptance: shall be defined as the date at which all contract work (save for a correction period) is complete, including punchlist completion & verification, closeout submittals, and written verification by the Owner is obtained by the Contractor that the systems have been accepted.

D. On-site Response: Contractor shall respond on-site within eight (8) business hours from the time of the initial phone contact in the event that the issue cannot be resolved over the phone.

E. Equipment on Loan: Contractor shall loan equipment for any broken, defective, or non-functional equipment that cannot be repaired and returned within one week. Contractor shall provide shipping, delivery, and integration at no additional cost to Owner. Equipment shall be comparable in size, speed, brightness, and relevant performance specifications, as determined by Owner.

F. Projection Lamps: Projection lamps are to be warranted by Contractor for a minimum of 90 days, or the rated life expectancy of the lamp, whichever comes first.

G. Damaged Equipment: Equipment that is damaged due to intentional misuse, abuse or negligence is not covered under this warranty; however, Contractor shall assist Owner in putting the system back in working order in the shortest possible timeframe while charging normal service rates for labor and equipment.

PART 2 – PRODUCTS

2.01 PRODUCT REQUIREMENTS

A. Substitutions: Contractor may propose substitutions during the bid process.

B. Substitution Approval: Consultant and Owner reserve the right to govern over and determine whether proposed substitutions are equal to the product(s) named in the specifications.

2.02 PRODUCT SPECIFICATIONS

A. Provisions: Product specifications are provided in subsequent sections to Contractor for the appropriate configuration and/or provision of accessories as well as for a guide to indicate key features for possible substitutions.

B. Substitutions for Non-specified Products: Where no product specification is provided, Contractor may use manufacturer's specification for the identified product as a guide for suggesting appropriate substitutions. Substitutions are subject to prior approval by Consultant.

C. Deviation: Products provided or installed that deviate from the products named herein in make, model, color, or other significant characteristic (i.e., non-approved substitutions) shall be removed and replaced with specified products at no additional expense to Owner.

D. Where wireless microphone systems are specified, Contractor shall determine optimal frequency range for final product selection and submit Manufacturer's recommended frequency band for Owner and Consultant approval prior to ordering equipment. Contractor shall provide congruent frequency band products where like systems are specified for interoperability of components. Where three (3) or more wireless microphones are specified within the same system, Contractor shall provide and install necessary antennae distribution for optimal performance, to be submitted for Owner and Consultant approval during pre-construction phase.

2.03 MISCELLANEOUS MATERIAL

A. Required Equipment: Contractor shall provide additional system components typically and reasonably required to make system operational even though not specifically indicated in Drawings, Appendices or Specifications including, but not limited to, cable, connectors, connecting accessories, adaptors, power supplies, power strips, rack mounting adapters and shelves, cover plates and closure panels, relays and switches, remote antenna mounts, terminal blocks, and related connector and termination hardware required by but not supplied with the equipment.

B. Blank Fill Panels: Contractor shall provide blank fill panels to cover any openings in equipment racks provided under this contract whether specified in

the equipment schedules or not. Fill panels shall match finish of specified rack hardware.

C. Power Distribution Strips: Contractor shall provide power distribution strips as necessary for distributing power within equipment racks and consoles. Strips shall be UL listed, be securely mountable, and appropriate for professional installation.

2.04 CABLE

A. Cable shall be provided and installed as detailed herein. Cable installed that does not conform to these standards or that has not been given prior approval by Consultant shall be removed by Contractor and replaced at Contractor's sole expense.

B. Plenum: Plenum-rated cables shall be used where required by code or by best practices.

C. Installed Video: Video signal coaxial cables shall have #18 solid copper center conductor, gas-injected high density Polyethylene or Fluorinated Ethylene Propylene insulation, copper braid shield of at least 95% coverage and 100% dual-sided foil and black PVC jacket unless color is otherwise noted. Cable shall be designed as a low loss serial digital video cable. Belden 1694A, WestPenn 6350, Canare L-5CFB, Liberty 18-CMR-SD, or equal. Plenum cable, Belden 1695A, WestPenn 256350, Liberty 18-CMP-VID-COAX, or equal.

D. Flexible Video: Short video cables that are intended to be moved or adjusted on a regular, frequent basis may be constructed of a stranded bare copper center conductor RG-59/equivalent cable with >94% copper braid shield and polyethylene dielectric. Canare LV-61S, Belden 1505A, WestPenn 819, or equal. Plenum cable, Belden 1506A, WestPenn 25819, or equal.

E. High Resolution RGBHV Graphics/Video: Cable type and size shall be selected to provide a minimum of 250 MHz bandwidth (-3dB) at over the length of each RGBHV signal path from source to display, including losses and gains through cable loss, signal processing, switching and distribution equipment. Manufacturer shall designate cable as suitable for high-resolution use. Extron MHR-5, Liberty RGB5C-CM or equal. Plenum cable, Extron MHR-5P, Liberty RGB5C-25-CMP, or equal.

F. Installed Line Level and Microphone (single line): Audio signal cable shall have twisted pair #22 stranded tinned copper conductors, polyethylene conductor insulation, aluminum-polyester foil shield, #24 stranded tinned copper drain wire and chrome PVC jacket. Belden 8761, West Penn 291, Canare L-2T2S, Liberty 24-2P-STAR, or equal. Plenum cable, Belden 88761 or equal.

G. Portable Microphone, Enclosure and Breakout Line Level Audio: Cable shall have 4 conductors per channel arranged in star quad double-balanced pairing, #24 stranded conductors of at least 40 tinned annealed copper wires, 100% coverage wrap shield, tinned copper braid shield of approximately 50% coverage, uniformly round form and black PVC jacket. Canare L-4E6S, Belden 8723, WestPenn 355, or equal. Plenum Cable, Belden 88723, Liberty 24-4P-PLCSH-WHT, or equal.

H. Broadband Video Antenna Cable: For runs shorter than 15', RG-59. For runs 15'-50', RG-6.

I. Wireless Microphone Antenna Extension Cable: 50-Ohm coaxial cable, or as directed by microphone manufacturer.

J. Loudspeaker Wire: 14 AWG minimum.

K. UTP Cable: Shall be consistent with Project standards for CAT-6 cable, unless otherwise noted in specification or recommended by hardware manufacturer for use with their equipment.

L. Control: Shall be as recommended by equipment manufacturer, with the appropriate number of conductors for the application.

M. Cable Construction: Contractor shall fabricate interconnecting cables using products defined in this section unless equipment manufacturer-provided cable is of a specialized or proprietary nature. Pre-manufactured cables are subject to prior approval by Consultant.

N. Labels: Labels shall include a white paper or vinyl slip with typed or machine printed designations, secured in place with a wider section of clear heat shrink tubing or integral clear adhesive-backed plastic.

O. Terminations: Provide specialized terminating hardware as required.

P. Schedule: Contractor shall submit schedule prior to installation for Consultant review indicating cable types that will be used on the project.

2.05 CONNECTORS

A. Connectors shall be provided and installed as detailed herein. Connectors installed that do not conform to these standards or that have not been given prior approval by Consultant shall be removed by Contractor and replaced at Contractor's sole expense.

B. HDMI (Video/Audio/Control): Cables to be factory-terminated with molded strain relief.

C. BNC (Video): Video signal BNC connectors shall be 3-piece crimp-on type with insertion barrel and ferrule, and gold flashed crimp-on center pin. Barrel shall provide full circumferential contact with the braid. Fittings shall be sized

to fit the cable. Canare BCP-C series or equal. Crimping and die tools shall be Canare TC-1 Hand Crimp Tool with appropriate TCD die sets or equal.

D. RCA (Video): Video signal RCA connectors shall be 3-piece crimp-on type with gold flashed center pin, Canare RCAP-C series or equal. Crimping and die tools shall be Canare TC-1 Hand Crimp Tool with appropriate TCD die sets or equal.

E. F (Video): Video signal F connectors shall be 3-piece crimp-on type with gold flashed crimp-on center pin. Canare FP-C series or equal. Crimping and die tools shall be Canare TC-1 Hand Crimp Tool with appropriate TCD die sets or equal.

F. BNC (RGBHV Graphics): Graphics signal BNC connector shall be crimp-on type with insertion barrel and ferrule, and gold flashed crimp-on center pin. Barrel shall provide full circumferential contact with the braid. Fittings shall be sized to fit the cable. BNC manufacturer, model and tools as recommended by the manufacturer of the RGBHV/graphics cable.

G. XLR: Strain relief shall be sized to fit the cable. Connector shell shall be isolated from all contacts. Neutrik CA-NC series or equal.

H. Mini-XLR: Strain relief shall be sized to fit the cable. Connector shell shall be isolated from all contacts. Switchcraft or equivalent.

I. Phono (RCA): Phono/RCA connectors shall have gold contact and solid center pin with metal strain relief. Canare F-10 or Canare F-09 or equal.

J. Phone (1/4 inch): Reinforced one-piece body shall have brass bar running length of handle. Canare F-15 (TS) or Canare F-16 (TRS) or equal.

K. Mini (1/8 inch): Shall be Canare F-11 (TS) or Canare F-12 (TRS) or equal.

L. RJ45: RJ45 jacks that are field-terminated shall be punch-down type. All flexible connectivity to AV devices shall be factory-molded patch cables. Where a field-terminated plug is required by manufacturer recommendations, Contractor shall use appropriate connector type to the type of cable used (solid vs. stranded).

M. Shielded cable to be terminated with shielded connectors or as required by manufacturer recommendations.

N. Schedule: Contractor shall submit schedule prior to installation for Consultant review indicating connectors that will be used on the project.

2.06 INTERFACE PANELS

A. Finish: Interface plates and connector panels shall be as indicated on Drawings and as specified herein. Finish on custom wall interface plates shall match that of electrical and other work and shall be coordinated with

Consultant prior to ordering. Connector panels in equipment racks shall match finish of rack frame and specified/provided blank panels unless called out otherwise in equipment schedules.

B. Floor Boxes: Floor box plates shall be provided wherever connectivity through a floor box is indicated on drawings.

C. Labels: Interface plates and connector panels shall be engraved to show connector functionality. Engravings shall be finished with a contrasting color to plate finish. Verify engraving detail in preconstruction submittal prior to fabrication.

D. Connector Placement: Verify connector layout detail for custom panels in Preconstruction submittal prior to fabrication.

E. Box Mounts: Wall and floor interface plates shall mount to appropriate electrical conduit boxes unless indicated otherwise.

F. Cut-ins: Where no box is provided, Contractor shall cut in appropriate opening for plate, and provide appropriately sized mud-ring/caddy to securely attach plate to wall.

G. Rack Blank Panels: Contractor shall provide all blank rack panels necessary to fill opening in the front of AV equipment racks, whether specified in the equipment schedules or not.

PART 3 – EXECUTION

3.01 EQUIPMENT

A. As required by Section 27 00 00.

1. Safety: Contractor shall use proper structural installation techniques and maintain a minimum 5:1 safety margin.

2. Custom Mounting Finish: Custom mounting hardware shall be painted by Contractor to match either color of wall, ceiling or equipment, at Consultant's discretion.

3.02 INTERCONNECTION

A. As required by Section 27 00 00.

1. Interpretation: Contractor shall make system interconnections as indicated on Drawings and specified herein. Contractor shall interpret Drawings using an understanding of the equipment and general system topology (both existing and future/specified). Contractor shall provide power and control lines to and from power supplies, remotely controlled equipment and other devices even though not explicitly indicated on Drawings or listed in equipment tables.

2. Additional: Contractor shall be responsible for associated equipment signals not specifically documented in provided drawings. These include synchronizing signals, transmitting and receiving antennas, and LAN connections to equipment provided and/or installed by Contractor.

3. Exceptions: Contractor shall not be responsible for unrelated low voltage wiring such as data and voice connections except as they pertain to interface boxes, interface plates, and integrated control systems.

3.03 CABLE MANAGEMENT

A. As required by Section 27 00 00.

1. Above Ceiling: Cabling located above ceilings shall be tied off to and supported by ceiling supports or other structures at a minimum of eighteen (18) inches above the ceiling.

2. Not on Ceiling: Cabling shall not lie on the ceiling.

3. Wall Cabling: Cables installed in a horizontal fashion along wall surfaces shall be installed in surface raceway approved by Owner and Consultant.

4. Floor Cabling: Cabling placed at floor level such as microphones shall be installed on the floor in the shortest possible route to the nearest wall considering traffic patterns and in an enclosure designed for that use and offering protection from foot traffic.

5. Desk Cabling: Where a cable is installed inside desk furniture, a means of protecting the cables and holding cabling to a fixed surface shall be installed.

6. Grommets: Holes in horizontal furniture surfaces for cable pass-through shall be provided with appropriate sized grommet. Grommet shall be black unless otherwise specified or required.

7. Stub-ups: Where conduit is stubbed-up through the floor and exposed, Contractor shall wrap cables with black expandable sleeving and secure at least three (3) inches below level of conduit top.

   a. Where conduit is stubbed-up through floor and concealed within furniture, Contractor shall install tether comprised of aircraft cabling to limit the distance furniture may be moved away from stubbed-up conduit. Cabling service loop exiting stubbed-up conduit and entering furniture shall be longer than the corresponding tether, providing protection against movement of furniture that would otherwise damage installed cabling.

8. Umbilicals: Exposed cable umbilicals, such as those between instructional furniture and a floor- or wall-mounted plate, shall be covered in black expandable sleeving, with neatly finished ends (heat-shrink or Consultant-approved method).

3.04 CONNECTOR TERMINATION

A. As required by Section 27 00 00.

1. Video Connectors: Video connectors (BNC, RCA, and F) shall be terminated using a crimp tool or dies designed specifically for the connectors being applied.

2. XLR Connectors: Terminate XLR type connectors wired pin 2 high, pin 3 low, and pin 1 shield.

3. UTP: UTP cable shall be terminated with appropriate crimps tools or tools specified by manufacturer. Refer to 27 40 00, 2.05 Connectors.

3.05 GROUNDING

A. Audiovisual equipment racks shall be grounded to the telecommunication grounding system with a minimum 6 AWG grounding cable. Refer to Section 27 00 00 for additional grounding requirements.

3.06 TRAINING

A. General Information: As required by Section 27 00 00 and following section(s).

B. Coordination and Personnel: Training shall be coordinated with Owner's schedule, and Contractor personnel who provide training are subject to Owner's approval.

3.07 PROJECT CLOSEOUT

A. Completion: System shall be considered complete when all of the following has occurred:

1. Testing has been completed to the satisfaction of Owner and Consultant.

2. Punch-listed items have been addressed to the satisfaction of Owner.

3. As-built drawings and system documentation has been turned over to Owner and Consultant.

4. Complete operational training has been conducted with Owner's staff.

5. System Commissioning Process has been completed.

B. Acceptance: Contractor shall secure written Acceptance of systems in the form of authorized Owner signature on Acceptance Document. This shall constitute the date of Acceptance.

PART 4 – TESTING

4.01 TESTING & INSPECTION

A. General Information: As required by Section 27 00 00.

B. Notification: Prior to start of testing, provide a list to Consultant of test equipment make, model numbers and calibration dates that will be used.

C. Display/Output checks: Contractor shall verify that visual and audio outputs from the system are high-quality and without noticeable distortion or feedback at normal operating levels.

D. Wiring and Labeling: Contractor shall check all inputs and outputs for correct wiring and labeling.

E. Loudspeakers: Contractor shall measure the impedance of each speaker line leaving the equipment racks. For full range devices, use a frequency of 1000 Hz, for band limited devices, use a frequency appropriate for the operating range of the transducer. When documenting results, Contractor shall include the calculated impedance based on number of units on a line and the size and distance of the run. Contractor shall correct any field readings that differ more than 20% from the calculated impedance. Contractor shall use an electronic polarity checker to test each reinforcement speaker. Speakers shall have the same relative polarity.

F. Computer Graphics: Computer graphics shall be crisp and focused with respect to color alignment. If color alignment is not registered properly, Contractor shall identify source of problem and correct. EDID and other auto-registration features shall be set within AV equipment where required for optimal system performance.

END OF SECTION

SECTION 27 41 00 – AUDIO & VIDEO SYSTEMS (AVS)

Part 1 - PART 1 – GENERAL

1.01 SCOPE-OF-WORK SUMMARY

A. Unless otherwise noted, the term "Contractor", "Proposer" or "Vendor" maybe used interchangeably herein and refers to the respondent submitting a proposal for this RFP.

B. This specification section includes related work for the following Leon Valley City project(s):

1. Renovation of Police / Municipal Office
2. Renovation of the Fire Station

C. This Section Scope-of-Work includes

1. Provide necessary services to integrate each component, cable or device depicted or described collectively in the totality of the Construction Documents into a fully functional package with seamless functionality.
2. Provide all devices and services necessary for a complete installation and operational system.
3. Integrate into the construction existing or owner furnished equipment and miscellaneous hardware as may be described herein.
4. Maintain timely installations according to the project construction schedule.
5. Provide Owner System Training, As-Built documentation, and project manuals.
6. Overview of work includes but is not limited to the following:
   a. Removal of existing audio & video devices and cabling not required by new audio & video systems
   b. Police / Municipal Building Installation of New Audio & Video Systems as depicted in the Construction Documents for but not limited to the following areas:
      i. Council Chamber A124
      ii. Meeting Room A121
      iii. Conference Room A126
      iv. Large Conference Room A107
      v. Small Conference Room A109
      vi. Lobby A119
      vii. Fitness Room A166

c. Fire Station Installation of New Audio & Video Systems as depicted in the Construction Documents for but not limited to the following areas:
   i. Training Room A108
   ii. Dinning / Day Room A113
   iii. Workout Area A138
   iv. Outside "S3" Loudspeakers

d. Provide the Fire Station Facility, General Public Address (PA) System throughout facility.

e. Provide the Fire Station Facility a minimum of (4) Push-to-Talk "PTT" microphone locations for General Overhead PA System.

f. Provide Both the Fire Station and Police / Municipal building with a CATV RF Distribution System for all "1+V" locations shown on the Construction Drawings.

g. Generally cleanup of installation to reflect quality installation

1.02 GOVERNING REQUIREMENTS

A. The following are general provisions, requirements and expectations of the Technology Contractor delivering Audio & Video Systems equipment and installation for this construction package:

1. This document is intended to provide all hopeful Vendor(s) / Contractor(s), hereafter referred to as the Proposer, with information it needs to submit a complete Turnkey solution and proposal for the Leon Valley City, hereafter referred to as the City. The City will evaluate the submitted proposals to select a perceived Best Value Vendor to supply and install the Audio & Video Systems for this project as described herein.

2. The work performed shall be of professional quality and installed as would normally be expected by a professional Audio & Video Contractor in the primary business of providing quality installations of equivalent systems.

3. The Proposer shall furnish their lump sum price offer to provide a turn-key package in response to the Audio & Video systems specified herein and further defined in the associated Construction Documents.

4. The Contractor shall provide a 100% performance bond, payable to the Owner, until written acceptance by the Owner of all work and materials. The cost of these bonds shall be included in the Contractor's proposal price and shown by separate line item.

5. The City shall accept proposals from both manufacturers and authorized resellers of products and systems specified herein and desire to have a competitive choice of local authorized reseller / manufacturers to find the best value for delivery of the systems.
6. The Proposer's proposal response shall include provisioning, installation, configuration, training and warranty support for all systems furnished and provide the City a fully functional system.
7. The Successful Proposer's responsibilities shall include but are not limited to the following:
    a. Provide, install, and make fully functional the systems made up of equipment, cabling, devices, and hardware described in this Construction Document and found in Appendix "A" attached hereto.
    b. Systems will include a complete Audio & Video System with sound reinforcement, video projection, media / press interface, broadcast video, archival equipment, and Master Control Automation for the Council Chamber, Board Conference Room, and Training Rooms.
    c. Furnish necessary services to integrate each system component into a fully functional package with seamless functionality as described herein.
    d. Integrate into the construction any owner furnished equipment and miscellaneous hardware as may be described herein.
    e. Maintain timely installations according to the project construction schedule.

1.03 DEFINITIONS

A. General Construction common words, acronyms, and phrases found herein this specification and construction documents shall be as defined by and in accordance with AIA Document A201, Fifteenth Edition, 1997.

B. Specific special use of common words, acronyms, and phrases found here in this document shall use the following definitions:
    1. "Owner" shall refer to the City of Leon Valley.
    2. "Consultant" shall refer to Elert & Associates
    3. "Successful Contractor" shall imply the Vendor or Contractor that is awarded the project scope of work described herein and enters into a written contract with the Owner or General Contractor to deliver said work.
    4. "Proposer" shall mean Vendor, Contractor or Subcontractor that submits a proposal to deliver the scope of work described herein this construction document package.

5. “Lump Sum” shall refer to a total amount to deliver full scope of work described inclusive of all materials and labor.
6. “AVS” shall be an acronym for Audio & Video Systems

1.04 RELATED DOCUMENTS

A. References to the following related documents do not limit or release the Contractor from the responsibility of having the necessary knowledge of other non-referenced related documents that makeup the Construction Document Package.

B. The following Contract Documents are hereby made a part of this Section:
   1. AIA Document A201, Fifteenth Edition, 1997
   2. Division 1 Documents found in the Project Manual
   3. Division 27 documents that collectively make up the Construction Package including:
      a. Section 27 00 00 General Technology Requirements
      b. Section 27 40 00 AV-Multimedia General Requirements
      c. 27 10 00 Structured Cabling Infrastructure
   4. Work diagrammatically shown or noted on project drawings
   5. Other documents that collectively make up a part of this Construction Document package

1.05 RELATED WORK

A. References to the following specific related work do not limit or release the Contractor from the responsibility of coordination with other trades, or from having the necessary knowledge of other related work.
   1. Work provided by Owner or Owner’s Contractors
   2. Work by Electrical Subcontractor
      a. The Project Electrical Contractor will install electrical rough-in for use by the AVS Contractor and their devices. The AVS Contractor shall have the specific responsibility to fully coordinate their needs with the Electrical Contractor for their equipment AC Power, Back Box Type & Dimensions, Raceway & Pathways
      b. The AVS Contractor shall examine construction documents for familiarization of the provided Electrical Rough-in by the Electrical Contractor

c. Needed Electrical back boxes, raceways, and pathways not provided by the Electrical Contractor, but needed for the AVS scope of work shall be the responsibility of the AVS Contractor unless noted to the contrary

3. UNIT PRICES
4. The Proposer shall provide unit pricing breakdown for all equipment as a line item materials list submitted with their proposal. In the event the Proposal form does not specifically provide a worksheet for requested unit pricing, the Contractor shall provide the unit price list by separate attachment along with their Proposal.
5. The unit price may be used to add or deduct, by change order, quantities of units as represented by the unit price.
6. Failure to provide requested unit prices may result in the rejection of the proposal.

1.06 ALTERNATE & ALTERNATIVE PROPOSALS

A. Alternates

1. The Base proposal shall include all equipment described herein and / or depicted in the construction-drawing package, but shall not include any marked or listed Alternates.
2. All Alternates shall be listed, Marked as Additive or Deductive Amounts and Priced separately on the proposal form or by Contractor in a separate attachment if Proposal form does specifically have a place for Alternate prices.
3. Requested Alternates for this Proposal package are described in detail under in Part 2. 2.06 Alternates and found on the Proposal Form.
4. Provide lump sum pricing for the following alternates:

   a. Alternate # T-1: Provide a lump sum amount to furnish (13) new 22" widescreen 16:10 monitors with HDMI inputs and 1080p HD+ capable resolution. The new monitors shall be Viewsonic Professional VG2239m-LED 22" Monitors or equal. The Contractor shall remove and replace the existing 4:3 flat panel display monitors at the Dais Table, Staff Tables, and Lectern. If the Alternate #T-1 is not accepted, then as the Base Proposal Scope-of-Work the Contractor shall use the existing monitors.

   b. Alternate # T-2: Provide a lump sum amount to replace the existing monitor mounts at the Dais Table with a Humanscale Model M8 mount.

   c. Alternate # T-3: Provide a lump sum amount to provide the PENN-ELCOM CPU-87BLSLIM Lockable Mini-PC holder at each Dais

Table and Staff Table seating position. The holder shall be placed under tabletop for Owner Provided Mini-PCs.

d. Alternate # T-4: Provide a lump sum amount to provide the complete Lectern as depicted on Drawing Sheet T5.14, complete with electronics as shown on Drawing Sheet T5.13.

e. Alternate # T-5: Provide a lump sum amount to remove from the base proposal the Ashly ne.2424 DSP mixer and replace with Lectrosonics Aspen Series Digital Audio Processor.

1.07 PERFORMANCE REQUIREMENTS & REFERENCES

A. Referenced standards and / or procedures will be binding on Contractor and all work will be judged against such standards and procedures unless otherwise stated in writing.

B. Reference Standards

1.08 SUBMITTALS

A. General Requirements

1. Provide a full electronic file copy in PDF format of all required paper document submittals. The PDF Files shall be delivered on Thumb-Drive and / or Electronically via a “DropBox.com” or equivalent.
2. Contractor shall provide four (4) copies of submittals required prior to procurement of equipment or commencement of work.
3. Contractor shall submit FULL System Shop Drawings as described herein to the General Contractor and Consultant for review within (30) thirty days from the date of the contract. Failure to comply with this requirement may be cause for cancellation of the contract without penalty or cost to the Owner / General Contractor.
4. Present submitted documents in a clear and thorough manner, include original drawings that illustrate diagrammatically Contractor's intent to assemble, construct, fabricate, build, and supply the systems and equipment as described by the collective specifications.
5. Product Data Sheets (Cut-Sheets) are only required on products that differ from that which is specifically specified. This includes a revised model number or part number, replacement model, or that differ in any way from devices described herein.
6. Submit only pages that are pertinent; mark each copy of standard printed data to identify pertinent products, referenced to Specification Section and Article number. Provide required performance standard information, descriptive characteristics, capacities and wiring requirements for system control.

7. Modify manufacturer's diagrams and schematic drawings to supplement standard information and provide information specifically applicable to the Work.
8. Omit information on product cut sheet not applicable to this project
9. Identify each detail element of drawings by reference to full drawing sheet number.
10. Submit where applicable any and all finish options for prior approval where not specifically specified.
11. Title each drawing with the project name, drawing name, installing Contractor's name, and Consultant's name Elert & Associates.

B. Submittal Conditions

1. The Contractor shall not consider the Consultant or Owner's review of submittals to be exhaustive or complete in every detail. Approval of shop drawings or submittals including substitutions indicates only the acceptance of the Contractor's apparent intent to comply with general design or method of construction and quality as specified. The finished product must meet functional requirements, operations, arrangements, and quantities and comply with the contract documents unless specifically approved to the contrary.
2. The Contractor shall be held responsible for delivery of systems as specified any errors or omissions in the submittals shall not relieve said Contractor of responsibility to deliver complete systems as specified, that fully meets or exceeds the minimum requirements set forth by the specifications, drawings and contract documents.
3. The Contractor shall be responsible for deviations in submittals from the requirements of Contract Documents, unless Consultant gives specific written acceptance specifically identifying such deviation. The Consultant shall review and stamp submittals for general conformance to design intent only. This stamped review alone does not imply any specific written acceptance of deviations.
4. Submittals that, in the Consultant's opinion, are incomplete, deviate significantly from the requirements of the Contract Documents, or contain numerous errors shall be returned, without review, for rework and are to be re-submitted.
5. Submittals of front end shop drawings and other items shall not be in more than two (2) partial submittals, or as allowed by the Consultant. Do to the complexity of the systems the consultant reserves the right to require full Submittals prior to Submittal Review.
6. If shop drawings are rejected for any reason, the Contractor shall correct and resubmit within seven (7) working days. The Contractor shall always

be required to obtain stamped approval of submittals prior to any fabrication or installation of equipment.

7. The submittals must be received and stamped reviewed by the Consultant prior to procurement of equipment or commencement of work. Any prior work performed is at the Contractor's own risk.
8. Failure to obtain shop-drawing approval within forty five (45) days of contract award, where the delay is due to the poor performance of the Contractor, may be cause for cancellation of the contract without penalty to Owner / General Contractor.
9. Do not fabricate products or begin work that requires submittals until return of stamped reviewed submittals with Consultant acceptance. If work does progress prior to this, the Contractor shall have proceeded at his or her own risk.
10. Any Contractor noted corrections, changes, and additions, as may be necessary to the design document drawings, shall clearly show any such changes by a noted cloud around the change.

C. Front End Submittal Requirements

1. Complete project material list for each item and or device to be furnished. The Materials List is required to include the following categories:
   a. Quantity provided
   b. Manufacturer name
   c. Model Numbers
   d. Product Description
   e. Product value in the form of cost to the project
2. Product Data Sheets (Cut-Sheets) are only required on products that differ from that which is specifically specified. Product Cut-Sheets for each item furnished shall be submitted as follows:
   a. As 8-1/2" by 11" product catalog specification sheet from the manufacturer
   b. Neatly bound in a three-ring binder and divided by manufacturer with tab dividers
   c. The front of the binder shall include a material list as described above
   d. The products shall be organized in the binder such that they match the materials list order
   e. Where more than one item appears on a page, the Contractor shall mark the appropriate item, for easy identification

f. Submit only pages that are pertinent, delete or mark through information not applicable, mark each copy of printed data to identify pertinent products

g. Reference pertinent products to Specification Section and Article number, if more than one Section of work.

h. Highlight reference standards, performance characteristics, capacities, component parts, finishes; and dimensions

i. Modify manufacturer's standard schematic drawings and diagrams to supplement standard information and to provide information specifically applicable to the work or scope

3. Construction Drawings:

a. Comprehensive system drawings with device locations overlaid on project floor plans, system schematic diagrams in block format, and detail of all custom fabrications including but not limited to device wall plates. Drawings shall be prepared and submitted on E Size 24" x 36" paper.

b. Drawings shall be executed at an appropriate scale as the project would require to clearly read pertinent detail, but for equipment layouts not smaller than 1/4" = 1'- 0" and the floor plans and reflected ceiling plans, not smaller then 1/16" = 1'-0".

c. The shop drawings shall include: Identification of equipment manufacturer, equipment model numbers, cable types, cable identification numbers, cable color codes, cable paths, plate and panel details, consoles and enclosures' details. Additionally, equipment rack layouts showing locations of all rack-mounted equipment, comprehensive system schematic block diagrams (one-line drawings showing device connectivity), equipment rack elevations and custom fabricated equipment.

d. Shop drawings that depict all devices and device locations to be installed.

e. Shop drawings that depict all cabling infrastructure to be installed. Cabling shall be overlaid on floor plan drawings.

f. Comprehensive system schematic wiring diagrams showing detailed point-to-point connections to and between all equipment.

g. Elevation drawings showing intended equipment room layouts.

h. Elevation drawings showing intended equipment rack layouts. The equipment rack layouts shall show locations of all rack mounted equipment and identification of equipment as shown on the system schematic diagram.

i. Detail drawings showing intended fabricated equipment, custom work, and wall plates, etc.

j. Complete wire and cable riser diagram showing path and location of all cable to and between equipment; this cable shall be overlaid on facility floor plan. Include cable types, cable identification numbers, and color codes.

4. Plate or panel details:

a. Drawings shall include examples of proposed nomenclature and labeling scheme intended for use in labeling plates, equipment, cables, etc.

b. Connector numbering, e.g. "Mic # 1, Mic #2, used as examples in Construction Drawing set shall be submitted in full sequential numbering between plates as proposed to be installed. The Contractor is responsible for receiving review approval from Consultant prior to ordering.

c. Detail dimensional drawings of custom plates or panels.

d. Consoles, enclosures or support tables.

5. Wire and Cables

a. The Contractor shall provide their intended Wire and Cable color code strategy for the cabling between equipment. The Contractor must receive approval of color code prior to ordering cabling.

b. Provide complete wire and cable riser diagram showing pathways and locations of all wire and cables to and between equipment. The cabling infrastructure shall be overlaid on facility floor plan.

D. Project Closeout Submittals (As-Built Documents)

1. General

a. When the Contractor considers installation substantially complete, provide to Consultant a written report listing all known system deficiencies compared to specified requirements. Also furnish a timeline for correction of any deficiencies.

b. Submit a written report detailing the results of initial adjustments and verification tests including all relevant drawings, charts, and photographs. This report shall be completed and submitted for review at least five (5) days prior to acceptance verification walkthrough by the Owner and Consultant.

c. The Contractor shall provide written request, requesting a final acceptance walkthrough and demonstration. This request shall certify Contractor's declaration of completion with the project and that to the best of their knowledge all systems are installed and fully functional and ready for review by Consultant.

d. Submit one complete copy of each manual and other closeout documents for review ten (10) days prior to the final acceptance walkthrough.

e. At the time of the walkthrough, the Contractor shall transfer and turnover to the Owner's or Owner's represent the following:

   i. All ancillary and portable equipment such as microphone cables, patch cables, microphones, camcorders, spare equipment, etc.

   ii. An installable and actual copy of all software used and or created for the system including the source code.

   iii. Passwords

   iv. Keys

f. After the walkthrough review, make any noted corrections and / or additions required by Consultant. Provide corrected copies of final as-built documents.

g. Closeout Submittals shall be bound in three-ring binders with clear vinyl pockets on cover and spine for title cards with project name and manual volume numbers. Provide table of contents and tabular dividers with legends for each section.

h. Closeout Submittals shall be printed originals, not photocopied, unless more copies of a manual are required than the number of units used in the system. For custom circuits or modifications, provide a thorough description of the purpose, function, specifications, and operation

2. System Documentation, prepare the following system manuals and other information to accompany the finished installed system. These documents shall be provided prior to the final acceptance walkthrough with the Consultant:

   a. System Operations Manual(s)

   b. System Service Manual(s) and Maintenance Instructions

   c. As-built Drawings and other Documents

   d. Proposed Training Documentation and Materials

   e. Test Reports and Results

   f. Statements of Contractor's Warrantee

3. The System Operations Manual shall assume the reader to be technically inexperienced and unfamiliar with the operation of the system. This manual shall step a user through common and typical use of each system or subsystem. The manual shall include the following:

   a. Overall system operation and instructions

   b. Complete and typical operating procedures for the equipment by activity

c. "Quick Setup" instructions for use by inexperienced users working under time pressure

4. Service Manuals & Maintenance Instructions include clear statements of:

   a. Original Manufacturer's Instruction / Technical Service Manuals for all equipment. Instruction manuals shall be printed originals, not photocopied, unless more copies of a manual are required than the number of units provided

   b. The terms and coverage period of the Manufacturers' and Contractor's warranty

   c. Contractor's service department phone number(s) and hours

   d. Required maintenance schedules for any equipment

   e. Instructions for the proper maintenance of products

   f. Instructions for the Owner to obtain service on installed systems and equipment

   g. For custom circuits or modifications, provide a thorough description of the purpose, function, device modification, and operation

   h. Provide a list of correct settings for all semi-fixed controls (this shall be finalized after acceptance testing)

   i. Any other pertinent data generated during the project or required for future service.

5. System As-Built Documents

   a. Provide complete and corrected as-built drawings at the time of final system testing and Consultant / Owner demonstration.

   b. Original submittals shall be updated to become As-built drawings at the closeout of the project.

   c. Prior to final walkthrough of completed job, the Contractor shall supply one (1) corrected as-built set of Drawings showing the work as installed. Consultant, with any necessary noted corrections that may be required, shall return this drawing set to Contractor. Contractor shall have corrected the installation work as noted and have updated the drawings and have them present at final walkthrough. Upon final acceptance by Owner, the Contractor shall provide five (5) copies of as-built drawings and manuals.

   d. The Contractor shall also furnish to Owner a copy of the complete set of electronic CAD files, in DFX or DWG format, along with a complete PDF file copy of all As-Built drawings.

   e. Include as part of the As-built drawings the original submittals with updates to reflect the actual installed work.

f. Any other pertinent data generated during the project or required for future service.

6. Owner Training

a. Contractor shall provide a proposed Owner training plan for installed systems for review by Consultant prior to Owner Training

b. Training plan shall comply with training requirements found herein under the Owner Training Requirements.

7. Test Reports and Results

8. Warranty Information

a. Warranty information: Include clear statements of the terms and coverage periods for all equipment.

b. Provide Contractor's service department phone number(s) and hours, maintenance schedule and description of products recommended for use in maintenance.

c. The Contractor shall complete and deliver to the Owner a warranty card for each piece of equipment covered by manufacturer's warranty.

1.09 PAYMENT PROCEDURES

A. Payment Procedures

1. Terms: Unless stated otherwise in the contract between the Owner and the Contractor, the Owner shall pay the Contractor on a monthly basis for work completed, based on inspection and sign-off by the Owner or Owner's Agent, up to eighty percent (80%) of the total contract amount. The remaining twenty percent (20%) shall be paid upon Final Acceptance.

2. Application: Payments to the Contractor shall be made only after the Contractor has issued the proper Application for Payment. Pay request must be on the Consultant's supplied AIA form(s). Contractor's Application for Payment must be provided:

a. On AIA Document G702 with AIA G703 support page

b. In accordance with governing AIA Document A201, Fifteenth Edition, 1997

3. The Owner or Owner's representative must review and sign the Contractor's Application for payment prior to payment being issued.

4. The Contractor's payments shall not be processed if any of the following conditions exist:

a. Contractor's submittals are not provided or current as required herein.

b. Contractor's work is not in compliance with the specification.

5. Application for payment has not been submitted on the proper form and with required support documentation Contractor shall submit for approval

by the Owner and Consultant a "Schedule of Values" on the form AIA G-703 prior to the first application for payment. Retainage shall be 5% of the scheduled contract value for each item listed in the "Schedule of Values." "Schedule of Values" shall include separate lines for each category of the work with separate values for materials and labor.

1.10 DELIVERY, STORAGE, AND HANDLING

A. General

1. The Project General Contractor shall have final approval authority for any Subcontractor's needs regarding material Delivery, Storage, and Protection.
2. Storage of materials installed or stored will remain the full responsibility of the Contractor until written acceptance of the competed system by the Owner.
3. Refer to Delivery, Storage, and Handling found in Section 27 41 00.

B. Delivery

1. The Contractor shall have full responsibility for delivery of all materials needed to meet requirements of this specification package.
2. The Contractor shall coordinate with the General Contractor any delivery requirements they may have.

C. Storage

1. Storage of materials shall remain the full responsibility of the Contractor, until the Owner has accepted the work and materials in writing.
2. The Contractor shall coordinate with the General Contractor any need for storage requirements at the site of work.

D. Handling

1. The Contractor shall take necessary steps to protect all materials from:
   a. Dents
   b. Scratches
   c. Dust
   d. Temperature
   e. Moisture and Weather
   f. Cutting
   g. Other hazardous conditions
2. The Contractor shall replace any damaged material as required by the General Contractor or Consultant.

1.11 PROJECT CONDITIONS

A. Existing Conditions

1. This work is renovation Construction to an existing facility
2. The Contractor shall be responsible to review the existing facility and have full understanding of the scope-of-work requested and deliver such work without additional charge to the Owner. Owner reserves the right to issue change request for pricing and inclusion in the final delivered product.
3. The Contractor shall be responsible to closely coordinate with other trades.
4. Electrical Contractor
   a. Electrical rough-ins shall be provided by the electrical contractor, including conduit, raceways and electrical back boxes or box eliminators. Any exceptions shall be specifically noted in the construction document drawings.
   b. Locations not requiring electrical rough-ins where this scope-of-work requires a special device shall be placed in fishable walls. This shall include control system touch panel, push to talk microphone plate, and other device locations noted to need final coordination with the Owner or Consultant.
   c. In locations where electrical conduits or raceways are shown and not provided by the Electrical Contractor, the installing Contractor for this scope-of-work shall provide their sleeved penetrations, raceways, and cable pathways, including coring as may be required.

1.12 WARRANTY

1. Refer to Warranty found in Section 27 41 00
2. Warranty/Maintenance Program
   a. All materials, equipment, parts and labor shall be guaranteed (warranted) for a minimum warranty period of two years (24 months).
   b. Warranty period shall begin immediately following the date of final acceptance in writing by the Owner and Project Consultant.
   c. During the first two (2) year Warranty period, all warranty repairs shall include parts & labor.
   d. The Proposer shall, upon notification of any malfunction, make the necessary repairs, including labor and materials, at no cost to the Owner.
   e. Contractor's Warranty shall include the following provisions:
      i. Contractor's statements of long-term commitment to the sales and service of their products in the project's geographic location.

ii. The Contractor shall warrant that the system(s) shall be provided free from defects and shall perform under usual usage and with continued service for a period of two years after written final acceptance by the Owner or Consultant.

iii. The Contractor guarantees replacement of all defective materials, parts, components, equipment, including labor, free of charge to the Owner during the Warranty period, when made necessary from normal usage and / or wear.

iv. The Contractor shall provide on and off site technical support, software patches, and labor for any necessary site repairs.

v. The Contractor shall provide a full service office, capable of troubleshooting and repairing any system failure in a timely fashion as required by these specification documents

vi. Warranty service shall be delivered within regular facility access hours set forth by the Owner

3. The Warranty more specifically, shall be provided in accordance with the following:

   a. For major system failures: "major system failures" are failures that prohibit the use of a typical system function in one or more instructional spaces or pose a life safety concern. Such failures are considered a major impact to the Owner. The Contractor shall provide service correcting the impact within eight (8) hours after notification by the Owner or his representative and no later than the next business day if the notification falls after noon of the notification date

   b. For minor system failures: "minor system failures" are failures that do not inhibit typical system usage in an instructional space or pose no life safety concern. The Contractor shall provide service within forty-eight (48) hours, after notification by the Owner or his representative.

   c. The Owner reserves the right to make the final determination of major or minor system failures and the right to coordinate the best times for service of any system failure.

   d. The Contractor shall supply Service Request forms and or proper contact procedure to the Owner with instructions for proper notification of the Contractor for warranty service. By following said instructions, the Owner shall constitute proper notification for any need warranty service.

4. The Contractor shall provide an optional extended one-year warranty as an Owner Alternate option. The extended one-year warranty shall extend the warranty for one additional year and cover all technology systems that are a part of this specification package. The warranty shall be equal to the base 2 year warranty described above and shall include on and off sight technical support, materials, software patches, and labor for any necessary site repairs.

5. The Contractor shall offer this extended warranty price to the Owner for their acceptance up to and including thirty days after basic warranty expiration. The Contractor shall be responsible for contacting the Owner in writing 30 days prior to the expiration of this offer. Failure to do so shall constitute an extension of the extended warranty offer.

Part 2 - PRODUCTS

2.01 GENERAL:

A. The Contractor is bound by the intent of these Specifications to provide a complete and functional technology system as described herein, of high professional quality and reliability, and that meets or exceeds standards that are currently established for such systems.

B. Provide all necessary labor, materials, tools, transportation, services, ancillary items, and coordination to furnish the Owner a complete and fully functional turnkey installation as described herein.

C. The Contractor warrants that they will provide professional services, to meet or exceed performance standards and industry recommendations that relate to the scope of work under contract, and that the workmen or system installers are experienced and regularly in the business of installing such systems as specified herein.

D. All work shall be in accordance with the respective drawings, written specifications, supplemental information, industry standards, manufacturer specific installation procedure, trade practice, and applicable regulatory agencies.

E. The Contractor(s) shall thoroughly familiarize themselves with complete construction documents, Proposal package information and all necessary details of the complete set of drawings and specifications before submitting their Proposal.

F. Ancillary and Accessory Items

1. The Proposer shall provide ancillary and required accessory items necessary to furnish to the Owner a complete and fully functional system.
2. The exclusion of / or limitation in the language used in the drawings or specifications shall not be interpreted as meaning that ancillary or accessories items of work or equipment necessary to complete or make the installed system fully functional can be omitted.
3. The mention in writing or representation by depiction materials, services, or operations within this specification document and or Proposal package is binding upon the Proposer to include and provides such items, services, and operations without additional charge to Owner. Exceptions shall be

noted by the acronym (NIC) "Not In Contract" or (OFE) "Owner Furnished Equipment." If this notation does not appear, then the Proposer shall assume the need to provide the item in question.

4. The Proposer shall receive no allowances because of omissions in work due to unfamiliarity or their misunderstanding of Proposal package.

G. Drawing Symbols

1. The project scope drawings utilize symbols and schematic block diagrams to indicate various items of work. Neither of these has any dimensional significance nor do they delineate all items that may be required for the intended construction and installation.
2. The work shall be installed in accordance with the intent diagrammatically expressed on the drawings and described in the written specifications. The Proposer shall not make limiting interpretation that provides for incomplete work or a non-functioning system.

H. Document Discrepancy

1. In the event of an inconsistency or discrepancy that may exist in or between parts of these Construction Documents, the following direction shall be followed and shall govern:
   a. The document, section, phrase, or requirement with better quality, more stringent requirement, or greater amount or quantity of work or material shall apply and shall be expected, delivered and used. Such work or material shall be provided by the Contractor and installed at no additional cost to the Owner.

I. Omissions

1. The omission of or express reference to any part(s) necessary for or reasonably incidental to a complete and fully functional system and installation as intended shall not be construed as a release from the Proposer providing and installing such parts.

2.02 MANUFACTURERS

A. Governing Clauses

1. It is not the intent of these specifications to limit or restrict submission of proposals for products or systems by manufacturers other than those specified.
2. The products specified are intended to establish a minimum baseline of operational, functional, and performance based system expectations that all proposed products must meet or exceed by features, functionality and quality.

3. The Owner reserves the right to govern over and proclaim whether proposed products are equal to the specified system standards.
4. If the proposed system does not meet all of the features or functions described herein, then the Proposer shall identify and list those exceptions in their proposal submittal by separate cover titled "System Exceptions" in red letters.
5. The Proposer shall not be automatically disqualified for not meeting one or more requirements. The Owner shall evaluate proposals on their overall value; all proposals shall be fully considered for best value.
6. Reference to specific equipment manufacturers does not imply that all products produced by that manufacturer meet the specification requirements.

2.03 SOFTWARE TERMS & CONDITIONS

A. The successful Contractor providing software for this project affirms that it possesses complete and valid title and rights to furnish the said software. Further that it possesses legal right to sell, transfer, or license the software to the Owner.

B. The Successful Contractor herby agrees to protect, indemnify, and hold the Owner harmless against any and all claims, suits, or proceedings for patent, trademark, copyright, or franchise infringement arising out of, or resulting from, the installation or use of software or any part of the Contractor provided materials or equipment.

C. Provide the Owner with an installable and exact copy of each software program installed and running on any system furnished. The software delivered to the Owner shall include the source code. Additionally provide a compiled copy that is user installable. Provide all software to the owner on a DVD, CD, Thumb-Drive or other format acceptable to the Owner.

2.04 NARRATIVE OF EXPECTED SCOPE-OF-WORK

A. General

1. This narrative is intended to supplement the Construction Drawings and other information herein for the audiovisual system upgrades and improvements of the existing Leon Valley City Police & Municipal Building and the Fire Station. The requirements described are expected in the final delivery of the project Scope-of-Work.
2. Because this Scope-of-Work is for an existing facility, the Proposer shall visit and examine the Council Chamber Technology Systems and review the Construction Documents for formularization of the design intent and

work required. The Construction Documents show new equipment to be provided and the final expected configuration of each subsystem for Audio & Video system as a whole.

3. The flexibility of all these spaces and how easily they can be configure and combined in any combination is of the utmost importance to the City.

B. Police & Municipal Building & Fire Station, provide CATV RF City Cable Service Distribution System that meets or exceeds the following:

1. The Contractor shall extend the CATV RF City Cable Company Service from the existing main building DMARC to each "1+V" symbol jack locations as shown on the Construction Drawings. The Contractor shall at their discretion utilize 75 ohm ½" hardline or 75 ohm RG-11 cable as needed to maintain adequate signal strength to a multi-port tap(s) to be located in the IDFs or above accessible ceiling.
2. The Contractor shall provide any necessary CATV amplification or equalizer for balancing the signal to supply the CATV jacks with a minimum of +2Dbm signal.
3. From the CATV RF multi-port taps the Contractor shall feed the CATV RF jacks shown on the project drawings as "1+V" with 75 ohm 100% shielded RG-6 Coax Cable.
4. The Contractor shall be responsible for calculating the CATV RF distribution system loss and amplification necessary to meet the above requirements. The system shall be part of the submittal package for the project. Acceptable Equipment shall be Blonder Tongue or equal.

C. Police & Municipal Building

1. System upgrades for the Council Chamber Scope-of-Work are, but not limited to, the following:
   a. Update the Council Chamber Audio & Video Systems per the Construction Drawings.
   b. Provide and mount two Video Projectors shown as "P2" locations
   c. Provide two motorized Projection Screens for the "P2" Projectors
   d. Configure the re-built Dais & Staff Tables as shown in the construction drawings with Microphones, Input / Output audio & video connectivity plates, multi-button Control Panels and,
   e. Replace the existing Dais Table 4:3 flat panel monitors with 16:10, 19" Diagonal Monitors.
   f. Reuse existing monitor mounts in the base proposal. But as a proposal Alternate provide new HumanScale M8 mounts to replace the existing mounts.

g. Provide an Audio DSP/Mixer with associated power amplification

h. Provide a Digital Media STP matrix Switcher with required DM Transmitters & Receivers.

i. Provide coaxial type ceiling mounted loudspeakers, shown as “S2”s.

j. Provide a Crestron Control System with Custom Software and Touch Panel user interface.

k. Provide two Pan, Tilt, Zoom 720P cameras, one at the front and one at the rear of the room. Cameras shall be controlled from the Control System software.

l. Mount Council Chamber Audio & Video Equipment in Storage Room A122 in 6’ 4-Post Equipment cabinet.

m. Provide and locate on the side wall just above Staff Table 2 an ATS Digital CC2001 wall mounted Clock. This clock shall normally display the current time. From the Crestron Touch Panel a control operator shall be able to select a countdown timer function for the clock. By inputting the duration time in minutes, the clock shall count down from the input number of minutes to “00:00”, when the Clock reaches “00:00” the Crestron software shall trigger a doorbell chime using a contact closure. This chime shall be audible in the Council Chamber. The Contractor shall provide a Nutone Model LA600WH MP3 Doorbell.

n. The Contractor shall provide at the rear wall of the Council Chamber two (2) audio and video connections for press connectivity from the system. The audio and video shall be the same as heard in the ceiling sound reinforcement loudspeakers and the video will automatically follow any source being sent for presentation to the video projector. The Contractor shall provide a custom wall plate with needed Audio & Video Distribution Amplifiers.

2. Council Chamber Custom Software for the Crestron Control System

a. The Contractor shall provide the custom control system software written by one of the pre-approved Crestron Programmers. Programmer qualifications shall be submitted to the Consultant for review prior to contract. Preapproval must be received in writing.

b. The Contractor shall be responsible for delivery of fully functional control system software.

c. The Contractor and Subcontractor (Programmer) shall meet with the Consultant Dan Gable of E&A for software program planning meeting(s) as may be required. The Contractor shall document the software requirements in detail and provide an outline of expected features and functions for review prior to final programing, this shall include proposed touch panel page layouts. The defining of the

Software features and functions shall be a collaborative process with the Consultant and with sufficient number of meetings as needed for the Contractor gains understanding of the functionality expected in the final product.

d. The Contractor shall be solely responsible without additional charge to the Owner for the developing final fully functionality and bug-free control system software.

3. Meeting Room A121, provide:
   a. At the "P1" location a video projector with ceiling mounting system ready for use.
   b. Ceiling recessed manual Video Projection Screen 16:10 ratio
   c. (2) audio & video input connectivity plates at AV3 locations
   d. Projector multi-button wall control panel with volume control knob
   e. "S2" coaxial ceiling mounted loudspeakers
   f. Digital Media Video Switcher and Audio Amplifier
4. Meeting Room A107, provide:
   a. At the "P1" location a video projector with ceiling mounting system ready for use.
   b. Ceiling recessed manual Video Projection Screen 16:10 ratio
   c. (1) audio & video input connectivity plates at AV3 locations
   d. Projector multi-button wall control panel with volume control knob
   e. "S2" coaxial ceiling mounted loudspeakers
   f. Digital Media Video Extender Receiver
   g. Room Audio Amplifier
5. Meeting Room A109, provide:
   a. At the "L1" location a Chief LSTU ThinStall LCD TV Mount
   b. At the "L1" location a Chief PA516 Wall Box for LCD TV
   c. At the "L1" location a CATV RF City Cable Service Drop
   d. (1) audio & video input connectivity plates at AV1 location
   e. Projector multi-button wall control panel with volume control knob
6. Meeting Room A126, provide:
   a. At the "L1" location a Chief LSTU ThinStall LCD TV Mount
   b. At the "L1" location a Chief PA516 Wall Box for LCD TV
   c. At the "L1" location a CATV RF City Cable Service Drop

d. (1) audio & video input connectivity plates at AV1 location

e. Projector multi-button wall control panel with volume control knob

7. Lobby A119, provide:

a. At the "L1" location a Chief LSTU ThinStall LCD TV Mount

b. At the "L1" location a Chief PA516 Wall Box for LCD TV

c. At the "L1" location a CATV RF City Cable Service Drop

d. Projector multi-button wall control panel with volume control knob, locate the "WCP" for Lobby TV in Administration Room A129

e. Provide a Digital Signage Player Tightrope Media Carousel Solo 250 player for the Owner furnished LCD TV.

8. Fitness Room A166, provide:

a. (1) TASCAM CD-200SB Player

b. (1) Custom wall shelf for CD Player

c. (1) Audio Amplifier

d. (1) Premier Mount GB-STOR3 ceiling box for equipment

e. (1) wall control panel with volume knob

D. Fire Station

1. Training Room A108, provide:

a. At (3) "P3" locations a video projector ceiling mounting system ready for Owner's use and Owner Furnished video projectors.

b. (3) Ceiling recessed manual Video Projection Screens 16:10 ratio for each "P3" projector location.

c. (2) audio & video input connectivity plates at AV3 locations

d. Wall mounted touch panel controller with volume control knob

e. Extron room controller

f. "S2" coaxial ceiling mounted loudspeakers

g. Digital Media Video Switcher and Audio Amplifier

2. Dinning / Day Room A113, provide:

a. (2) "L1" locations a Chief LSTU ThinStall LCD TV Mount

b. (2) "L1" locations a Chief PA516 Wall Box for LCD TV

c. (2) "L1" locations a CATV RF City Cable Service Drop

d. (2) audio & video input connectivity plates at AV2 locations

3. Projector multi-button wall control panel with volume control knob

4. Fitness Room A1138, provide:
    a. (1) TASCAM CD-200SB Player
    b. (1) Custom wall shelf for CD Player
    c. (1) Audio Amplifier
    d. (1) Premier Mount GB-STOR3 ceiling box for equipment
    e. (1) wall control panel with volume knob
5. Outside "S3" loudspeakers

2.05 EQUIPMENT

A. Herein and in the Construction Drawings can be found the required minimum AVS equipment requirements. Described are both technical performance specifications along with certain desired features and functions that the Contractor shall provide with their proposed system solution.
    1. The Proposer must state clearly in their proposal any exceptions to the equipment and or requirements found in the construction documents to that offered in the Contractors proposal.
    2. Additionally to exceptions, the Proposer shall list clearly any value added features and or functions their proposed equipment may offers over and above the stated minimums.
    3. AVS equipment provided and installed shall be as depicted or shown on the construction drawings, described herein this document or more specifically under the System Description above.
    4. The Contractor shall be aware that the construction documents in totality identifies the requirements and equipment required to deliver the desired performance, this means the written specifications, drawings, and associated equipment list or generally known in totality as the "Construction Documents."

B. Proposal Equipment List
    1. The Proposer shall provide along with their Proposal Bid Form Provide complete project material/equipment list for each device to be furnished. The Materials List is required to include the following completed categories the following:
        a. Quantity of item provided
        b. Manufacturer of item
        c. Model number of item

d. Description of item

e. Individual price of item

f. Extended price for quantity of items

g. Total of Proposal in the form of Lump Sum Amount

C. The Project Material / Equipment List shall be complete in detail and provided in XL spreadsheet file form and as a PDF document included and attached to the Proposal Form.

D. Contractor shall also furnish any ancillary equipment, devices, cables, connectors, and hardware necessary to provide a complete and functional system.

E. Provide:

1. All Equipment and Systems as depicted on the Project Construction Drawings.

2. All features and functions as described herein this document.

3. The Proposer shall provide one lump sum price for a complete turn-key-system installation per the construction documents. This lump sum price shall be inclusive of all work and material needed for fully functional systems.

F. The Proposer shall provide a lump sum price for each Alternate requested and list them separately from the base proposal lump sum price.

2.06 ALTERNATES

A. Alternates shall be identified clearly on the proposal with the associated Alternate number as listed below. State clearly if the alternate is an Additive or Deductive price to the base bid lump sum amount.

1. Provide the following:

a. Alternate # T-1: Provide a lump sum amount to furnish (13) new 22" widescreen 16:10 monitors with HDMI inputs and 1080p HD+ capable resolution. The new monitors shall be Viewsonic Professional VG2239m-LED 22" Monitors or equal. The Contractor shall remove and replace the existing 4:3 flat panel display monitors at the Dais Table, Staff Tables, and Lectern. If the Alternate #T-1 is not accepted, then as the Base Proposal Scope-of-Work the Contractor shall use the existing monitors.

b. Alternate # T-2: Provide a lump sum amount to replace the existing monitor mounts at the Dais Table with a Humanscale Model M8 mount.

c. Alternate # T-3: Provide a lump sum amount to provide the PENN-ELCOM CPU-87BLSLIM Lockable Mini-PC holder at each Dais Table and Staff Table seating position. The holder shall be placed under tabletop for Owner Provided Mini-PCs.

d. Alternate # T-4: Provide a lump sum amount to provide the complete Lectern as depicted on Drawing Sheet T5.14, complete with electronics as shown on Drawing Sheet T5.13.

e. Alternate # T-5: Provide a lump sum amount to remove from the base proposal the Ashly ne.2424 DSP mixer and replace with Lectrosonics Aspen Series Digital Audio Processor..

Part 3 - EXECUTION

3.01 EXAMINATION

A. The Contractor's responsibilities

1. Examine all related construction documents and ensure compliance to them.
2. Examine and coordinate the installation schedule to comply with contracted timeline.
3. Examine the facility and construction documents to the extent necessary to plan for efficient installation strategies prior to the delivery of materials to the site or the commencement of work.
4. Failure to make the required examinations shall not result in any additional charges to the Owner.

3.02 INSTALLATION

A. Requirements and Responsibilities

1. The Contractor shall furnish, deliver, transport, erect, install, configure, and connect completely all of the materials and equipment described herein, found or depicted on the construction document package and drawings. The Contractor shall supply all other incidental material required, such as interconnecting cables, connectors, and hardware to make the work complete and leave all systems in first class operating condition.
2. The Contractor shall make this a “Turnkey Project” ready for the Owner’s use.
3. Coordinate with other trades working in the facility to provide seamless installation.
4. In the event of any conflicts, delays or improper preparatory work by other trades or existing conditions, notify the General Contractor, Consultant and Owner.

5. Provide cut-in boxes or approved clamping rings where back boxes are required but not provided by Electrical Contractor.
6. The Contractor shall coordinate their requirements for proper ground system to all equipment.
7. Coordinate and verify with the Electrical Contractor, the installation of needed cable raceways
8. The Contractor shall not use any other trade's work or material for support or fastening. Example: ceiling grid support wires cannot be used to support cable hangers, etc. Any exceptions shall be noted or coordinated in writing with the General Contractor.
9. The Contractor shall not shoot, fasten, or screw hangers to the roof deck. Any exceptions shall be noted or coordinated in writing with the General Contractor.
10. The Contractor shall coordinate clearance for cable paths and coordinate clearance for access above cable tray to easily add or remove cable from the cable tray they install.
11. A Contractor installing any equipment shall be responsible for providing all interconnecting cables to and/or between same equipment that may be required to make equipment fully operational.
12. Equipment shall be fabricated with equipment mounted into racks, enclosures, and consoles and be fully wired and tested, before delivery to job site.
13. With the installation of equipment and cables, consideration shall be given not only to operation efficiency but also to overall aesthetic factors to comply with industry standards and practices.
14. Contractor's construction, fabrication, installation, or delivery of materials must comply with applicable standards and practices.
15. The Contractor shall coordinate and field-verify the electrical rough-ins provided for their use by the Electrical Contractor.
16. The Contractor shall remove and replace cabling that is found to have been stretched or pulled past the recommended pulling tension during installation.
17. The Contractor shall install all operational software, as required by equipment and ensure that such software is fully functional and operational. In the event of software conflicts due to upgrades, bugs, or other reasons, the Contractor shall provide solutions suitable to Owner at no additional cost.
18. The Contractor shall be responsible for coordination with Owner's staff the software configuration options of software configurable systems.

19. The Contractor shall provide to the Owner keys for all lockable equipment installed.
20. The Contractor shall provide all passwords for any system or equipment that may use or be locked with a password.

B. Procedures & Methods

1. The Contractor shall provide rack shelves or rack mounting ears for any equipment that is not rack mountable. All equipment installed using shelves shall be fastened to the rack shelf. If Velcro is used to fasten any equipment, the Velcro must be fastened with screws. Adhesive is not an acceptable means to fasten any equipment.
2. Supplementary equipment within equipment racks, such as special assemblies that are not rack mountable or fastened to rack shelves shall be mounted on painted black high grade wooden boards running vertically on side rails of equipment racks. The same wooden strips shall also be used to support cable tie support bars for lacing cables to equipment.
3. Equipment shall be mounted into racks and consoles, and fully wired and tested, before delivery to job site.
4. Equipment and enclosures shall be mounted plumb and square in relation to the structure.
5. Devices, wire raceways, and equipment, except for portable equipment, shall be permanently attached to equipment racks or building structure and held firmly in place with screws or fasteners. Adhesives alone shall not be accepted as fasteners.
6. All equipment mounting boards in head-end rooms, MER's, electrical, or TR closets shall be painted white or black as location dictates with fire retardant paint. The mounting boards shall be made of high-grade plywood.

C. Wire and Cable Requirements

1. Cable installation must follow related TIA/EIA standards and recommendations, including methodology as noted in TIA/EIA 569 - Part 4.6 Ceiling Pathways. Specifically, including sections 4.6.1 General, 4.6.2 Design Guidelines, and 4.6.5 Cable Support.
2. All equipment rack wiring and cabling shall be neatly laced, ends dressed with heat shrink tubing, and all cables shall have service loops between the horizontal tie bar and the connection to equipment. Rack cabling shall be adequately supported with tie wraps or Velcro wire wraps and horizontal support bars to rack frame as it enters or exits the front or back of equipment.
3. There shall be no unmarked cables at any place in any part of any system this includes both in equipment racks and outside of equipment racks.

Label markings codes used on cables shall correspond and be shown clearly on as built drawings

4. All cables shall be separated into like groups according to signal or power levels and routed separately to eliminate signal contamination and cross-talk, this includes both in equipment racks and outside of equipment racks.
5. All power cables, control cables, and high level cables shall be grouped to one side of the equipment rack while low level cables shall be grouped to the other side.
6. All cables within equipment racks will use Velcro wire wraps to manage and bundle cables. Velcro strips will be no more than a ¼" wide.
7. All cabling located above ceilings shall be tied off to and supported by ceiling supports or other structures at a minimum of eighteen inches above the ceiling.
8. Cabling shall be placed in conduit where exposed in gym roof joist. Exposed cables shall not be allowed.

D. Equipment and Cable Labels:

1. All cables, regardless of length, shall be marked with indelible color-coded labels that have unique identifying number that corresponds with those found on the schematic diagrams and as-built drawings.
2. Labels shall be directly hot stamped or factory-stamped with closed sleeve method. Adhesive strip labels may only be used if protected by transparent heat-shrink tubing.
3. Marking codes used on cables shall correspond and be shown clearly on as-built drawings.
4. Provide all proposed wording and / or numbering scheme for labeling to the Consultant for review and written approval prior to procurement or installation.
5. All wall plates shall be labeled with Input and Output identifications and referenced to corresponding operational software or hardware it serves.
6. All labels used must be permanent and secure. Provide labeling as follows unless otherwise noted in a specific section:
   a. Provide engraved Lamacoid labels at the front of all equipment mounted in the racks. Labels shall indicate equipment type and model number and correspond to the As-Built drawings for equipment identification.
   b. Mount labels on the equipment rack, not on the equipment, and attach in a neat, plumb, and permanent manner. The labels shall be placed on the equipment rack vertical frame (post). If the equipment rack vertical posts have a recessed mid-section, then match label width to fit this recessed section.

c. Labels shall be uniform in size. All adjacent labels shall be sized to match the other labels used for same purpose. Similarly, provide engraved labels of like size in other locations.

d. Provide engraved Lamacoid labels on each equipment rack rear door or console rear panel reading "No user serviceable parts. Refer service to qualified technician."

e. Embossed adhesive labels are not acceptable.

f. All label lettering shall be a minimum of .08" high. Embossed adhesive labels are not acceptable.

g. Position at the left side front top rack space of each equipment cabinet a label that states the name of system Installer with contact information and at the right side a label that states the Design Consultant with contact information.

h. Unless otherwise noted, labels on dark panels shall be black with white letters. Labels on stainless steel or brushed natural aluminum plates or light colored panels shall be white with black lettering.

i. All wall plates shall have input and output connectors labeled in a professional and permanent manner, no hand written labels shall be accepted.

j. Cable and Jack labels shall include room identification with unique cable number, jack location within the room, and MER or TR number.

k. The Contractor shall use actual room identifications in their labeling scheme. Contractor shall obtain written approval from the Owner for the actual room numbers, and labeling scheme, to be used prior to installation.

l. Switches, connectors, jacks, receptacles, outlets, cables and cable terminations shall be logically and permanently marked in a manner approved by the Consultant.

m. Custom panel nomenclature shall be engraved, etched, or screened. Markings for these items are purposely detailed in the construction drawings to ensure consistency and clarity. Verify markings and placement with the Consultant prior to procurement. Submit label sample layouts for Project Consultant's review.

n. All terminal blocks, rack mounted equipment, and active slots of card frame systems shall be clearly and logically labeled in a manner acceptable to the Consultant.

o. All labeling information shall appear on the As-Built drawings as device and equipment cross-reference identifier and servicing aids.

E. Connections and Connectors

1. Connections shall be made with approved connectors on cables, terminal blocks, or punch blocks. Crimp style connectors shall be made with proper crimping tool. Two point crimps will not be accepted.
2. RF cable connectors shall be made with hex crimp.
3. Cables shall be terminated with the proper connector specifically produced for use with each type of cable.
4. Video connectors that are not of solder type (HDMI, BNC, RCA, F, etc.) shall be terminated using a crimp tool or dies designed specifically for the connectors being applied.
5. XLR type connectors shall be wired with pin 2 high, pin 3 low, and pin 1 shield.
6. Mechanical connectors must be specially made for type of cable or wire used.
7. Connector adapters will not be allowed in any part of the system.
8. Twist on connectors shall not be allowed.
9. Solder joints will be made with rosin-core solder.

F. Interconnection

1. Contractor shall make all system interconnections as necessary, as indicated on the Drawings, or specified herein.
2. Contractor shall provide power and control cables to and from power supplies, remotely controlled equipment and other devices even though such cables are not explicitly indicated on Drawings or listed in equipment tables.

G. Cable Management

1. Cabling located above ceilings shall be tied off to and supported with cable hangers fastened directly to the structure.
2. Where a cable is installed inside desk or other furniture, a means of protecting the cables and holding cabling to a fixed surface shall be provided.
3. Holes in horizontal furniture surfaces for cable pass-through shall be provided with appropriate sized grommet. Grommet shall be black unless otherwise specified.
4. Provide Service Loops with ample cable at each termination so that plates, panels, and equipment can be removed for service, re-termination or inspection. Provide the following as a minimum:
   a. Wall plate outlet box: minimum of ten (10) inches from wall surface to jack.

b. Termination panel: Six (6) inches behind termination panel from cable tie to jack.

H. Equipment Racks

1. Install all rack-mounted equipment using steel 10-32 machine screws with Phillips large oval heads or Allen head drives. Screws must have a black oxide finish, and plastic cup washers to protect the equipment panel finish.
2. Provide wire and cable management at the front of equipment and wire and cable support bars at the rear of equipment. Support bars will be used to tie cables for strain relief before connection to the accompanying equipment. Provide sufficient service loops between support bars and equipment.
3. Unused open front rack spaces in equipment racks must be filled with black rack blank spacers (not vents). Equipment rack vents shall only be used at top and bottom of the rack.
4. Place all rack devices requiring adjustments, cleaning, or similar attention so that they will be accessible for such attention.
5. Equipment racks shall be positioned to permit full access for operation and service. This means clearance for door swing and service technician at both front and back of equipment rack.
6. Equipment racks and sensitive components shall be placed so that signals will not be contaminated by induced electromagnetic and electrostatic noise from other electrical devices.
7. All wire and cable to and from the equipment racks shall run across the top of the racks on a ladder cable tray mounted with standoffs from the equipment rack or hung below the ceiling.
8. As a general practice, all power cables, control cables, and high level cables shall be grouped to one side of the equipment rack while low-level cables are on the other side.

3.03 CONSTRUCTION

A. Required typical system mockups

1. The Contractor shall build typical mockups as required and complete in detail for review by the Owner and Consultant prior to their final equipment install in the rest of the facility. Once reviewed and accepted, this mockup shall be the approved configuration model to install in the remaining locations. Mockups for this project include but are not limited to the following:

   a. Video Monitor at Dais Table complete with mounting arm

   b. New 4.3” Touch Panels and existing multi-button panels placed on FSR DSKB series tabletop boxes

c. Proposed changes to Touch Panel pages of the Crestron Control System

B. Special Techniques

1. Network Devices

a. Coordinate with the Owner's IT staff the assigned data port numbers for use with any Network Devices of the system.

b. Most of the Data Network system devices (black boxes) that makeup the IP signal platform are what is commonly called "Network Appliances". Each box will likely require a data network port number and IP; the Contractor shall coordinate with the Owner and configure the following:

i. Device IP Address

ii. Network Subnet Mask

iii. Default Gateway

c. V-LANs are required for control system data traffic and will require coordination with the Owner's IT staff.

2. The Contractor installing infrared devices shall be aware of other infrared devices and infrared interference in the facility and take whatever precautions necessary to avoid this causing problem to other equipment operations. For example, cover all IR receiver sensors.

3. The Contractor installing any RF devices shall be aware that RF devices may cause interference to the equipment and take whatever precautions necessary to avoid causing interference.

3.04 MANUFACTURER'S FIELD SERVICE & CALIBRATIONS

A. Not Used

3.05 PROTECTION AND CLEANING

A. Equipment

1. The Contractor shall coordinate with other trades to provide an acceptable environment for installed equipment. For example, provide a dust free environment for VCRs, laser disk players, CD players, etc.

2. Cover installed equipment racks for protection during high dust periods.

3. Do not operate equipment with fans during high dust periods of the installation.

4. Coil and protect cabling from damage prior to termination to equipment

B. Prior to system turnover to Owner:

1. Remove all dirt and debris from equipment racks and equipment rooms.

2. Clean all equipment filters, vents, and fans.

3. Clean all enclosures and back box interiors thoroughly before installing plates, panels, or covers.

3.06 CLOSE OUT & QUALITY CONTROL

A. The Contractor will not receive written acceptance of work and materials until the Contractor provides written release of lien to the Owner.

B. The following should be complete and in place before final system inspection & demonstration is scheduled and performed with the Owner's Consultant:

1. Provide written detailed substantial completion reports of system testing
2. Dust, debris, solder splatter, etc. is removed
3. Cables are dressed, routed, and labeled with heat-shrink tubing over label at ends
4. Connections are confirmed consistent with regard to polarity
5. Equipment operation tested and operating normally
6. Equipment software is installed and configured
7. Electronic devices are properly grounded
8. Devices requiring AC Power are Powered and from the proper circuit
9. Test each AC power receptacle for proper hot, neutral and ground connections
10. Interconnecting patch cables and jumpers are in place
11. The system documentation is complete with "as- built" drawings available
12. To the best of the Contractor's knowledge, all contractual system specifications are fully met, in detail and intent.

C. TESTING & ADJUSTING

1. The Contractor will be responsible for adjusting the installed system and notifying the Consultant when system adjustments have been completed:
   a. In accordance with Construction Documents
   b. As required, to provide the Owner a fully functional system at system turnover
   c. As directed by the Consultant
2. Audio System Equalization
   a. Using a Real-Time audio frequency spectrum analyzer, such as Audio Control SA-3052 or equivalent, with both 1/3 band and narrow band display, equalize all loudspeaker systems to provide a suitable frequency response as follows:

i. Flat from 60 Hz to 2 kHz + or – 1-1/2db with a 1db per 1/3 octave roll off after 2K

ii. Load and save the final normal settings in the DSP as preset one and record same settings including system gain and amplifier level settings in the As-Built Project Manual

3. Notification: When above tests have been completed and system is ready for inspection, notify Consultant in writing at least seven working days prior to inspection. Include in this notice copies of all data recorded, date each test was completed and results of each test. All test data shall be available during inspection process.

3.07 DEMONSTRATION

A. The final acceptance, with proof of performance and operational verifications for the installed Audio & Video Systems shall be the responsibility of and performed by the Contractor in the presence of the Consultant and Owner's representative.

B. Final acceptance shall be in accordance with Construction Documents, General Conditions, and Division 27 Technology General Requirements.

C. The Contractor shall notify the Consultant 10 day's prior substantial completion and intended schedule for the final acceptance walkthrough demonstration.

D. Acceptance Testing shall include, but not be limited to the following:

1. Demonstration of all system operations to the Consultant as the Owner's representative.

2. A minimum of two (2) installation technicians provided by the Contractor to assist the project Consultant, as required, during final test verification and final acceptance demonstration.

3. The technicians shall be equipped to perform necessary corrections to the system. They Contractor shall provide test equipment capable of testing any and all parts of the equipment, cabling, or systems.

4. The minimum required test equipment shall include but not be limited to the following:

a. Three (3) two-way radios, that covers the area of testing, for communications between Contractor and Consultant

b. Multi test meter for reading AC / DC Voltage, Amperage, Resistance, and continuity

c. Sound level meter calibrated in db with A, C, and flat filters

d. Audio Tone Generator and audio signal tracer

e. Calibrated Pink Noise Generator

f. Real Time Audio Analyzer (RTA)

g. Audio acoustical pulse polarity / phase tester

h. Computer with installed device software and connecting cables, example DSP

5. The Contractor shall be responsible for equipment adjustments to ensure normal and proper operation. Owner required system adjustments will be made by the Contractor as directed by Owner or Project Consultant during final testing

6. During the final acceptance walkthrough the Contractor shall demonstrate operation of each major component and functional requirement as specified herein.

7. If any portion of the system does not appear to be functioning properly during the final acceptance walkthrough the Contractor shall do further test, along with corrective actions that may be immediately possible. If the need for further corrections or corrective actions does not resolve the issue the demonstration, at the Consultant's discursion, shall be discontinued until the system operates properly.

8. The Contractor shall remain responsible for all equipment, labor, hardware and documentation, in part and in total, until Owner accepts such work or material in writing.

3.08 OWNER'S TRAINING

A. Training Requirements

1. Owner Training of the completed installation is an important part of the overall success of this project and therefor the installing Contractor shall provide comprehensive system training to the Owner as defined below and with the minimum training hours as specified.

2. Prior to scheduling or delivering Owner Training confirm the following:

a. System as-built documentation must be provided for review to Owner and Consultant.

b. System final walkthrough inspection must be completed.

c. Training materials and program outline must be provided and approved by the Owner / Consultant.

d. Training schedule must be coordinated with the Owner and Consultant.

3. Training is to include:

a. Detailed training plan that meets approval by the Consultant and the Owner

b. Practical and comprehensive operation of system

c. Basic system troubleshooting techniques

d. Digital Video file of each training session. Furnish two edited copies to the Owner

4. Training Hours

a. The Owner reserves the right to establish training times, duration, and training topics within the total training time allotted. Training Session Blocks, as defined below, can at the Owner's request be combined in any combination

b. Provide each group of users, as defined below, with the minimum training hours as specified.

c. Training time shall be defined as those hours specifically set-aside for the sole purpose of training City personnel. Credited time shall not be given for time spent providing instructions to the Owner's staff for a system not completed or that has not passed final acceptance by the Owner and Consultant, or training performed outside of the approved training plan.

d. The Contractor shall issue a certificate of training completion to the trainees, upon completion of their training. Both the trainer and trainee(s) must sign the certificate before Contractor shall receive final payment.

e. The Contractor shall provide a minimum of (8) eight hours of Owner training. This training shall be divided into training session "Blocks" as coordinated with the Owner.

f. The first block session will consist of a two-hour training period and occur when the basic system comes on line. This training shall primarily be intended for the common system operators.

g. The second block will consist of a two-hour training period and will occur as directed by the Owner. This training session shall be structured for high-level users, for example staff champions that will provide instruction to other users.

h. The third block will consist of a two-hour training period to assist the staff champions with training the end users. This training shall consist of a training session structured for Advanced System Configuration and Operational Knowledge needed to maintain and manage all systems. It shall include basic troubleshooting skills.

i. The fourth training session shall be structured as requested by the Owner. Unless otherwise directed, provide a minimum of four (2) two hours of special in-service training for City's maintenance personnel. This training shall cover system overview and any special

maintenance requirements. The owner will designate the personnel to attend this training and the systems to be covered.

5. Training sessions shall cover at a minimum:
   a. Basic System Configuration and Operation Knowledge
   b. Advance System Configuration and Operation Knowledge
   c. Typical system usage
   d. Typical User troubleshooting skills
   e. Service and maintenance requirements
6. The Owner reserves the right to establish training times, duration, and topics.

END OF SECTION

SECTION 27 41 80 – AUDIO DSP CONFIGURATION

PART 1 – GENERAL

1.01 REFERENCE

A. The provisions of Sections 27 00 00, 27 40 00, 27 41 00, the Bidding and Contract Requirements, drawings and appendices are included as a part of this section as though bound herein.

B. Additional Reference Standards

1. Copyright Act of 1976
   U.S. Copyright Office
   101 Independence Ave. S.E.
   Washington, DC 20559
   Phone: (202) 707-3000

2. ANSI/InfoComm 1M-2009
   Audio Coverage Uniformity in Enclosed Listener Areas (ACU)
   American National Standard Institute
   1819 L Street NW, Washington DC 20036
   Phone: (202) 293-8020Scope Summary

C. Provide, install, configure, and test Digital Signal Processing systems as part of an integrated audiovisual system.

1.02 DEFINITIONS

A. Configuration: the software and firmware programming that defines and creates the functionality, levels, presets, and settings of DSP devices.

B. Configure: To define functionality, levels, presets, and settings of DSP device(s) using software and/or firmware.

C. Programmer: Contractor personnel engaged in developing the configuration of DSP systems.

D. DSP: Digital Signal Processing, or Digital Signal Processor.

E. AEC: Acoustic Echo Cancellation.

F. Fixed Architecture: Referring to DSP software providing fixed processing paths with adjustable processing objects in a predetermined sequence.

G. Open Architecture: Referring to DSP software providing infinitely variable Programmer selected processing paths with adjustable processing objects arranged in any sequence deemed appropriate by Programmer.

H. End-User: Individual who will ultimately use the completed system.

1.03 QUALIFICATIONS

A. Training: Programmer shall have received manufacturer-provided and/or manufacturer approved training in the configuration of the DSP systems being provided.

B. Certification: Programmer shall hold highest available certification(s) offered by the manufacturer(s) of the DSP hardware.

C. Submittal: Certification certificate shall be submitted with DSP submittals.

1.04 FUNCTIONAL REQUIREMENTS

A. Functions: The DSP shall be configured to provide:

1. Pre-amplification
2. Filtering and Equalization
3. Dynamics processing
4. Gating
5. Mixing, Automatic mixing – gain sharing or gated
6. Zoning
7. Mix-minus
8. Delay
9. AEC
10. Volume control
11. Emergency/Alarm muting
12. Signal metering
13. Logic functions

B. Gain Structure: The DSP shall be configured to obtain and maintain unity gain structure from input pre-amplification stage to output stage or associated end-user volume control.

C. AEC: The DSP shall be configured to provide AEC for all microphones detecting echo in conferencing and specialty DSP applications. AEC shall be configured per DSP Manufacturer's recommendations and best practices.

D. AEC and Pre-AEC: Where microphones used for speech / sound reinforcement are part of a conferencing system requiring AEC processing, the "Pre-AEC" audio path shall be utilized for speech / sound reinforcement while a separate path processed for AEC shall be utilized for conferencing.

E. Organization: Referring to open-architecture DSP platforms. Processing objects shall be clearly labeled and organized clearly to follow the intended signal path from left to right, top to bottom. Connection lines between objects shall be routed in an organized fashion.

F. Multiple DSP: Where designs include more than one DSP linked via virtual multi-channel audio buss or digital audio network, all signals shall be routed to a central processor for master routing and 3rd party control. All control points being controlled by ICS controls shall be located on a single DSP operating as the master unit.

G. Latency: Also known as propagation delay, Programmer shall utilize sufficient and efficient processing paths to achieve intended results whilst minimizing latency from input to output.

1.05 DSP CONTROLS

A. ICS: Refer to Section 27 41 70 for Integrated Control System (ICS) programming requirements.

1. Contractor shall coordinate work of ICS Programmer and DSP Programmer.

2. Volume controls shall be range limited within DSP to provide end-user with adequate adjustment range (typically +/-6dB for microphones and +/-10dB for presentation sources). Operation of DSP from end-user standpoint shall be seamless with ICS system operation.

3. Processing objects within Audio DSP configuration shall be clearly identified where controlled by ICS. Text objects or similar shall identify these objects.

1.06 IT COORDINATION

A. General: Where connection between components or control features are accomplished over the Owner's LAN, Contractor shall coordinate with Owner's IT department for IP addresses, firewall access, and other issues pertaining to successful integration.

B. Permission: It is Contractor's responsibility to obtain necessary information and permissions to implement their system. Any delays or problems with gathering information or coordinating access to the LAN or WAN shall be brought to Consultant immediately for resolution.

1.07 OWNERSHIP

A. General: Upon completion of the project, all configuration of DSP devices shall be property of Owner.

B. Property Rights: Contractor assigns to Owner any and all intellectual property rights and applications made by Contractor, or its agents or employees in connection with the performance of this contract. Contractor also acknowledges and agrees that services rendered in connection with the performance of this contract shall be a "work made for hire" within the meaning of Section 201 inventions of the Copyright Law of 1976.

C. Passwords: Contractor shall not use any passwords to prevent access to Audio DSP configuration files in submittal formats.

1.08 DELIVERABLES

A. Pre-Installation Submittals: Contractor shall supply the following to Consultant for review within 15 business days of contract award:

1. Configuration file for audio digital signal processors (DSP), drafted in DSP manufacturer's provided software.

2. Processor power required of DSP shall not exceed 95% total processing capacity.

   a. If processing power required exceeds available processing power, Contract shall immediately notify Consultant during pre-installation phase.

3. Copy of manufacturer configuration software, or link to manufacturer website download page for accessing configuration software.

   a. Version: Submitted software shall be identical version used to create Audio DSP configuration.

4. Layouts of physical and virtual user controls in graphical format. This shall include:

   a. Engraved buttons and overlays

   b. Machine-printed adhesive labels

   c. Graphical user interfaces for touch panels or web interfaces.

B. Closeout Submittals: Contractor shall submit the following to Consultant prior to final inspection:

1. Two (2) copies of all Audio DSP configuration on one of the following media formats:

   a. CD-R

   b. SD card

   c. USB thumb drive

2. Immediately prior to final inspection, in the presence of Consultant and/or Owner representative, Contractor shall load DSP program from Closeout Submittal media and demonstrate full system functionality.

1.09 QUALITY ASSURANCE

A. Contractor shall verify complete functionality prior to scheduling inspections with Consultant, including but not limited to:

1. ICS control functionality, verification of presets, volume controls, mute controls, etc.
2. Stable operation, completely free of feedback and distortion throughout entire range of available ICS controls.
3. Correct routing of all signals to intended destinations.
4. Unity gain structure.
5. Output transducer (speaker) protection processing functionality.
6. AEC functionality.
7. Provide measurement test results per ANSI/InfoComm 1M-2009 ACU.
8. Outdoor sound system measurements shall be provided at a minimum of one measurement location per 50 seats. Measurements shall be performed using pink noise test signal at a volume congruent with nominal system operation. Measurements shall indicate:
   a. Site plan map of seating areas and test locations.
   b. Frequency response from 80Hz-16kHz in 1/3 octave resolution.
   c. SPL (A weighted) of the test signal as measured from each location.
   d. Weather conditions at time of test; including temperature, humidity and average wind speeds.

1.10 UPGRADES

A. Firmware: Firmware upgrades shall be dated the same as Date of Acceptance. Contractor shall upgrade firmware and software as necessary during project so that latest versions are installed as of Date of Acceptance.

PART 2 – PRODUCTS

2.01 PRODUCT SPECIFICATIONS

A. General: Contractor shall provide product as identified in Appendix A. Contractor shall detail price for programming under Appendix A.

B. Hardware: Contractor shall supply equipment, accessories, cable, and connectors necessary for system to operate according to stated functional requirements, whether or not said products are named in Appendix A.

C. Software: Contractor shall utilize Manufacturers official current version of configuration software. Special exemption may be obtained from Consultant if current version contains known issues. In such event, the version immediately preceding shall be utilized.

D. Control Interfaces: shall be labeled or configured with graphical user interface as appropriate.

PART 3 – EXECUTION

3.01 EQUIPMENT LOCATION

A. DSP hardware shall be housed with equipment detailed in Section 27 41 00.

3.02 TRAINING

A. Refer to Sections 27 40 00 and 27 41 00.

END OF SECTION

SECTION 27 41 70 – INTEGRATED CONTROL SYSTEMS

PART 1 – GENERAL

1.01 REFERENCE

A. The provisions of Sections 27 00 00, 27 40 00, 27 41 00, the Bid and Contract Requirements, drawings and appendices are included as a part of this section as though bound herein.

B. Additional Reference Standards

1. Copyright Act of 1976
   U.S. Copyright Office
   101 Independence Ave. S.E.
   Washington, DC 20559
   Phone: (202) 707-3000

1.02 SCOPE SUMMARY

A. Contractor Responsibility: Provide, install, program and configure fully functional Integrated Control System (ICS).

B. Software: All versions shall be current as of date of substantial completion.

1.03 AESTHETIC REQUIREMENTS

A. Printing: Button labels shall be engraved where applicable, or machine-printed where now engraved button/bezel is available. Handwritten labels are not acceptable.

B. Graphics: Icons and graphic representations of equipment and functions shall be crisp, sharp, and easy to identify. Icons shall be used wherever possible.

C. Text: ICS screens shall not use uncommon abbreviations. Text shall be sans serif and shall be sized to be clearly readable.

1.04 IT COORDINATION

A. General: Where connection between components or control features are accomplished over the Owner's LAN, Contractor shall coordinate with Owner's IT department for IP/MAC addresses, firewall access, and other issues pertaining to successful integration.

B. Permission: It is Contractor's responsibility to obtain necessary information and permissions to implement their system. Any delays or problems with gathering information or coordinating access to the LAN or WAN shall be brought to Consultant immediately for resolution.

1.05 OWNERSHIP

A. General: Upon completion of the project, all programming and configuration of control hardware, touch panels, and other devices shall be property of Owner.

B. Property Rights: Contractor assigns to Owner any and all intellectual property rights and applications made by Contractor, or its agents or employees in connection with the performance of this contract. Contractor also acknowledges and agrees that services rendered in connection with the performance of this contract shall be a "work made for hire" within the meaning of Section 201 inventions of the Copyright Law of 1976.

C. No Passwords: Contractor shall not use any passwords to prevent access to code files except as specified herein.

1.06 DELIVERABLES

A. Pre-Installation Submittals:

1. Screen layouts for each/any ICS application screen.
2. Hard button layouts for each ICS/ICT/ICB device.
3. Button layouts for each screen layout/page.
4. Descriptive write-up of function(s) of each button on each page.
5. Engraving/labeling detail for buttons.
6. Contractor shall make changes as requested by Consultant in pre-installation ICS review.
7. Integrated Control System review shall be done via WebEx conference with Consultant.

B. Closeout Submittals: Contractor shall demonstrate the freshness of control systems and DSP programming code by providing all project ICS and DSP programming on CD-R or USB Flash Drive and loading programming files from closeout CD-R / USB Flash Drive at commencement of final inspection. Following the final inspection, Contractor shall provide the following:

1. Three (3) copies of all project ICS programming on CD-R or USB Flash Drive. Deliver two (2) sets to Owner, one (1) set to Consultant.

1.07 UPGRADES

A. Firmware: Firmware upgrades shall be current as of Date of Acceptance.

PART 2 – PRODUCTS

2.01 PRODUCT SPECIFICATIONS

A. General: Contractor shall provide product as identified in Appendix A.

B. Hardware: Contractor shall supply equipment, accessories, cable, and connectors necessary for system to operate according to stated functional requirements, whether or not said products are named in Appendix A. If Contractor wishes major additions to be given special consideration, part numbers, quantities, and line item pricing may be listed under Bid Exceptions.

PART 3 – EXECUTION

3.01 EQUIPMENT LOCATION

A. ICS equipment shall be housed with equipment detailed in Section 27 41 00.

3.02 CONFIGURATION

A. Contractor shall configure software to meet all functional requirements.

B. Contractor shall make adjustments to programming as required by Consultant up to issuance of substantial completion punchlist at no additional charge, so long as changes relate to equipment in this bid package.

3.03 TRAINING

A. Refer to Sections 27 40 00 and 27 41 00.

PART 4 – TESTING

4.01 TESTING

A. General: Contractor shall check the functionality and programming of system prior to substantial completion inspection. Any programming bugs shall be fixed prior to that inspection.

B. Demonstration: Contractor shall demonstrate all system control functions during substantial completion inspection.

END OF SECTION

SECTION 27 51 13 – OVERHEAD PAGING SYSTEM (OPS)

PART 1 – GENERAL

1.01 SCOPE-OF-WORK SUMMARY

A. Unless otherwise noted, the term "Contractor", "Proposer" or "Vendor" maybe used interchangeably herein and refers to the respondent submitting a proposal for this RFP.

B. This specification section includes related work for the following Leon Valley City project:

1. Renovation of the Fire Station

C. This Section Scope-of-Work includes

1. Provide necessary services to integrate each component, cable or device depicted or described collectively in the totality of the Construction Documents into a fully functional package with seamless functionality.
2. Provide all devices and services necessary for a complete installation and operational system.
3. Integrate into the construction existing or owner furnished equipment and miscellaneous hardware as may be described herein.
4. Maintain timely installations according to the project construction schedule.
5. Provide Owner System Training, As-Built documentation, and project manuals.

C. Overview of work includes but is not limited to the following:

1. Provide for the Fire Station Facility a General Multi-Zone Public Address System, hereafter referred to as "PA".
2. The PA shall provide:
   a. A minimum of 24 user programmable distributed loudspeaker zones
   b. A minimum of 24 zone groups
   c. For compatibility with analog telephone interface and direct connection to loop start and ground start trunks of a PBX or Key port
   d. Allow for two-way communications (talk back)
   e. Emergency All-Facility Override Paging
   f. Control of auxiliary relays and contact closures
   g. Background music input

h. A minimum of 250 watt power amplification

i. Acceptable system shall be Bogen Model PCM2000 or equal

1.02 GOVERNING REFERENCES & RQUIREMENTS

A. The provisions of Section 27 00 00 and the Bidding Requirements and Contract Requirements are included as a part of this section as though bound herein.

B. Description: The scope of this project covers the provision, installation, wiring, and interconnection of paging speakers.

C. The following are general provisions, requirements and expectations of the Technology Contractor delivering Audio & Video Systems equipment and installation for this construction package:

1. This document is intended to provide all hopeful Vendor(s) / Contractor(s), hereafter referred to as the Proposer, with information it needs to submit a complete Turnkey solution and proposal for the Leon Valley City, hereafter referred to as the City. The City will evaluate the submitted proposals to select a perceived Best Value Vendor to supply and install the Audio & Video Systems for this project as described herein.

2. The work performed shall be of professional quality and installed as would normally be expected by a professional Audio & Video Contractor in the primary business of providing quality installations of equivalent systems.

3. The Proposer shall furnish their lump sum price offer to provide a turn-key package in response to the Audio & Video systems specified herein and further defined in the associated Construction Documents.

4. The Contractor shall provide a 100% performance bond, payable to the Owner, until written acceptance by the Owner of all work and materials. The cost of these bonds shall be included in the Contractor's proposal price and shown by separate line item.

5. The City shall accept proposals from both manufacturers and authorized resellers of products and systems specified herein and desire to have a competitive choice of local authorized reseller / manufacturers to find the best value for delivery of the systems.

6. The Proposer's proposal response shall include provisioning, installation, configuration, training and warranty support for all systems furnished and provide the City a fully functional system.

7. The Successful Proposer's responsibilities shall include but are not limited to the following:

a. Provide, install, and make fully functional the systems made up of equipment, cabling, devices, and hardware described in this Construction Document and found in Appendix "A" attached hereto.

b. Systems will include a complete Audio & Video System with sound reinforcement, video projection, media / press interface, broadcast video, archival equipment, and Master Control Automation for the Council Chamber, Board Conference Room, and Training Rooms.

c. Furnish necessary services to integrate each system component into a fully functional package with seamless functionality as described herein.

d. Integrate into the construction any owner furnished equipment and miscellaneous hardware as may be described herein.

e. Maintain timely installations according to the project construction schedule

1.03 DEFINITIONS

A. Section 27 00 00 – E&A General Technology Requirements

B. General Construction common words, acronyms, and phrases found herein this specification and construction documents shall be as defined by and in accordance with AIA Document A201, Fifteenth Edition, 1997.

C. Specific special use of common words, acronyms, and phrases found here in this document shall use the following definitions:

1. "Owner" shall refer to the City of Leon Valley.

2. "Consultant" shall refer to Elert & Associates

3. "Successful Contractor" shall imply the Vendor or Contractor that is awarded the project scope of work described herein and enters into a written contract with the Owner or General Contractor to deliver said work.

4. "Proposer" shall mean Vendor, Contractor or Subcontractor that submits a proposal to deliver the scope of work described herein this construction document package.

5. "Lump Sum" shall refer to a total amount to deliver full scope of work described inclusive of all materials and labor.

D. "AVS" shall be an acronym for Audio & Video Systems.

1.04 RELATED DOCUMENTS

A. References to the following related documents do not limit or release the Contractor from the responsibility of having the necessary knowledge of other non-referenced related documents that makeup the Construction Document Package.

B. The following Contract Documents are hereby made a part of this Section:

1. AIA Document A201, Fifteenth Edition, 1997

2. Division 1 Documents found in the Project Manual

3. Division 27 documents that collectively make up the Construction Package including:

a. Section 27 00 00 General Technology Requirements

b. Section 27 40 00 AV-Multimedia General Requirements

c. 27 10 00 Structured Cabling Infrastructure

4. Work diagrammatically shown or noted on project drawings

5. Other documents that collectively make up a part of this Construction Document package.

1.05 RELATED WORK

A. References to the following specific related work do not limit or release the Contractor from the responsibility of coordination with other trades, or from having the necessary knowledge of other related work.

1. Work provided by Owner or Owner's Contractors

2. Work by Electrical Subcontractor

a. The Project Electrical Contractor will install electrical rough-in for use by the OPS Contractor and their devices. The OPS Contractor shall have the specific responsibility to fully coordinate their needs with the Electrical Contractor for their equipment AC Power, Back Box Type & Dimensions, Raceway & Pathways

b. The OPS Contractor shall examine construction documents for familiarization of the provided Electrical Rough-in by the Electrical Contractor

c. Needed Electrical back boxes, raceways, and pathways not provided by the Electrical Contractor, but needed for the OPS scope of work shall be the responsibility of the OPS Contractor unless noted to the contrary

1.06 ALTERNATE & ALTERNATIVE PROPOSALS

A. Not used.

1.07 PAYMENT PROCEDURES

A. Terms: Unless stated otherwise in the contract between the Owner and the Contractor, the Owner shall pay the Contractor on a monthly basis for work completed, based on inspection and sign-off by the Owner or Owner's Agent, up to eighty percent (80%) of the total contract amount. The remaining twenty percent (20%) shall be paid upon Final Acceptance.

B. Application: Payments to the Contractor shall be made only after the Contractor has issued the proper Application for Payment. Pay request must be on the Consultant's supplied AIA form(s). Contractor's Application for Payment must be provided:

   1. On AIA Document G702 with AIA G703 support page

   2. In accordance with governing AIA Document A201, Fifteenth Edition, 1997

C. The Owner or Owner's representative must review and sign the Contractor's Application for payment prior to payment being issued.

D. The Contractor's payments shall not be processed if any of the following conditions exist:

   1. Contractor's submittals are not provided or current as required herein.

   2. Contractor's work is not in compliance with the specification.

E. Application for payment has not been submitted on the proper form and with required support documentation Contractor shall submit for approval by the Owner and Consultant a "Schedule of Values" on the form AIA G-703 prior to the first application for payment. Retainage shall be 5% of the scheduled contract value for each item listed in the "Schedule of Values." "Schedule of Values" shall include separate lines for each category of the work with separate values for materials and labor

1.08 SUBMITTALS

A. General Requirements

   1. Provide a full electronic file copy in PDF format of all required paper document submittals. The PDF Files shall be delivered on Thumb-Drive and / or Electronically via a "DropBox.com" or equivalent.

   2. Contractor shall provide four (4) copies of submittals required prior to procurement of equipment or commencement of work.

3. Contractor shall submit FULL System Shop Drawings as described herein to the General Contractor and Consultant for review within (30) thirty days from the date of the contract. Failure to comply with this requirement may be cause for cancellation of the contract without penalty or cost to the Owner / General Contractor.

4. Present submitted documents in a clear and thorough manner, include original drawings that illustrate diagrammatically Contractor's intent to assemble, construct, fabricate, build, and supply the systems and equipment as described by the collective specifications.

5. Product Data Sheets (Cut-Sheets) are only required on products that differ from that which is specifically specified. This includes a revised model number or part number, replacement model, or that differ in any way from devices described herein.

6. Submit only pages that are pertinent; mark each copy of standard printed data to identify pertinent products, referenced to Specification Section and Article number. Provide required performance standard information, descriptive characteristics, capacities and wiring requirements for system control.

7. Modify manufacturer’s diagrams and schematic drawings to supplement standard information and provide information specifically applicable to the Work.

8. Omit information on product cut sheet not applicable to this project

9. Identify each detail element of drawings by reference to full drawing sheet number.

10. Submit where applicable any and all finish options for prior approval where not specifically specified.

11. Title each drawing with the project name, drawing name, installing Contractor’s name, and Consultant’s name Elert & Associates.

B. Submittal Conditions

1. The Contractor shall not consider the Consultant or Owner’s review of submittals to be exhaustive or complete in every detail. Approval of shop drawings or submittals including substitutions indicates only the acceptance of the Contractor’s apparent intent to comply with general design or method of construction and quality as specified. The finished product must meet functional requirements, operations, arrangements, and quantities and comply with the contract documents unless specifically approved to the contrary.

2. The Contractor shall be held responsible for delivery of systems as specified any errors or omissions in the submittals shall not relieve said

Contractor of responsibility to deliver complete systems as specified, that fully meets or exceeds the minimum requirements set forth by the specifications, drawings and contract documents.

3. The Contractor shall be responsible for deviations in submittals from the requirements of Contract Documents, unless Consultant gives specific written acceptance specifically identifying such deviation. The Consultant shall review and stamp submittals for general conformance to design intent only. This stamped review alone does not imply any specific written acceptance of deviations.

4. Submittals that, in the Consultant's opinion, are incomplete, deviate significantly from the requirements of the Contract Documents, or contain numerous errors shall be returned, without review, for rework and are to be re-submitted.

5. Submittals of front end shop drawings and other items shall not be in more than two (2) partial submittals, or as allowed by the Consultant. Do to the complexity of the systems the consultant reserves the right to require full Submittals prior to Submittal Review.

6. If shop drawings are rejected for any reason, the Contractor shall correct and resubmit within seven (7) working days. The Contractor shall always be required to obtain stamped approval of submittals prior to any fabrication or installation of equipment.

7. The submittals must be received and stamped reviewed by the Consultant prior to procurement of equipment or commencement of work. Any prior work performed is at the Contractor's own risk.

8. Failure to obtain shop-drawing approval within forty five (45) days of contract award, where the delay is due to the poor performance of the Contractor, may be cause for cancellation of the contract without penalty to Owner / General Contractor.

9. Do not fabricate products or begin work that requires submittals until return of stamped reviewed submittals with Consultant acceptance. If work does progress prior to this, the Contractor shall have proceeded at his or her own risk.

10. Any Contractor noted corrections, changes, and additions, as may be necessary to the design document drawings, shall clearly show any such changes by a noted cloud around the change.

C. Front End Submittal Requirements

1. Complete project material list for each item and or device to be furnished. The Materials List is required to include the following categories:

   a. Quantity provided

b. Manufacturer name

c. Model Numbers

d. Product Description

e. Product value in the form of cost to the project

2. Product Data Sheets (Cut-Sheets) are only required on products that differ from that which is specifically specified. Product Cut-Sheets for each item furnished shall be submitted as follows:

   a. As 8-1/2" by 11" product catalog specification sheet from the manufacturer

   b. Neatly bound in a three-ring binder and divided by manufacturer with tab dividers

   c. The front of the binder shall include a material list as described above

   d. The products shall be organized in the binder such that they match the materials list order

   e. Where more than one item appears on a page, the Contractor shall mark the appropriate item, for easy identification

   f. Submit only pages that are pertinent, delete or mark through information not applicable, mark each copy of printed data to identify pertinent products

   g. Reference pertinent products to Specification Section and Article number, if more than one Section of work.

   h. Highlight reference standards, performance characteristics, capacities, component parts, finishes; and dimensions

   i. Modify manufacturer's standard schematic drawings and diagrams to supplement standard information and to provide information specifically applicable to the work or scope

3. Construction Drawings:

   a. Comprehensive system drawings with device locations overlaid on project floor plans, system schematic diagrams in block format, and detail of all custom fabrications including but not limited to device wall plates. Drawings shall be prepared and submitted on E Size 24" x 36" paper.

   b. Drawings shall be executed at an appropriate scale as the project would require to clearly read pertinent detail, but for equipment layouts not smaller than 1/4" = 1'- 0" and the floor plans and reflected ceiling plans, not smaller then 1/16" = 1'-0".

c. The shop drawings shall include: Identification of equipment manufacturer, equipment model numbers, cable types, cable identification numbers, cable color codes, cable paths, plate and panel details, consoles and enclosures' details. Additionally, equipment rack layouts showing locations of all rack-mounted equipment, comprehensive system schematic block diagrams (one-line drawings showing device connectivity), equipment rack elevations and custom fabricated equipment.

d. Shop drawings that depict all devices and device locations to be installed.

e. Shop drawings that depict all cabling infrastructure to be installed. Cabling shall be overlaid on floor plan drawings.

f. Comprehensive system schematic wiring diagrams showing detailed point-to-point connections to and between all equipment.

g. Elevation drawings showing intended equipment room layouts.

h. Elevation drawings showing intended equipment rack layouts. The equipment rack layouts shall show locations of all rack mounted equipment and identification of equipment as shown on the system schematic diagram.

i. Detail drawings showing intended fabricated equipment, custom work, and wall plates, etc.

j. Complete wire and cable riser diagram showing path and location of all cable to and between equipment; this cable shall be overlaid on facility floor plan. Include cable types, cable identification numbers, and color codes.

4. Plate or panel details:

a. Drawings shall include examples of proposed nomenclature and labeling scheme intended for use in labeling plates, equipment, cables, etc.

b. Connector numbering, e.g. "Mic # 1, Mic #2, used as examples in Construction Drawing set shall be submitted in full sequential numbering between plates as proposed to be installed. The Contractor is responsible for receiving review approval from Consultant prior to ordering.

c. Detail dimensional drawings of custom plates or panels.

d. Consoles, enclosures or support tables.

5. Wire and Cables

a. The Contractor shall provide their intended Wire and Cable color code strategy for the cabling between equipment. The Contractor must receive approval of color code prior to ordering cabling.

b. Provide complete wire and cable riser diagram showing pathways and locations of all wire and cables to and between equipment. The cabling infrastructure shall be overlaid on facility floor plan.

D. Project Closeout Submittals (As-Built Documents)

1. General

a. When the Contractor considers installation substantially complete, provide to Consultant a written report listing all known system deficiencies compared to specified requirements. Also furnish a timeline for correction of any deficiencies.

b. Submit a written report detailing the results of initial adjustments and verification tests including all relevant drawings, charts, and photographs. This report shall be completed and submitted for review at least five (5) days prior to acceptance verification walkthrough by the Owner and Consultant.

c. The Contractor shall provide written request, requesting a final acceptance walkthrough and demonstration. This request shall certify Contractor's declaration of completion with the project and that to the best of their knowledge all systems are installed and fully functional and ready for review by Consultant.

d. Submit one complete copy of each manual and other closeout documents for review ten (10) days prior to the final acceptance walkthrough.

e. At the time of the walkthrough, the Contractor shall transfer and turnover to the Owner's or Owner's represent the following:

i. All ancillary and portable equipment such as microphone cables, patch cables, microphones, camcorders, spare equipment, etc.

ii. An installable and actual copy of all software used and or created for the system including the source code.

iii. Passwords

iv. Keys

f. After the walkthrough review, make any noted corrections and / or additions required by Consultant. Provide corrected copies of final as-built documents.

g. Closeout Submittals shall be bound in three-ring binders with clear vinyl pockets on cover and spine for title cards with project name and

manual volume numbers. Provide table of contents and tabular dividers with legends for each section.

h. Closeout Submittals shall be printed originals, not photocopied, unless more copies of a manual are required than the number of units used in the system. For custom circuits or modifications, provide a thorough description of the purpose, function, specifications, and operation

2. System Documentation, prepare the following system manuals and other information to accompany the finished installed system. These documents shall be provided prior to the final acceptance walkthrough with the Consultant:

   a. System Operations Manual(s)

   b. System Service Manual(s) and Maintenance Instructions

   c. As-built Drawings and other Documents

   d. Proposed Training Documentation and Materials

   e. Test Reports and Results

   f. Statements of Contractor's Warrantee

3. The System Operations Manual shall assume the reader to be technically inexperienced and unfamiliar with the operation of the system. This manual shall step a user through common and typical use of each system or subsystem. The manual shall include the following:

   a. Overall system operation and instructions

   b. Complete and typical operating procedures for the equipment by activity

   c. "Quick Setup" instructions for use by inexperienced users working under time pressure

4. Service Manuals & Maintenance Instructions include clear statements of:

   a. Original Manufacturer's Instruction / Technical Service Manuals for all equipment. Instruction manuals shall be printed originals, not photocopied, unless more copies of a manual are required than the number of units provided

   b. The terms and coverage period of the Manufacturers' and Contractor's warranty

   c. Contractor's service department phone number(s) and hours

   d. Required maintenance schedules for any equipment

   e. Instructions for the proper maintenance of products

f. Instructions for the Owner to obtain service on installed systems and equipment

g. For custom circuits or modifications, provide a thorough description of the purpose, function, device modification, and operation

h. Provide a list of correct settings for all semi-fixed controls (this shall be finalized after acceptance testing)

i. Any other pertinent data generated during the project or required for future service.

5. System As-Built Documents

a. Provide complete and corrected as-built drawings at the time of final system testing and Consultant / Owner demonstration.

b. Original submittals shall be updated to become As-built drawings at the closeout of the project.

c. Prior to final walkthrough of completed job, the Contractor shall supply one (1) corrected as-built set of Drawings showing the work as installed. Consultant, with any necessary noted corrections that may be required, shall return this drawing set to Contractor. Contractor shall have corrected the installation work as noted and have updated the drawings and have them present at final walkthrough. Upon final acceptance by Owner, the Contractor shall provide five (5) copies of as-built drawings and manuals.

d. The Contractor shall also furnish to Owner a copy of the complete set of electronic CAD files, in DFX or DWG format, along with a complete PDF file copy of all As-Built drawings.

e. Include as part of the As-built drawings the original submittals with updates to reflect the actual installed work.

f. Any other pertinent data generated during the project or required for future service.

6. Owner Training

a. Contractor shall provide a proposed Owner training plan for installed systems for review by Consultant prior to Owner Training

b. Training plan shall comply with training requirements found herein under the Owner Training Requirements.

7. Test Reports and Results

8. Warranty Information

a. Warranty information: Include clear statements of the terms and coverage periods for all equipment.

b. Provide Contractor's service department phone number(s) and hours, maintenance schedule and description of products recommended for use in maintenance.

9. The Contractor shall complete and deliver to the Owner a warranty card for each piece of equipment covered by manufacturer's warranty.

1.09 WARRANTY

1. Warranty/Maintenance Program

   a. All materials, equipment, parts and labor shall be guaranteed (warranted) for a minimum warranty period of two years (24 months).

   b. Warranty period shall begin immediately following the date of final acceptance in writing by the Owner and Project Consultant.

   c. During the first two (2) year Warranty period, all warranty repairs shall include parts & labor.

   d. The Proposer shall, upon notification of any malfunction, make the necessary repairs, including labor and materials, at no cost to the Owner.

   e. Contractor's Warranty shall include the following provisions:

      i. Contractor's statements of long-term commitment to the sales and service of their products in the project's geographic location.

      ii. The Contractor shall warrant that the system(s) shall be provided free from defects and shall perform under usual usage and with continued service for a period of two years after written final acceptance by the Owner or Consultant.

      iii. The Contractor guarantees replacement of all defective materials, parts, components, equipment, including labor, free of charge to the Owner during the Warranty period, when made necessary from normal usage and / or wear.

      iv. The Contractor shall provide on and off site technical support, software patches, and labor for any necessary site repairs.

      v. The Contractor shall provide a full service office, capable of troubleshooting and repairing any system failure in a timely fashion as required by these specification documents

      vi. Warranty service shall be delivered within regular facility access hours set forth by the Owner

2. The Warranty more specifically, shall be provided in accordance with the following:

    a. For major system failures: "major system failures" are failures that prohibit the use of a typical system function in one or more instructional spaces or pose a life safety concern. Such failures are considered a major impact to the Owner. The Contractor shall provide service correcting the impact within eight (8) hours after notification by the Owner or his representative and no later than the next business day if the notification falls after noon of the notification date

    b. For minor system failures: "minor system failures" are failures that do not inhibit typical system usage in an instructional space or pose no life safety concern. The Contractor shall provide service within forty-eight (48) hours, after notification by the Owner or his representative.

    c. The Owner reserves the right to make the final determination of major or minor system failures and the right to coordinate the best times for service of any system failure.

    d. The Contractor shall supply Service Request forms and or proper contact procedure to the Owner with instructions for proper notification of the Contractor for warranty service. By following said instructions, the Owner shall constitute proper notification for any need warranty service.

3. The Contractor shall provide an optional extended one-year warranty as an Owner Alternate option. The extended one-year warranty shall extend the warranty for one additional year and cover all technology systems that are a part of this specification package. The warranty shall be equal to the base 2 year warranty described above and shall include on and off sight technical support, materials, software patches, and labor for any necessary site repairs.

4. The Contractor shall offer this extended warranty price to the Owner for their acceptance up to and including thirty days after basic warranty expiration. The Contractor shall be responsible for contacting the Owner in writing 30 days prior to the expiration of this offer. Failure to do so shall constitute an extension of the extended warranty offer.

PART 2 – PRODUCTS

2.01 PRODUCT REQUIREMENTS

A. The Contractor is bound by the intent of these Specifications to provide a complete and functional technology system as described herein, of high professional quality and reliability, and that meets or exceeds standards that are currently established for such systems.

B. Provide all necessary labor, materials, tools, transportation, services, ancillary items, and coordination to furnish the Owner a complete and fully functional turnkey installation as described herein.

C. The Contractor warrants that they will provide professional services, to meet or exceed performance standards and industry recommendations that relate to the scope of work under contract, and that the workmen or system installers are experienced and regularly in the business of installing such systems as specified herein.

D. All work shall be in accordance with the respective drawings, written specifications, supplemental information, industry standards, manufacturer specific installation procedure, trade practice, and applicable regulatory agencies.

E. The Contractor(s) shall thoroughly familiarize themselves with complete construction documents, Proposal package information and all necessary details of the complete set of drawings and specifications before submitting their Proposal.

F. Ancillary and Accessory Items

1. The Proposer shall provide ancillary and required accessory items necessary to furnish to the Owner a complete and fully functional system.

2. The exclusion of / or limitation in the language used in the drawings or specifications shall not be interpreted as meaning that ancillary or accessories items of work or equipment necessary to complete or make the installed system fully functional can be omitted.

3. The mention in writing or representation by depiction materials, services, or operations within this specification document and or Proposal package is binding upon the Proposer to include and provides such items, services, and operations without additional charge to Owner. Exceptions shall be noted by the acronym (NIC) “Not In Contract” or (OFE) “Owner Furnished Equipment.” If this notation does not appear, then the Proposer shall assume the need to provide the item in question.

4. The Proposer shall receive no allowances because of omissions in work due to unfamiliarity or their misunderstanding of Proposal package.

G. Drawing Symbols

1. The project scope drawings utilize symbols and schematic block diagrams to indicate various items of work. Neither of these has any dimensional significance nor do they delineate all items that may be required for the intended construction and installation.

2. The work shall be installed in accordance with the intent diagrammatically expressed on the drawings and described in the written specifications. The Proposer shall not make limiting interpretation that provides for incomplete work or a non-functioning system.

H. Document Discrepancy

1. In the event of an inconsistency or discrepancy that may exist in or between parts of these Construction Documents, the following direction shall be followed and shall govern:

   a. The document, section, phrase, or requirement with better quality, more stringent requirement, or greater amount or quantity of work or material shall apply and shall be expected, delivered and used. Such work or material shall be provided by the Contractor and installed at no additional cost to the Owner.

I. Omissions

1. The omission of or express reference to any part(s) necessary for or reasonably incidental to a complete and fully functional system and installation as intended shall not be construed as a release from the Proposer providing and installing such parts.

2.02 MANUFACTURERS

A. Governing Clauses

1. It is not the intent of these specifications to limit or restrict submission of proposals for products or systems by manufacturers other than those specified.

2. The products specified are intended to establish a minimum baseline of operational, functional, and performance based system expectations that all proposed products must meet or exceed by features, functionality and quality.

3. The Owner reserves the right to govern over and proclaim whether proposed products are equal to the specified system standards.

4. If the proposed system does not meet all of the features or functions described herein, then the Proposer shall identify and list those exceptions in their proposal submittal by separate cover titled “System Exceptions” in red letters.

5. The Proposer shall not be automatically disqualified for not meeting one or more requirements. The Owner shall evaluate proposals on their overall value; all proposals shall be fully considered for best value.

6. Reference to specific equipment manufacturers does not imply that all products produced by that manufacturer meet the specification requirements.

2.03 EQUIPMENT

A. Paging Speakers

1. All speakers shall operate from a 70-volt distribution system.
2. Speakers shall have audio and physical characteristics that are compatible with the total system.
3. Ceiling Speakers
   a. Have an 8” speaker frame.
   b. Have a universal transformer.
   c. Have 7” color coded wiring pigtails.
   d. Have a white finish.
   e. Have tile bridge, back can and baffle.
4. Areas without dropped ceiling tile the contractor shall hang speaker and backbox with wire rope.
5. Ceiling speakers shall be AMK or as shown on construction drawings or prior approved equal.

B. Wall Mount Speakers

1. Wall Speakers shall…
   a. Be high density polypropylene.
   b. Have 4” LF driver.
   c. Have removable color coordinated grill.
   d. Have a black finish.
2. Wall speakers shall be EV EVID 4.2 or approved equal.

C. Cable

1. Cable shall be provided and installed that meets manufacturer recommendations for equipment and signal types that are being transmitted.
2. Terminations: Provide specialized terminating hardware as required.
3. Cable shall…

a. Be CMP-rated.

b. Have a 100% coverage Aluminum Foil-Polyester Shield.

c. Have 16 AWG copper stranded conductors.

D. Amplifiers

1. The contractor shall supply and install appropriate number and size amplifiers to ensure amplifiers will normally be operating at no more than 70% of the rated power. The installation shall meet manufacturer recommendations.

2. Amplifiers shall…

a. Be completely solid state and have screw type connections for all inputs and outputs.

b. Be wall mountable.

c. Have a black finish.

3. Amplifiers shall be Bogen TPU100B, Bogen TPU250 or approved equal as required per listed performance requirement.

E. Multi Zone Controller

1. Contractor shall provide and install the following Bogen control devices:

a. One (1) PCMCPU – Central Processor Unit

b. One (1) PCMTIM – Telephone Interface Module

c. One (1) ZPM3 – 3 Zone Expansion Module

i. Adjust dipswitch to low power for 70-volt system.

d. One (1) DFT120 – Digital Feedback Terminator

e. One (1) Pro-4 Prerecorded Message Player (for duress button message)

f. One (1) VAR1 – Voice Activate relay (for duress button message)

i. VAR1 shall be connected to override port of PCMTIM.

2. Contractor shall be responsible for a complete functional overhead paging system.

F. Audio Baluns

1. In the event of ground loop problems causing noise over paging system, this contractor shall provide and install any/all necessary Audio Baluns to correct the problem.

G. Proposal Equipment List

1. The Proposer shall provide along with their Proposal Bid Form Provide complete project material/equipment list for each device to be furnished. The Materials List is required to include the following completed categories the following:

   a. Quantity of item provided

   b. Manufacturer of item

   c. Model number of item

   d. Description of item

   e. Individual price of item

   f. Extended price for quantity of items

   g. Total of Proposal in the form of Lump Sum Amount

2. The Project Material / Equipment List shall be complete in detail and provided in XL spreadsheet file form and as a PDF document included and attached to the Proposal Form.

3. Contractor shall also furnish any ancillary equipment, devices, cables, connectors, and hardware necessary to provide a complete and functional system.

4. Provide:

   a. All Equipment and Systems as depicted on the Project Construction Drawings.

   b. All features and functions as described herein this document.

   c. The Proposer shall provide one lump sum price for a complete turn-key-system installation per the construction documents. This lump sum price shall be inclusive of all work and material needed for fully functional systems.

   d. The Proposer shall provide a lump sum price for each Alternate requested and list them separately from the base proposal lump sum price

PART 3 – EXECUTION

3.01 PROJECT RECORD DOCUMENTS

A. Shop drawing submittals shall show:

1. Confirmation of equipment mounting locations

2. Schematic block diagram of interconnection of all components

B. A complete set of equipment manuals shall be kept and organized in 3-ring binders for each system. The contractor shall write a quick-reference guide covering normal system operation and basic troubleshooting procedures.

C. The Contractor shall compile a set of as-built drawings, with all changes clearly marked in red.

3.02 CABLES

A. Contractor shall install all speaker cables as necessary to connect speakers from amplifiers located in the telecommunication rooms. Contractor shall coordinate with Construction Manager for access to pathways and shall provide required pathways where necessary.

B. Cables shall be supported to building structure every 60".

C. Cabling shall be installed in a neat and orderly fashion.

D. 70-Volt speaker cabling shall not share cable pathways with voice/data cabling.

E. Cables shall have a ten-foot service loop located and supported within five feet of all speakers.

3.03 PAGING ZONES

A. Contractor shall install paging system using the following zones:

1. Up to 6 of the Owner's choosing.

3.04 CONNECTORS

A. Preparation: Cables shall be carefully prepared and connectors installed as directed by the manufacturer. Proper stripping devices shall be used.

B. Terminations: Connectors shall be carefully fitted to mating devices on equipment to avoid damage to mating contacts, inserts, or bodies. Specialized terminations shall be made in a neat and secure manner suited to the service of the wire and as directed by the manufacturer. In all cases where the manufacturer specifies the terminations, those terminations shall be used.

C. Termination Testing: The strength of the termination shall be tested by manually pulling on the connector and cable.

3.05 SYSTEM INTERCONNECTIONS

A. Complete System: Contactor is responsible for providing complete and functional paging system.

B. Paging System: The paging system headend shall be located in the MDF of each building. The paging system shall be connected to a trunk port on the PBX. Coordinate interface with PBX contractor.

C. High Voltage: Contractor shall coordinate with EC provision of high voltage power where necessary.

D. Manufacturer Instructions: All manufactured items, materials, and equipment shall be applied, installed, connected, erected, used and adjusted, as recommended by the manufacturers, or as indicated in their published literature unless specifically noted herein to the contrary.

3.06 CONTRACTOR'S TESTING PROCEDURE

A. Contractor shall be responsible for the following testing procedures:

1. Measure each area's Ambient Noise level during normal business operation.
2. Provide amplifier(s) and estimate speaker transformer tap values that provide acceptable performance without exceeding 75% of the amplifier's rated root-mean-square (RMS) power.
3. Acceptable performance is deemed to mean that a voice page is 6-7 dB over the Ambient Noise level when measured at 4 feet above finished floor. Make all necessary adjustments per owner and/or Architect/Consultant request.

B. This contractor is ultimately responsible to ensure the overhead paging system voice pages are 6-7 dB over the Ambient Noise Level in each area without exceeding 75% of the amplifiers' rated power.

C. Inspection: After Contractor's testing is complete and the system is properly adjusted, the contractor shall contact the owner to schedule a "spot test" of the system with the owner and Architect/Consultant. Contractor shall make changes/adjustments per owner and/or Architect/Consultant's request at no additional cost to owner. These adjustments may include but not be limited to:

1. Adjusting volume control of amplifier.
2. Providing a more powerful amplifier.
3. Adjusting local volume control of individual speaker.
4. Re-tapping up to 60% of speakers at different wattage.

3.07 INSPECTION

A. Contractor shall coordinate with Project Representative for inspection after Contractor has completed testing of entire system.

B. Contractor shall provide trained Contractor representative and testing equipment onsite during inspection to assist with spot verification of tests.

C. Contactor shall verify with Project Representative the precise positioning of speakers and shall make fine adjustments as requested.

END OF SECTION

SECTION 27 60 00 – PHYSICAL SECURITY GENERAL REQUIREMENTS

PART 1 – GENERAL

Unless noted otherwise, "Contractor" or "This Contractor" refers to the Physical Security Contractor.

1.01 REFERENCE

A. Provisions of Section 27 00 00, previous sections, and Construction Documents are included as a part of this section as though bound herein.

1.02 RELATED WORK

A. Section 27 00 00 – General Technology Requirements

B. Section 27 62 00 – Video Surveillance System

C. Section 27 64 00 – Electronic Access Control System

D. Section 27 66 00 – Intrusion Detection System

1.03 DEFINITIONS

A. Work: The provision of products and/or services to meet the requirements specified in these documents.

B. Consultant: Elert & Associates.

C. NIC: Not in Contract. Item will be the responsibility of others.

D. OFE: Owner Furnished Equipment. Item will be provided and integrated by Owner.

E. OFCI: Owner Furnished Contractor Installed. Item will be provided by Owner and installed by Contractor.

F. As Required: Contractor shall provide the quantity of said item that is necessary. Owner and Architect/Consultant reserve the right to make the final determination of necessary quantities to provide for a complete system.

1.04 SCOPE

A. This section describes the general product and execution requirements related to furnishing and installing Physical Security Systems. Physical Security Systems includes Video Surveillance, Electronic Access Control, Intrusion Detection Systems and their sub systems.

B. Contractor shall be responsible for providing complete and functional systems as described in this specification and project drawings.

C. Contractor shall provide low voltage power and control lines to and from power supplies, remotely controlled equipment, and other devices, even though not explicitly indicated on drawings or listed in equipment tables.

D. Contractor shall be responsible for any and all related programming and end-user training unless noted otherwise.

1.05 SHOP DRAWINGS & EQUIPMENT SUBMITTALS

A. In addition to the requirements set forth in 27 00 00 the following shall be followed for the physical security systems.

B. General: Bid documents, including drawings, details and specifications are considered conceptual in nature, and provide direction on products and project requirements. Contractor is given a choice of methods that may be incorporated into the system. These choices may affect the overall design, configuration and installation of the proposed system.

C. Contractor Responsibility: Prepare and submit shop drawings which show details of all work to insure proper installation of the work using those materials and equipment specified or allowed under the approved plans and specifications. A complete Shop Drawing submittal package shall consist of AutoCAD 2010 Drawings, Equipment Data Sheet Submittals in PDF and an Acceptance Testing Plan.

D. Completeness: The Equipment Submittals, Acceptance Testing Plan and the Shop Drawings shall be submitted as a complete package. Partial or unmarked submittals will not be accepted for review.

E. Requirements: Provide the following information complete, and in the manner described herein:

1. Hardware, Application Software, and Network Requirements: A system description including analysis and calculations used in sizing equipment required by the Access Control systems. The description shall show how the equipment will operate as a system to meet the performance requirements of the systems. The following information shall be supplied as a minimum:

   a. Server(s) processor(s), disk space and memory size

   b. Workstation(s) processor(s), disk space and memory size

   c. Description of site (field) control equipment (Controllers/Field Panels) and their configuration

   d. Operating System(s) Software, where software is provided or upgraded

e. Application Software, with Optional and Custom Software Modules supplied in this project

f. Integration Schemes: Proposed connectivity, software, development requirements, and SDK information, for inter-system communication.

g. Network reliability requirements

h. Number and location of LAN ports required

i. Number of IP addresses required.

j. Other specific network requirements, preferences, and constraints

k. Backup/archive system size and configuration

l. Start-up operations

m. Battery backup requirements

2. Shop Drawings: Shop Drawings shall accurately and distinctly present the following information:

   a. Title Sheets including:

      i. Project name, Project Number and descriptions

      ii. Submittal date and space for revision dates

      iii. Identification of equipment, product or material

      iv. Name of Contractor and Subcontractor

      v. Name of Supplier and Manufacturer

      vi. Relation to adjacent structure of material

      vii. Physical dimensions clearly identified

      viii. ASTM and Specifications references

      ix. Identification of deviations from the Contract Documents

      x. Contractor's stamp, initialed or signed, dated and certifying to review of submittal, certification of field measurements and compliance with Contract

   b. Summarized equipment list

   c. Floor Plans: Showing devices, pull boxes, cabinets, and conductors in their proposed locations with device numbering scheme.

   d. Single-Line/Block Diagrams: Show signal relationships of controls and devices within the system.

   e. Custom Assembly Diagrams: For each custom assembly such as Access Control Terminal Cabinets, receptacle assemblies, or door

control panels, provide an assembly drawing illustrating the appearance of the assembled device. Include dimensions, assembly components, and functional attributes.

f. Component Connection Diagrams

i. Show the wire designations on connectors (typical wiring detail where multiple of same device is provided).

g. Necessary details, including complete information for making connections between work under this Contract, existing work, and work under other Contracts.

h. Duplicate of design drawings may be used where each sheet is modified to reflect contractor coordination, specific requirements of the project and multidiscipline conditions.

3. Equipment Submittals

a. Provide a Parts List, for proposed equipment, materials, components and devices, listing the following information for each line item:

i. The system type

ii. Model number

iii. Specification sheet page reference

b. Provide Manufacturers Specification Sheet with descriptive information for equipment, materials, components and devices. Number each page, to correspond with the Parts List.

c. Clearly delineate (with highlighter, arrow, or underline) on each specification sheet, specific model numbers, options and configurations being proposed for this project.

d. Indicate kinds of materials and finishes for equipment where more than one option is presented.

4. Acceptance Testing Plan

a. Submit a written document detailing the test procedures to be followed in evaluating and proving the installed system(s).

b. Provide a sample of the test forms to be used for each system and for each component of each system.

c. Include all tests required by the equipment manufacturer and by this Specification.

5. Include when requested:

a. Spare Parts List: Submit a list of spare parts when specified.

6. Training Program

   a. The proposed training program shall be designed to provide a level of basic competence with the system for selected personnel. These selected personnel shall then be expected to train other personnel as required, utilizing the training that they have been given and the body of training documentation provided by Contractor. This plan shall comply with the requirements stated in the "Training" section, of these Specifications, all stated hours of which shall be considered to be classroom hours.

   b. Submit a curriculum to account for, and relate, each subject to actual training time. All required hours shall be accounted for in this curriculum.

   c. The training plan shall cover the overall system, each individual system, each subsystem, and each component. The plan shall also cover procedures for database management, normal operations, and failure modes with response procedures for each failure. Each procedural item shall be applied to each equipment level.

F. Timeliness: The Contractor shall schedule, prepare and submit a complete shop drawing assembly in accordance with a time-table that will allow his suppliers and manufacturers sufficient time to fabricate, manufacture, inspect test and deliver their respective products to the project site in a timely manner so as to not delay the complete performance of the work.

G. Departure from Contract Requirements: If shop drawings show departures from the Contract requirements, the Contractor shall make specific mention thereof in his letter of transmittal; otherwise review of such submittals shall not constitute review of the departure. Review of the drawings shall constitute review of the specific subject matter for which the drawings were submitted and not of any other structure, materials, equipment, or apparatus shown on the drawings.

H. Contractor Responsibility: The review of shop drawings will be general and shall not relieve the Contractor of responsibility for the accuracy of such drawings, nor for the proper fitting and construction of the work, nor for the furnishing of materials or work required by the Contract. No construction called for by shop drawings shall be initiated until such drawings have been reviewed and approved in their entirety.

I. Shop Drawing Submittal Review: The procedure in seeking review of the shop drawings shall be as follows:

   1. Drawings or descriptive data will be stamped "Reviewed", "Furnish as Corrected", "Revise and Resubmit", "Rejected" or 'Submit Specific Item'

and one copy with a Letter of Transmittal will be transmitted to the Contractor with the return of submitted documents.

2. If a shop drawing or data is stamped "Reviewed" or "Furnish as Corrected", no additional submittal is required for that shop drawing.

3. If a shop drawing or data is stamped "Revise and Resubmit" or "Rejected", the Contractor shall make the necessary corrections and resubmit the documents as required above. The letter transmitting corrected documents shall indicate that the documents are re-submittals.

4. If any corrections, other than those noted by the Owner, are made on a shop drawing prior to resubmittal, such changes shall be pointed out by the Contractor upon resubmittal.

5. The Contractor shall revise and resubmit the shop drawing as required, until they are stamped either "Reviewed" or "Furnish as Corrected."

6. The Owner will not issue a "Notice to Proceed" until shop drawings are reviewed, unless otherwise approved by the Owner.

J. The Contractor shall be responsible for extra costs incurred by the Owner caused by the Contractor's failure to comply with the procedure outline above.

1.06 NOTIFICATION

A. Contractor shall not shut off any existing systems. Contractor shall give the Owner at least 10 working calendar days' notice of any requirement to shut off or interfere with existing alarm, access control, regulating, computer or other service systems. The Owner will arrange and execute any shutdown. All work such as splicing where approved, connections, necessary to establish or re-establish any system shall be completed by Contractor in close coordination with the Owner.

1.07 INTERFERENCE WITH THE FACILITY

A. Transportation and storage of materials at the facility, work involving the facility, and other matters affecting the habitual use by the Owner of its buildings, shall be conducted so as to cause the least possible interference's, and at times and in a manner acceptable to the Owner. Contractor shall make every effort to deliver equipment per the schedule required by the project.

1.08 PERMITS AND INSPECTIONS

A. Responsibility: Obtain permits and inspections required for the work. Permit and inspection costs will be borne by the Contractor.

B. Performance: Perform tests required herein, or as may be reasonably required to demonstrate conformance with the Specifications or with the requirements of any legal authority having jurisdiction.

C. Review: Obtain approvals from authorities responsible for enforcement of applicable codes and regulations to establish that the work is in compliance with all requirements of reference codes indicated herein and required by the appropriate jurisdiction. Make corrections, changes or additions as required and deliver certificates of acceptance, operation, and/or compliance with the "Operating and Maintenance Manuals" as described herein.

1.09 SAFEGUARDS AND PROTECTION

A. Barriers: Provide and maintain suitable barriers, guards, fences and signs where necessary to accommodate the safety of others relative to and/or for the protection of this work.

B. Regulations: Comply with OSHA, Federal, State, and local regulations and standards pursuant to this work.

C. Protection: Protect all materials and equipment to prevent the entry or adhesion of any and all foreign material. If necessary, cover equipment with temporary protective material suitable for this purpose.

D. Finishing: Check, clean and remove defects, scratches, fingerprints and smudges if necessary from all equipment and devices immediately prior to Acceptance of the Installation.

E. Damage: Replace all damaged or defective material or work at no additional cost prior to Final Acceptance.

F. Documentation: Provide written description of accidents by workers, students and staff of any incident occurring on the project. Report incident in writing to Owners representative immediately and to the Project Manager for follow up.

1.10 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Delivery: Unless otherwise noted, pre-testing or configuration is required by the contractor, deliver materials to the job site in manufacturer's original containers, clearly labeled with the manufacturer's name and equipment model identification number.

B. Storage and Handling: Store and protect equipment in a manner which will preclude damage.

1.11 EQUIPMENT COMPATIBILITY REQUIREMENTS

A. While individual items of equipment may meet the equipment specifications and in fact meet the system specifications, the total system shall be designed so that the combination of equipment actually employed does not produce any undesirable effects such as signal distortion, noise, transients or crosstalk interference's when electrically associated with itself or other equipment.

1.12 OWNER'S RIGHT TO USE EQUIPMENT

A. The Owner reserves the right to use equipment, material and services provided as part of this work prior to Acceptance of the Work, without incurring additional charges and without commencement of the Warranty period.

PART 2 – PRODUCTS

Refer to individual sections.

PART 3 – EXECUTION

3.01 EXAMINATION OF SITE AND DOCUMENTS

A. Bidder shall examine all documents, shall visit the site(s) prior to submitting proposal, record their own investigations, and shall inform themselves of all conditions under which the Work is to be performed at the site(s) of the Work, including the structure of the ground, the obstacles that may be encountered, and all of the conditions of the documents, including superintendence of the Work, requirements of temporary environmental controls, the time of completion, list of sub-contractors, and all other relevant matters that may affect the Work or the proposal process.

B. Verify cable lengths comply with published standards.

C. Notify Owner/Consultant of installation that would exceed maximum lengths prior to installation of cable.

D. Contactor shall consult with Owner/Consultant regarding alternative routing or location of cable.

E. Do not proceed until unsatisfactory conditions have been corrected.

F. Failure to make the examination shall not result in any Change Order requests.

G. The Bidder shall base the proposal on the site(s) examination, materials complying with the plans and specifications and shall list all materials where the proposal form requires.

H. The commencement of work by the Contractor shall indicate acceptance of existing conditions, unless a written notice of exceptions has been provided to the Owner/Consultant prior to commencement.

I. If the Contractor observes, during preliminary examinations or subsequent work, existing violations of fire stopping, electrical wiring, grounding, or other safety- or code-related issues, the Contractor shall report these to the Owner/Consultant in a timely manner.

3.02 INSTALLATION REQUIREMENTS

A. Contractor shall furnish and install all cables, connectors, and equipment as shown on Drawings and as specified herein.

B. It is the Contractor's responsibility to survey the site and include all necessary costs to perform the installation as specified. This includes any modifications required to route and conceal horizontal distribution wiring.

C. Beginning installation means Contractor accepts existing conditions.

D. Contractor shall furnish all required installation tools to facilitate cable pulling without damage to the cable jacket. Such equipment shall include, but not be limited to, sheaves, winches, cable reels, cable reel jacks, duct entrance tunnels, pulling tension gauge, and similar devices. All equipment shall be of substantial construction to allow steady progress once pulling has begun. Makeshift devices that may move or wear in a manner to pose a hazard to the cable shall not be used.

E. All cable shall be pulled by hand unless installation conditions require mechanical assistance. Where mechanical assistance is used, care shall be taken to ensure that the maximum tensile load for the cable as defined by the manufacturer is not exceeded. This may be in the form of continuous monitoring of pulling tension, use of a "break-away," or other approved method.

F. The Contractor shall be responsible for identifying and reporting to the General Contractor any existing damage to walls, flooring, tiles, and furnishings in the work area prior to start of work. All damage to interior spaces caused by the installation of cable, raceway, or other hardware shall be repaired by the Contractor.

G. Repairs shall match preexisting color and finish of walls, floors, and ceilings. Any Contractor-damaged ceiling tiles, floor, and carpet shall to be replaced to match color, size, style, and texture.

H. Where unacceptable conditions are found, the Contractor shall bring this to the attention of the construction supervisor immediately. A written resolution will follow to determine the appropriate action to be taken.

I. Qualified personnel utilizing state-of-the-art equipment and techniques shall complete all installation work. During pulling operation, an adequate number of workers shall be present to allow cable observation at all points of duct entry and exit as well as to feed cable and operate pulling machinery.

J. Cable pulling shall be done in accordance with cable manufacturer's recommendations and ANSI/IEEE C2 standards. Manufacturer's recommendations shall be a part of the cable submittal. Recommended pulling

tensions and pulling bending radius shall not be exceeded. Any cable bent or kinked to radius less than recommended dimension shall not be installed.

K. All wiring shall be run "free-air," in conduit, in a secured plastic raceway or in modular furniture as designated on the Drawings. All cable shall be free of tension at both ends. PLENUM rated cable shall be used in areas used for air handling.

L. Avoid abrasion and other damage to cables during installation.

M. Pulling lubricant may be used to ease pulling tensions. Lubricant shall be of a type that is non-injurious to the cable jacket and other materials used. Lubricant shall not harden or become adhesive with age.

N. The cable system will be tested and documented upon completion of the installation as defined in the section below.

O. A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit or surface mount raceway. Should it be found by the Consultant that the materials or any portion thereof furnished and installed under this contract fail to comply with the specifications and Drawings with the respect or regard to the quality, amount of value of materials, appliances, or labor used in the work, it shall be rejected, removed, and replaced by the Contractor and all work distributed by changes necessitated in consequence of said defects or imperfections shall be corrected at the Contractor's expense.

P. All manufactured items, materials, and equipment shall be applied, installed, connected, erected, used, and adjusted as recommended by manufacturers or as indicated in their published literature, unless specifically noted herein to the contrary.

3.03 COOPERATION

A. The Contractor shall cooperate with consultant's and owner's personnel in locating work in a proper manner.

B. Should it be necessary to raise, lower, or move longitudinally any part of the work to better fit the general installation, such work shall be done at no extra cost to the Owner, provided such decision is reached prior to actual installation. The Contractor shall check location of electrical outlets with respect to other installations before installing.

3.04 COMMISSIONING SUBMITTALS

A. Provide the following to the owner no later than 30 days prior to system commissioning/programming.

1. Commissioning Test Plan and Check-Off List: Specified elsewhere in this document.
2. Software: One set of fully functional software in manufacturer's original media packaging, temporarily licensed for a 30-day evaluation period.
3. Web-based Training: Access to web-based training modules.

3.05 COMMISSIONING

A. Provide programming and commissioning for each system as described in individual sections below.

B. This contractor shall develop and submit a plan for coordination of settings and programming issues with the consultant and owner no later than 30 days prior to performing programming and commissioning.

C. The security contractor is required to place entire system into full and proper operation as designed and specified.

D. Verify that all hardware components are properly installed, connected, communicating, and operating correctly.

E. Verify that all system software is installed, configured, and complies with specified functional requirements.

F. Perform final acceptance testing in the presence of owner's representative, executing a point-by-point inspection against a documented test plan that demonstrates compliance with system requirements as designed and specified.

1. Submit documented test plan to owner at least 14 days in advance of acceptance test, inspection, and check-off.
2. Conduct final acceptance tests in presence of owner's representative, verifying that each device point and sequence is operating correctly and properly reporting back to control panel and control center.
3. Acceptance by Owner is contingent on successful completion of check-off; if check-off is not completed due to additional work required, re-schedule and perform complete check-off until complete in one pass, unless portions of system can be verified as not adversely affected by additional work.
4. The system shall not be considered accepted until all acceptance test items have been successfully checked-off. Beneficial use of part or all of the system shall not be considered as acceptance.

3.06 TRAINING

A. On-Site Training

1. General: Present, review and describe equipment and materials to the Owner and Owner's operating personnel and fully demonstrate the operation and maintenance of the systems, equipment and devices specified herein.
2. Include with new systems, contractor to arrange and provide for video recording of each onsite training session.
    a. Provide professional video and audio recording of each software screen option with Owner approval of content.
    b. Provide end user video recording for Department of Safety & Security approved processes.
    c. Provide Security Systems Specialists approved recording of maintenance and troubleshooting process.
3. Training shall comprise two separate levels of training;
    a. User Group upon substantial completion of the project.
        i. User group training shall include a site/building walk through indicating locations of equipment and their usage.
        ii. User group training shall include the operation of workstation capability of system monitoring, command override and report generation.
    b. Maintenance Group upon completion of the project prior to close out.
        i. Maintenance group training shall include a site/building walk through indicating locations of equipment and their usage at up to six representative sites.
        ii. Review of a-build documentation at each controller location.
        iii. Troubleshooting techniques in hardware and software.
4. The training shall cover the overall system, each individual system, each subsystem, and each component. The training shall also cover procedures for database management, normal operations, and failure modes with response procedures for each failure. Each procedural item shall be applied to each equipment level.

B. Duration: Refer to the individual sections for the minimum time requirements.

3.07 OPERATION AND MAINTENANCE MANUALS

A. Part One: Notwithstanding requirements specified elsewhere, submit the following labeled as the "Operating and Maintenance Manual" within thirty (30) days after Final Acceptance of the Installation:

1. Record Drawings: Submit two (2) copies of revised versions of drawings as submitted in the "Shop and Field" and "Equipment Wiring Diagrams" Submittals showing actual device locations, conduit routing, wiring and relationships as they were constructed. Include nomenclature showing as-built wire designations and colors. Drawings shall include room numbers coinciding with Owner space planning numbering. Drawings shall be submitted in electronic editable AutoCAD 2010 files, in ".dwg" format, on CD or DVD disks.

2. Manuals: Submit two (2) copies of each of the following materials in bound manuals, or electronic PDF copies, with labeled dividers:

   a. A final Bill of Material for each system

   b. Equipment Instruction Manuals: Complete, project specific comprehensive instructions for the operation of devices and equipment provided as part of this work.

   c. Manufacturers Instruction Manuals: Specification sheets, brochures, Operation Manuals and service sheets published by the manufacturers of the components, devices and equipment provided.

   d. Include information for testing, repair, troubleshooting, assembly, disassembly and recommended maintenance intervals.

   e. Provide a replacement parts list with current prices. Include list of recommended spare parts, tools, and instruments for testing and maintenance purpose.

   f. Performance, Test and Adjustment Data: Comprehensive documentation of performance verification according to parameters specified herein.

   g. Warranties: Provide an executed copy of the Warranty Agreement and copies of all manufacturer's Warranty Registration papers as described herein.

B. Part Two: Within fourteen (14) days of receipt of engineer reviewed Operating and Maintenance Manual (Phase One), submit three (3) electronic copies in AutoCAD 2010 editable .dwg format of the reviewed Record Drawings and three (3) copies of the reviewed Operating and Maintenance Manuals to the Owner, on CD or DVD disks.

   1. Within each equipment enclosure and/or terminal cabinet, the contractor shall place a Single Line drawing of the system(s) and the respective Terminal Cabinet Wiring Diagram in a clear plastic sleeve permanently attached to the inside cover of the terminal cabinet.

   2. In each equipment enclosure the contractor shall place a drawing providing device locations served by the equipment within the enclosure

with identification that is identical to the wiring tags and with the software description of each point.

3. The contractor shall provide to the Owner one (1) copy of new administration and user software, including required graphical maps, on CD or DVD disks.

C. Sufficient information, (detailed schematics of subsystems, assemblies and subassemblies to component level) clearly presented, shall be included to determine compliance with drawings and specifications.

3.08 CLOSEOUT PROCEDURES

A. Notification: Contractor shall provide written notification to Architect/Consultant and Owner when Contractor is satisfied that the work has been completed and is ready for inspection.

B. Closeout Submittals: Contractor shall provide closeout documentation to the Architect/Consultant. The Architect/Consultant shall receive the closeout submittals no less than 72 hours prior to the scheduled inspection time.

C. Inspection: Contractor shall be present for the inspection by the Architect/Consultant. Contractor shall supply all testing equipment needed to verify compliance with the specifications found in Bid package.

D. Punch List: Work or materials found to be incomplete, of unsatisfactory quality, failing to meet the specifications in the Bid package, and/or unacceptable to the Architect/Consultant shall be documented by the Architect/Consultant and provided to Contractor to rectify.

E. Re-Inspection: If a re-inspection is necessary, the costs of the Architect/Consultant's additional travel, hours, and expenses may be deducted by the Owner from the contract amount due Contractor.

F. Punch List Approval: The punch list shall be considered complete only after having been signed by the Owner and Architect/Consultant.

G. The system has successfully completed a 30-day performance period.

H. Payment Authorization: Final payment will be authorized only after all closeout procedures and requirements have been followed and fulfilled by Contractor and approved in writing by the Owner and Architect/Consultant, including punch list(s) and/or re-inspection(s).

3.09 WARRANTY AND MAINTENANCE

A. Furnish and guarantee maintenance, repair and inspection service for the system using factory trained authorized representatives of the manufacturer of

the equipment for a period of one year after final acceptance of the installation.

B. Third Party Device warranties are transferred from the manufacturer to the contractor, which may then transfer third party warranties to the Owner. Specific third party warranty details, terms and conditions, remedies and procedures, are either expressly stated on, or packaged with, or accompany such products. The warranty period may vary from product to product. These products include but are not limited to devices that are directly interconnected to the field hardware or computers and are purchased directly from the manufacturer.

C. Purpose

1. The Contractor shall repair any system malfunction or installation deficiency discovered by the Owner or their representatives during the burn in and warranty period.

2. The Contractor shall correct any installation deficiencies found against the contract drawings and specifications discovered by the Owner or their representatives during the warranty period.

3.10 SERVICE CONTRACT

A. The service contract shall cover equipment and software related to this contract, and shall provide for the following parts and services, without additional cost to the Owner:

1. Bi-yearly inspections, preventative maintenance and testing of equipment and components in Year One of the warranty period.

2. Annual inspections, preventive maintenance, and testing of equipment and components in Years Two and above of the warranty period.

3. Regular Service, Emergency Service, and Call-Back Service

4. Labor and Repairs

5. Equipment, and Materials and transportation cost.

B. Response Time: Response time for service calls.

1. Emergency service calls where system is not responding to staff directed commands through the computer systems shall be within 2 hours to the project site.

2. Emergency service calls where controllers are not reporting shall be within 2 hours to the project site.

3. Normal service calls for device malfunctions shall be within 24 hours during normal working hours to the site.

C. Repair Time: Contractor shall stock parts in sufficient quantities such that repair or replacement shall be guaranteed within 12-hours. Temporary replacements within this time period shall be acceptable, provided temporary replacements do not compromise system functionality, and provided permanent replacement is achieved within 72 hours. Contractor may contact owner representative for use of owner supplied spare parts where delay of system repair will have negative impact on system performance.

D. Commencement: The warranty begins at the time of issuance of the statement of "Final Acceptance of the Installation" by the Owner.

E. Transferability: The warranty shall be transferable to any person or persons at the discretion of the Owner.

F. Transmittal: A copy of this Warranty shall be delivered to, and signed for by the Owner's representative whose primary responsibility is the operation and care of these systems. A copy of the signed Warranty document shall be delivered for review as part of the Final Submittals.

G. Registration: Register Warranty papers for all equipment and software in the name of the Owner. Furnish reproductions of all equipment Warranty papers to the Owner with the Final Submittals.

H. Sub-Contracting: Warranty service work may not be sub-contracted except with specific permission and approval by the Owner.

I. Resolution of Conflicts

1. The Owner retains the right to resolve unsatisfactory warranty service performance at any time by declaring the work unsatisfactory, stating specific areas of dissatisfaction in writing.

2. If the Contractor or his approved subcontractor does not resolve such stated areas of dissatisfaction within thirty (30) days, the Owner may appoint any alternative service agency or person to fulfill the terms of the Warranty; the cost of which shall be borne by the contractor. This action may be taken repeatedly until the Owner is satisfied that Warranty service performance is satisfactory. Satisfactory resolution of a malfunction shall be considered adequate when the device, equipment, system or component which is chronically malfunctioning is brought into compliance with the standards of performance as contained herein and published by the manufacturers of the equipment installed.

END OF SECTION

SECTION 27 62 00 – VIDEO SURVEILLANCE SYSTEM

PART 1 – GENERAL

Unless noted otherwise, "Contractor" or "This Contractor" refers to the Physical Security Contractor.

1.01 REFERENCE

A. Provisions of Section 27 00 00, previous sections, and Construction Documents are included as a part of this section as though bound herein.

1.02 RELATED WORK

A. Section 27 00 00 – General Technology Requirements

B. Section 27 11 00 – Communications Equipment Rooms

C. Section 27 15 00 – Communications Horizontal Cabling

D. Section 27 16 00 – Communications Connecting Cords

E. Section 27 18 00 – Communications Labeling and Identification

F. Section 27 60 00 – Physical Security General Requirements

G. Section 27 64 00 – Electronic Access Control System

H. Section 27 66 00 – Intrusion Detection System

1.03 GENERAL SUMMARY

A. System shall include IP cameras and a server based NVR with client stations and storage as described in this section and on the drawings.

B. System installation shall include, but not be limited to, installation, programming, and configuration of system components as well as all associated software upgrades, patches, and maintenance for the first year.

C. Contractor is responsible for meeting with Owner's representative at time of camera installation to verify exact placement and view of each camera to ensure coverage area is as intended.

1.04 MOUNTING AND INSTALLATION

A. Contractor shall provide the appropriate mounting hardware for all ceiling types and wall types where cameras shall be located.

B. Wall mounted 180 degree cameras shall be mounted on a gooseneck.

C. Exterior cameras shall be mounted on a gooseneck.

D. Cameras mounted in droptile shall have a tile support bridge with a steel support cable connected to structure to prevent theft and vandalism.

1.05 CODE AND STANDARD REQUIREMENTS

A. All work and materials shall conform in every detail to the rules and requirements of the National Fire Protection Association and any other codes as required by the AHJ.

B. All materials shall be listed by UL and shall bear the UL label. If UL has no published standards for a particular item, then other national independent testing standards shall apply and such items shall bear those labels. Where UL has an applicable system listing and label, the entire system shall be so labeled.

C. Other applicable codes and standards are as follows:

1. ANSI/IEEE C2 – National Electrical Safety Code
2. NFPA 70 – National Electrical Code
3. TIA/EIA 568-C-1, 2, 3 Standards

D. Cameras shall meet the following standards:

1. MPEG-4:
   a. ISO/IEC 14496-10 AVC (H.264)
2. Networking:
   a. IEEE 802.3af (Power over Ethernet)
3. Network Video:
   a. ONVIF Profile S or better

PART 2 – PRODUCTS

2.01 VMS SERVER

A. Video Management System (VMS) Server hardware shall be as specified by and manufactured by the VMS system manufacturer. Provide a minimum of a 3 year manufacturer's on-site warranty from the point of owner sign-off transferable to any dealer.

B. The server shall have a minimum of (1) Intel quad-core or greater cpu with hyper-threading enabled for a total of 8 threads. The server shall also have a minimum of 8 Gb of ram.

C. The server shall have redundant power supplies.

D. The contractor shall provide enough NIC cards to support the total input/output throughput of the system.

E. VMS Server Operating System (OS) shall be Windows Server 2008 R2 x64. Provide the most current version and patches as approved by the VMS manufacturer. Provide 3 years of upgrades, patches, maintenance from the point of owner sign-off transferable to any dealer.

F. The VMS Server Application shall be Video Insight. Provide all software, licensing, installation, configuration, and programming. Provide 3 years of software maintenance from the point of owner sign-off transferable to any dealer.

G. The VMS Database is integral to and provided with the VMS server application.

H. The Video Management System (VMS) software shall be used to view live and recorded video from IP devices connected to local and wide area networks. The VMS software shall have a client/server-based architecture that can be configured as a standalone VMS system with the client software running on the server hardware and/or the client running on any network-connected TCP/IP workstation.

I. Multiple client workstations shall be capable of simultaneously viewing live and/or recorded video from one or more servers. Multiple servers shall also be able to simultaneously provide live and/or recorded video to one or more workstations. The VMS server software shall also have the ability to be installed on an IP edge device like a compatible IP camera with SD card.

J. The VMS system shall utilize manufacturer built servers, commercial-off-the-shelf computer workstations, servers, IP edge devices that allow for third-party application installation, networking devices and storage equipment.

K. Recording of all video transmitted to the VMS shall be continuous, uninterrupted and unattended.

L. The VMS system shall offer the capability of video motion detection recording when the VMS detects motion within a region of interest of the camera's view. Video prior to the detection of the motion shall also be stored with recording using the pre-recorded feature. Refer to the VMS Storage requirement of this section to see which camera types will have motion based recording.

M. The VMS system shall manage the video it has been configured to monitor. Loss of video signal shall be configured to annunciate on VMS client by an on-screen visual indication alerting operators of video loss.

N. The VMS software shall have an open architecture supporting IP cameras and encoders from multiple manufacturers.

O. The VMS client software shall be able to view live video and audio, recorded video and audio and be able to configure the complete system all from a single application.

P. The VMS shall continue to record video and audio at all times during the administration and configuration of any feature.

Q. The VMS client software shall have the same functionality when connected remotely as it does when it is run locally on the same computer as the server software.

R. The VMS client software shall add and remove features based on the permissions of the user and the licensed functionality. The contractor shall work with the owner to set up three permission levels.

S. The VMS client software shall operate on all of the following operating systems:

   1. Microsoft Windows Server 2003/2008 R2
   2. Microsoft Windows XP (all versions)
   3. Microsoft Windows Vista (all versions)
   4. Microsoft Windows 7 (all versions)
   5. Linux Ubuntu 8.04/10.04 Debian Package
   6. Mac OSX (operating on Intel CPU)

T. The VMS software shall allow the user to have any combination of VMS client applications running on any of the supported operating systems and be able to connect to any of the VMS servers running on any of the supported operating systems.

U. The VMS software shall have the capability to run multiple client applications simultaneously on one workstation with up to 12 monitors on a single workstation with one (1) client application running on each monitor. The contractor shall provide the owner with recommended workstation performance requirements.

V. The VMS shall also allow an authorized user to view video through a web client interface. The web client interface shall allow authorized users to view live video, view recorded video, control pan-tilt zoom (PTZ) cameras and activate triggers. The web client interface shall allow connections to multiple VMS servers simultaneously. The web client interface shall operate without requiring installation of any software.

W. When using the web client interface, the VMS server shall transcode the video into a JPEG file of the size as the browser screen before sending it to the browser.

X. The web client interface shall support the following browsers:

1. Internet Explorer 6 and later
2. Firefox 2 and later
3. Opera 9 and later
4. Safari and later
5. Chrome
6. The web client interface shall also connect with non-JavaScript browsers and shall be compliant with HTML 4.0.

Y. The VMS server software shall record and retrieve video, audio and alarm data and provide it to the VMS clients upon request.

Z. The VMS software shall provide, at no additional charge, a purpose built mobile application capable of viewing multiple simultaneous live video streams and playing a recorded video stream. Application shall be provided for both iOS and Android operating systems.

AA. The VMS server shall not decode video for the purpose of motion detection.

BB. The VMS server shall not decode video for the purpose of repacking it for transmission to clients.

CC. The VMS server software shall record video based on metadata generated by an edge network device. The edge network devices shall generate the metadata and transmit it with the video stream to the VMS server software.

DD. The VMS shall license the total number of cameras on the system. This license shall be based on the MAC address of a single network card that is present on the system. The VMS shall only require that this network card be enabled and does not require that data is actually sent through it.

EE. The VMS shall not require the manufacturer to be contacted when a camera fails for any reason.

FF. The VMS server software shall run as a service. The VMS shall not require any application to be running in order to operate.

GG. The VMS shall use Active Directory or LDAP features of a network to authenticate users and determine which permissions they will have on each server. The contractor shall coordinate with the owner for LDAP integration and permission levels.

HH. The VMS shall allow for a user's permissions to be configured across multiple servers from a single screen.

II. The VMS shall allow the use of maps. The maps will be accessible to users with the appropriate permission levels and display video sources and their status. The contractor shall provide maps of the exterior site as well as all interior areas. The contractor shall contact the consultant to obtain a clean set of AutoCAD files for use as maps.

JJ. The VMS shall allow maps to be embedded inside of maps (i.e. hierarchical or nested maps). When an event happens on a map that is embedded inside of a map, it shall transmit the alert to all parent maps and change the color of the icon on the parent map and all subsequent parent maps.

KK. The VMS shall allow for soft triggers to be placed, viewed and triggered from a map. The contractor shall coordinate with the owner for any required soft triggers and rules associated with them.

LL. The VMS shall have a single page that displays the status of all servers and cameras currently connected. This page shall display any alarms, events, MAC addresses, camera configuration, format and frame rate from each individual camera.

MM. The VMS shall support the use of a panoramic lens on an encoded analog or IP camera. The VMS client shall de-warp the image on both live and recorded video.

NN. The VMS software shall have three methods of allowing third-party integration: command line, API and web SDK. The command line shall allow for the most basic of interfaces, calling up the appropriate video when requested using command line functionality. The API shall allow for a deeper interface, allowing video to be transmitted from the VMS software into the party software interface. The web SDK shall use the web server to transcode the video and send it to the third-party software interface. The web SDK method shall use standard HTML, XML, CGI and JavaScript commands.

2.02 VMS SOFTWARE

A. The contractor shall coordinate with the owner to install any required antivirus or other software on the server before it is connected to the network. The contractor will also provide the owner with any required antivirus on-access scanning exclusions for files/folders/processes.

B. When in live display mode, the user shall be able to view live video, live audio, point of sale (POS) data and alarm information.

C. The VMS shall be able to organize the camera video view panel in the following patterns:

1. 1-camera (full-screen) layout
2. 4-camera (2x2) layout

3. 8-camera (3 large views and 4 small views) layout
4. 10-camera (2 large views and 8 small views) layout
5. 13-camera (1 large view and 12 small views) layout
6. 16-camera (4x4) layout
7. 8-camera (1 very large view and 7 small views) layout
8. 9-camera (3x3) layout
9. 6-camera (2x3) widescreen layout
10. 12-camera (4x3) widescreen layout
11. 20-camera (5x4) widescreen layout
12. 30-camera (6x5) widescreen layout
13. 48-camera (8x6) widescreen layout

D. The VMS shall allow the customization of the user interface to allow software triggers to be shown. This shall allow them to activate events through the push of a button, which could trigger recording, PTZ presets, output triggers or email.

E. The VMS shall allow the user to pick their own icon and select the software triggers to display in the client. The VMS shall also display the status of any soft triggers on connected VMS servers.

F. The VMS software shall allow control of PTZ cameras to authorized users and be used to maneuver a PTZ camera. When used on a non-PTZ camera, it shall allow you to digitally pan, tilt and zoom on any video whether in live or recorded mode.

G. The VMS shall allow following methods of controlling a PTZ camera to be available:

1. PTZ graphics control windows
2. Live graphic overlay PTZ control icons
3. Keyboard control (up, down, left, right arrows; page up, page down for zoom)
4. PTZ presets
5. Digital PTZ
6. USB joystick to control PTZ cameras
7. Proportional PTZ control by clicking the mouse in the center and moving it

H. The VMS software shall allow virtual matrix functionality by designating a cell to do so. This video cell shall automatically show video as it is triggered.

I. The VMS software shall have a feature for viewing logical groups of cameras. This shall allow efficient viewing of cameras in a logical order.

J. The VMS software shall have a feature to organize your cameras into preset views. Views are preconfigured arrangements of the video panels so that they may be easily recalled later. A view can save the location of the video streams, audio streams, POS data, maps and event views. These views shall be accessible in both live and recorded video modes.

K. The VMS software shall have the capability to automatically cycle through two or more saved views to create a video tour. The VMS shall allow the configuration of the dwell time and the different views it shall use.

L. The VMS client software shall be used to search for and play back recorded video, audio and events from VMS servers.

M. The VMS software shall have the capability to search for and play back video from multiple cameras simultaneously. All recorded video shall be played back and displayed in a synchronized multi-camera layout.

N. The VMS software shall support searching through recorded video based on time, date, video source and image region and have the results displayed as both a clickable timeline and a series of thumbnail images.

O. The VMS software shall allow search and play back of audio in synchronization with video.

P. The VMS software shall allow you to search on a specific area of recorded video and only display the frames where motion happened in that area.

Q. The VMS software shall have the capability to export video, maps, POS data and audio files.

R. The VMS software shall provide the option of exporting the file in the following formats:

   1. Standalone Exe (*.exe) – includes an executable player with the video and audio data

   2. AVI File (*.avi) – a multimedia container format

   3. PS File (*.ps) – a format for multiplexing video and audio

   4. QuickTime File (*.mov) – native for Macintosh computers

S. The VMS standalone player shall package all of the exported video into a single executable. The VMS standalone player shall be able to authenticate

that the video has not been tampered with using a keyed Hash Message Authentication Code (HMAC).

T. The VMS client software shall be able to connect to multiple systems simultaneously. Each of the systems could have individual permissions, thereby limiting the client's configuration or viewing abilities for that system, but not affecting the abilities on the other systems.

U. The VMS system shall be able to display system information about users that are currently logged into the system, plug-in file version information number and status, and a system log that contains a detailed history of the processes that occur on the system.

V. The VMS system shall have the ability to record an audit trail of when users log in that shows what changes they have made, what video they have viewed and what they have exported.

W. The VMS system shall allow the configuration of the video devices to be performed in the client and pushed out to the devices. The configuration itself is stored both on the camera and on the VMS.

X. The VMS shall allow monitoring of the inputs on both network devices and on manufacturer provided hardware. The VMS shall also allow triggering of outputs on the network devices and manufacturer provided hardware.

Y. The VMS shall allow for the configuration of what drives to use for recording video. Those drives may be local drives, direct attached storage drives or iSCSI drives.

Z. The VMS shall allow for the configuration of rules of how to record the video. These rules shall allow you to set a maximum number of days or minimum number of days on a per video stream basis. The contractor shall coordinate with the owner and consult for desired rules during the final programming of the system.

AA. The VMS shall not require a database when recording video.

BB. The VMS shall use the operating systems native file system for recording the video. Each video stream shall be kept in 5-minute increments in a paired video and index file. The video file shall contain the data of the video, audio, and include meta data. The index file shall contain the index of the metadata from the network device.

CC. The VMS shall have the ability to receive ASCII data through the COM port on the server or over the network.

DD. The VMS shall have the ability to look for keywords in the ASCII data and use these to execute various events such as PTZ presets, recording video, recording audio and sending email notifications.

EE. The VMS software shall send a predefined email based on an event trigger. The VMS software shall support SSL and TLS connections for transmissions of the mail. The contractor shall coordinate with the owner to configure and integrate the email with the owners exchange system.

FF. The VMS software shall have a feature to export a video segment from specific cameras or audio inputs to a CD or DVD upon an input trigger or other event being activated.

GG. The VMS software shall be used to connect different types of events, such as input triggers, to a desired action such as recording video or triggering an alarm. The contractor shall coordinate with the owner on event and rule management requirements. The VMS software shall recognize the following event types:

1. Video Motion
2. Video Loss
3. Input Trigger
4. POS Port
5. POS Profile
6. Health
7. IP Camera Connection
8. Software Trigger
9. Analytics

HH. The VMS software shall be able to execute the following action types:

1. Record Video
2. Output Trigger
3. Output Video
4. Send an email
5. Burn a CD/DVD
6. Call a PTZ Preset

II. The VMS software shall have the ability to configure each video input's recording time on an hourly basis. This shall allow the user to schedule when to record on motion, when to record on event and when to not record.

JJ. The VMS shall use a combination of a user name and a password to authenticate the user's permission level.

KK. The VMS shall allow granularity of permissions by creating custom user groups. The members of these custom user groups shall all have the same permissions. The contractor shall coordinate with the owner on the required user group levels.

LL. The VMS client shall use OpenGL or Direct 3D to decompress and render video.

MM. The VMS shall allow the user to perform a visual thumbnail search. The user can select one camera to see one image per set time period. The user shall be able to play video from that image or zoom in to a time range.

NN. The VMS client can be configured to automatically switch views on any trigger within the event monitoring function.

2.03 VMS Camera Licenses

A. The contractor shall provide all required camera licenses and other licenses for a complete turn-key system.

2.04 VMS Health Monitor

A. The contractor shall provide, install and configure health monitoring software to be installed on a different server of the owners choosing.

2.05 VMS Video Storage

A. Provide a minimum of fifteen (15) days of storage calculated at the following resolution and rates. Provide all hardware, software and configuration needed to accomplish this.

1. Camera Type C1, C2, C3, C4:
    a. 5 fps
    b. 1 keyframe (I-Frame) per second
    c. Max resolution
    d. Motion based recording
    e. Motion based recording at 40% motion
    f. VBR with cap appropriate to resolution and quality
    g. Default camera data rates
    h. H.264 compression
2. Camera Type C5, C6, C7, C8, C9:
    a. 3.5 fps

b. 1 keyframe (I-Frame) per second

c. Max resolution

d. Motion based recording

e. Motion based recording at 40% motion

f. VBR with cap appropriate to resolution and quality

g. Default camera data rates

h. H.264 compression

3. Camera Type C10 (IP PTZ)

a. 15 fps

b. 3 keyframes (I-Frame) per second

c. Max resolution

d. Constant recording

e. VBR with cap appropriate to resolution and quality

f. Default camera data rates

B. Storage shall be RAID 5 and be internal to the server.

C. There shall be approximately 15%-20% CPU and storage headroom.

2.06 VMS CLIENT SOFTWARE

A. The contractor shall provide, install and configure client software on the following computers. The contractor shall coordinate with the owners to determine viewing privileges. The contractor shall provide the owner with recommended workstation/laptop performance levels early in the project so they may evaluate if hardware updates are required.

B. Acceptable Manufacturers:

1. Salient

2. Exacq

3. Milestone

4. Genetec

5. DVTel

C. The system shall be capable of a minimum of 10 concurrent users.

2.07 VMS Mobile Client App

A. The contractor shall provide, install and configure mobile client software apps on up to 10 concurrent mobile devices of the owners choosing.

2.08 VMS Client Workstations

A. The contractor shall provide and install full clients licenses:

   1. Ten (10) concurrent locations of the City's choosing.

B. The workstation hardware will be provided by the City.

2.09 PTZ Control Keyboard

A. The contractor shall provide a PTZ Control Keyboard at the following locations:

   1. One (1) locations of the City's choosing.

B. The PTZ surveillance keyboard shall be an add-on to the video management system (VMS).

C. The surveillance keyboard shall be USB and plug into an available USB port.

D. The surveillance keyboard shall operate on Windows, Linux and Macintosh systems.

E. The surveillance keyboard shall be part of an integrated system that includes custom firmware to integrate with VMS software.

F. The surveillance keyboard shall include a three-axis hall-effect joystick, a 10-button numeric keypad, 16 user-defined buttons, jog/shuttle dial and USB 1.1 interface. The jog/shuttle shall be able to travel 360 degrees. The surveillance keyboard shall have LED-illuminated buttons.

2.10 Power over Ethernet (PoE) Injector

A. The contractor shall provide PoE injectors for all cameras.

B. 16 ports, 1ru rack mount.

C. IEEE 802.3af (PoE) and IEEE 802.3at compliant (PoE+).

D. Provide a minimum of 30 watts per port up to a maximum of 300 watts per chassis.

E. RJ-45 LAN or laptop connection to enable programming of PoE shutdown and port monitoring.

F. Auto detection and protection of legacy non-PoE devices.

G. Manufacturer:

1. Altronix Netway 16M
2. Or approved equal

2.11 ETHERNET WITH POWER OVER ETHERNET (POE) UTP EXTENDER

A. The contractor shall provide Ethernet with PoE UTP extenders for out-of-distance cameras.

B. Shall support IEEE 802.3af (PoE) and IEEE 802.3at (PoE+) on input and output

C. Extends cable range an additional 328 feet (100 meters).

D. Can extend up to 800 meters when using multiple units.

E. No configuration required.

F. No power supply required.

G. Maintains full-rate network throughput.

H. Manufacturer:

1. Veracity OUTREACH Max (Interior Only)
2. Or approved equal

2.12 ETHERNET WITH POWER OVER ETHERNET (POE) UTP SURGE SUPPRESSOR

A. Interior spaces:

1. Shielded RJ-45 jacks and ground stud
   a. Connect ground stud directly to ground bar (TMGB/TGB) or ground.
   b. Do not use shielded cable on the output.
2. Maximum supported data rate: 1000Mb/s (Gigabit)
3. Supports IEEE 802.3af (PoE)
4. Turn on Voltage: 150V L-L, L-G
5. RoHS compliant
6. UL 497B listed
7. Meets Telecordia GR-1089
8. Manufacturer:
   a. Transtector TSJ GbE PoE (1101-994)

b. Or approved equal

B. Exterior spaces:

1. Shielded RJ-45 jacks and ground stud

a. Connected ground stud directly to ground.

b. Do not use shielded cable on the output.

2. Outdoor-rated NEMA 3R cast aluminum enclosure

3. Pole/surface mount. Provide pole mount kit when required.

4. Supports IEEE 802.3af (PoE)

5. Meets Telecordia GR-1089-2006 surge suppression standard

6. Impedance of 85 to 115 Ohms.

7. Manufacturer:

a. Transtector ALPU POE 60M (1101-933)

b. Or approved equal

2.13 WALL MOUNT POWER SUPPLY

A. The contractor shall provide 24/28 VAC power supplies for cameras with heater/blowers and PTZ cameras as required.

B. 4 fuse protected outputs.

C. 24 VAC @ 4 amps or 28 VAC @ 3.5 amps.

D. Built-in surge suppression.

E. 115 VAC, 0.9 amp power input.

F. Wall-mount enclosure.

G. Manufacturer:

1. Altronix ALTV244

2. Or approved equal

PART 3 – EXECUTION

3.01 INSTALLATION PRACTICES

A. All services provided shall be professional and conform to the highest standards for industry practices. The Owner reserves the right to halt any installation due to poor workmanship. All work shall be defect free, and the installer shall replace, at their expense, any work found to be defective.

B. The owner reserves the right to halt any installation due to failure of contractor to observe installation-free periods due to instructional or administrative requirements. To the maximum extent possible, the owner will provide advance notice of such periods.

C. Contractor is responsible for providing a complete and functional video surveillance system.

D. All manufactured items, materials, and equipment shall be applied, installed, connected, erected, used, and adjusted as recommended by the manufacturers, or as indicated in their published literature, unless specifically noted herein to the contrary.

E. Contractor shall follow these standards and approved submittals for locations of power supplies. The Owner intends to limit the number and location of power supplies to facilitate more effective long-term support and maintenance of the system.

3.02 COORDINATION

A. Contractor shall provide up to 8 hours (up to four, 2-hour sessions) of scheduled and dedicated coordination time to assist Owner with camera positioning and coordination as requested by owner or consultant.

3.03 PROGRAMMING

A. Contractor shall provide up to 36 hours of programming time to assist Owner with any specialty programming or integration requests.

3.04 TRAINING

A. Provide system operations, administration, and maintenance training by factory-trained personnel qualified to instruct.

1. Contractor shall provide up to 12 hours of scheduled and dedicated training time in three (3) four (4) hour sessions for administration and investigation.

2. Contractor shall provide up to 2 hours of scheduled and dedicated training time for maintenance including lens and dome cleaning, focusing and positioning.

3. Provide printed training materials for each trainee, including product manuals, course outline, workbook or student guides, and written examinations for certification.

4. Provide hands-on training with operational equipment.

5. Training shall be oriented to the specific system being installed under this contract as designed and specified.

6. Contractor shall provide all necessary documentation of system operating parameters prior to scheduled training sessions.

3.05 AESTHETICS

A. All cables and equipment terminating at panels frames shall be vertically straight, with no cables crossing each other, from twelve inches inside the ceiling area to the termination block.

B. All cable bundles shall be combed and bundled to accommodate individual termination block rows and panels.

C. For any given telecom room, a horizontal and vertical alignment for all mounting hardware will be maintained to provide a symmetrical and uniform appearance to the distribution frame.

D. All surface-mounted devices shall be firmly secured level and plumb

E. All rack mount equipment shall be securely installed.

3.06 HARDWARE LAYOUT

A. Hardware positioning and layout shall be reviewed and approved by the Owner prior to construction. The review does not exempt Contractor from meeting any of the requirements stated in this document.

3.07 VMS INSTALLATION PRACTICES

A. Verify that the manufacturer approved server hardware, OS meets the Owner's IT standards prior to ordering.

B. Coordinate server power, cooling, and mounting requirements with owner prior to installation.

C. Coordinate virus scan/security software requirements with owner and manufacturer prior to installation.

3.08 DEVICE CABLING/WIRING INSTALLATION PRACTICES

A. All external wire and cables shall be supported at least every five feet from the structure or as required to maintain not more than 12" cable sag between supports and without over tensioning the cables. Provide j-hooks as needed where cable tray or raceway is not available.

B. This Contractor shall coordinate installation with Division 27 10 00 cabling Contractor to ensure there is at least 2-inches of physical separation between security cabling and voice/data cabling throughout cable path. Voice/data cabling Contractor has first claim to cable tray.

C. All cables, regardless of length, shall be labeled within 18" of both ends with an identifier that is keyed to the door, room, or corridor number as identified.

D. All cables shall have 6-foot service loops neatly coiled in the equipment room. During initial cable rough-in, this Contractor shall have sufficient slack to route anywhere within the equipment room.

E. Cabling shall be adequately supported with Velcro wire wraps and horizontal support cable managers fastened to rack frame. Cables shall be dressed in a neat and orderly fashion. Any cabling or equipment installation that is deemed unacceptable by the Owner or Consultant shall be replaced or corrected by the Contractor at no additional cost. Plastic zip ties are not allowed.

F. All cables are to run at right angles to the structure, placed above the ceiling in halls or corridors.

G. Cables shall not run above red iron joist.

H. Contractor shall make every effort to conceal wiring and other apparatus into walls, floors, and ceilings, assuming code and good engineering practice allows and suggests.

I. Ties and straps shall be installed snugly without deforming cable insulation. Ties shall be spaced at uneven intervals not to exceed four feet. No sharp burrs shall remain where excess length of the cable tie has been cut.

J. Contractor shall notify Owner immediately if obstruction or hazard is discovered in a pathway provided by others.

K. Cable shall be stored and handled to assure that it is not stretched, kinked, crushed, or abraded in any way. Bend radiuses shall meet manufacturer specifications and/or recommendations. Cable shall not be installed in ambient temperatures or moisture conditions above or below the manufacturer's rating.

L. No splices shall be installed in any cable.

3.09 CABLE TERMINATION

A. Termination hardware (blocks and patch panels) positioning and layout shall be reviewed and approved by the Owner prior to construction. The review does not exempt Contractor from meeting any of the requirements stated in this document.

3.10 VIDEO SURVEILLANCE/ACCESS CONTROL/INTRUSION DETECTION INTEGRATION

A. The video surveillance system shall be integrated with the access control system and intrusion detection system.

1. The access control/intrusion detection interface shall be via an RS-232 or Ethernet interface. Contact closure integration shall only be utilized if the system is existing and cannot be upgraded to support RS-232 or Ethernet. The contractor shall supply all necessary expansion boards if contact closure integration will be required.

2. The access control/video surveillance integration shall be via a native IP interface.

3. The video surveillance /intrusion detection interface shall be via an RS-232 or Ethernet interface. Contact closure integration shall only be utilized if the system is existing and cannot be upgraded to support RS-232 or Ethernet. The contractor shall supply all necessary expansion boards if contact closure integration will be required.

B. The contractor shall provide any and all licensing to integrate the systems together including any additional items to be added to the yearly maintenance agreement.

C. The contractor shall provide any needed expansion boards for intrusion/access control integration.

D. Refer to the Electronic Access Control and Intrusion Detection System specification sections for additional specific integration requirements.

E. The VMS system shall be time syncing to common NTP server.

F. The contractor shall set up a meeting between the owner, consultant and manufacturer to determine the exact functionality of the integration before the integration starts.

3.11 FIRE STOPPING

A. Fire stopping of openings between floors, fire-rated walls, and smoke-rated walls, created by others for This Contractor to pass cable through, shall be the responsibility of the This Contractor. Sealing material and application of this material shall be accomplished in such a manner that is acceptable to the local fire and building authorities having jurisdiction over this work.

B. Any openings created by or for This Contractor and left unused shall be sealed up by This Contractor.

C. This Contractor shall be responsible for creating a waterproof seal in and around any openings that This Contractor creates from the structure to the outside environment.

3.12 SYSTEM TESTING PROCEDURES

A. Prior to energizing or testing the system, ensure the following:

1. All products are installed in a proper and safe manner per the manufacturer's instructions.

2. Dust, debris, solder, splatter, etc., is removed.

3. Cable is dressed, routed, and labeled; connections are consistent with regard to polarity.

4. All products are neat, clean, and unmarred, and parts are securely attached.

B. Contractor shall ensure that each device in the security system is functioning normally and in such a manner as to meet the functional and performance requirements in this specification.

3.13 SYSTEM INSPECTION

A. Contractor shall coordinate with project representative for inspection after Contractor has completed testing of entire system.

B. Contractor shall have trained Contractor representative and testing equipment on site during inspection to assist with spot verification of tests.

C. Contactor shall verify with Project Representative the precise positioning of camera aim and shall make fine adjustments as requested.

3.14 LABELING

A. Contractor shall neatly label all security devices and cabling at both ends. All labels shall be on Project as-built drawings.

3.15 CAMERA INSTALLATION

A. Contractor shall field verify all camera locations and positioning with owner prior to installation.

3.16 DOCUMENTATION

A. Upon completion of the installation, Contractor shall provide full documentation sets to the Consultant for approval as described in section 27 60 00. All documentation shall become the property of the Owner.

B. Documentation shall include the additional specific items detailed in the subsections below:

1. Contractor shall provide hard copy and electronic forms of the final test results.

2. Contractor shall provide a document including the following:

   a. Camera label/identifier

   b. Location of each drop by orientation/permanent landmark in the room

   c. Contractor shall provide accurate as-built Construction Drawings. The drawings are to include cable routes and device locations.

3.17 PRE-CHECKOUT

A. The Contractor shall demonstrate the following to Owner during system demonstration.

1. The cameras are fully installed and functional.
2. Camera adjustments are complete to the Owner's satisfaction including.
   a. Aim/Zoom
   b. Focus/Back Focus
   c. Dehumidification
   d. Masking Zones
   e. Motion Detection Zones
   f. Pre-Sets/Tours

3.18 FINAL ACCEPTANCE

A. In addition to closeout requirements in section 27 60 00, This Contractor shall demonstrate the following before final approval.

1. Owner training is complete.
2. Punch list items are complete.
3. As-built documentation is complete and submitted to Owner/Consultant.

3.19 ANNUAL SUPPORT AGREEMENT

A. An annual support agreement (after the 1st year full of support/warranty) shall not be part of the bid. The contractor shall work directly with the owner at the end of the project to determine the ongoing hardware/software support. The contractor shall send the consultant a copy of the support agreement for review prior to finalization.

3.20 FINAL PROCEDURES

A. Perform final procedures in accordance with section 27 60 00.

END OF SECTION

SECTION 27 64 00 – ELECTRONIC ACCESS CONTROL SYSTEM

PART 1 – GENERAL

1.01 DESCRIPTION

A. This specification section covers the furnishing and installation of a new and complete enterprise-wide, low-voltage, electronic access control system (EACS).

B. Contractor shall furnish and install access control hardware devices, mounting brackets, power supplies, switches, controls, consoles and other components of the system as shown and specified.

C. Contractor shall furnish and install access control related software to allow this system expansion. Software includes required license addition for access control readers and electrified portals, workstations and Video Management System (VMS) Integration.

D. Furnish and install outlets, junction boxes, conduit, connectors, wiring, and other accessories necessary to complete the system installation. Requirements shall be in accordance with Division 26 00 00, Electrical.

1.02 PRECEDENCE

A. Obtain, read and comply with General Conditions and applicable sub-sections of the contract specifications. Where a discrepancy may exist between any applicable sub-section and directions as contained herein, this section shall govern.

1.03 REFERENCE

A. Provisions of Section 27 00 00, previous sections, and Construction Documents are included as a part of this section as though bound herein.

1.04 RELATED WORK

A. Section 27 00 00 – General Technology Requirements

B. Section 27 11 00 – Communications Equipment Rooms

C. Section 27 15 00 – Communications Horizontal Cabling

D. Section 27 16 00 – Communications Connecting Cords

E. Section 27 18 00 – Communications Labeling and Identification

F. Section 27 60 00 – Physical Security General Requirements

G. Section 27 62 00 – Video Surveillance System

H. Section 27 66 00 – Intrusion Detection System

PART 2 – PRODUCTS

2.01 INTERCOM SYSTEM

A. The security contractor shall provide and install a new Audio/Video intercom system with door stations and master station as shown on the project drawings (MC/IC) with all accessories and adapters required for a fully functioning system.

1. The IP Surveillance Contractor shall provide and install an encoder and video/camera VMS license for every Aiphone JF-DVF-HID-I location.

B. The audio/video intercom system shall provide two-way audio communication between the door stations and master stations. The intercom door stations and master stations are shown on the project drawings.

C. The Aiphone system shall contain all of the following components. Access control contractor shall provide all necessary installation, wiring, mounting hardware and ancillary equipment as required for a turnkey and operating system. The following quantities are for both buildings (Fire Station & City Hall) with one additional MC & IC for both buildings, location TBD:

Qty	Description	Model #
2	JF-2MED	AUDIO VIDEO MASTER STATION
5	JF2HD	AUDIO VIDEO SUB MONITOR
2	AX-084C	CENTRAL EXCHANGE UNIT FOR 8 DOORS AND 4 MASTERS
4	JF-DVF-HID-I	AUDIO VIDEO FLUSH MOUNT DOOR STATION
2	PS-1820UL	24V DC, 2A POWER SUPPLY (110 VAC)
1	K-1900-5	VIKING PROGRAMMABLE DIALER

D. Contractor shall verify exact master station placement with owner prior to installation.

E. The security contractor is responsible for all associated wiring, access control panel cards (inputs/output), hardware and installation for a complete turnkey intercom system.

F. The system shall interface with the access control system to prevent the card access system from creating an alarm event when the card access door is opened when the intercom system is used to unlock the intercom door. Connecting the intercom door release button the card access systems REX input for that specific door is typically used for this purpose. The security contractor is responsible to make this work as defined.

G. This contractor shall provide all necessary door station backboxes to electrical contractor for installation at each door station. Coordinate installation prior to exterior mason work.

H. The system shall interface to the telephone system for automatic call forwarding when the call for the door station is not answered by the master station.

I. Category cabling shall be General, Mohawk or Berk-Tek Category 6.

J. Power to CCU shall be Aiphone #822202.

2.02 ELECTRONIC ACCESS CONTROL HARDWARE

A. Provide an access control system based off of Mercury Security Corp. open platform hardware and panels.

1. System Characteristics:

a. The Access Control Panel (ACP) is used as the subcomponent to the security management system for the purpose of initiating all decision-making criteria as it relates to the cardholders, readers, and associated hardware connected. Decisions are made by the ACP and uploaded to the host computer as historical events.

b. The ACP shall be listed for Underwriters Laboratory (UL):

i. UL294 (Access Control System)

c. The panels shall:

i. Operate without the need for the host to be on-line. No decisions shall be dependent on the host.

ii. Support on-board 10/100 Ethernet communications to the host as primary communication.

iii. Include a request-to-exit and door status contact input for each reader without the need for additional modules for future use.

iv. Detect “forced entry” and “door left open.” A separate action is required for each.

v. Allow mapping of readers to any output address within the same controller.

vi. Support at least 50 user-selected holidays.

vii. Allow all unused door logic, such as door strike relays, request-to-exit inputs, and door status inputs to be assigned as general-purpose points.

viii. Support optional modules for additional customization of inputs and outputs. The following modules shall be available:

- Output Point Module: A minimum of 6 additional output points shall be provided.
- Combination Module: Where inputs and outputs are necessary within the same enclosure, a combination of at least 6 inputs and 6 outputs shall be provided.
- Wireless reader module or external module.

ix. Support a minimum of 5,060 alarm input points.

x. Support a minimum of 5,060 relay output points.

xi. Maintain historical information for a minimum of three (3) months without AC power.

xii. Automatically adjust for daylight savings time and leap year.

xiii. Be supplied with battery backup and charger for a period for a minimum of four (4) hours.

xiv. Support a variety of reader technologies.

xv. Support the following card/reader technologies as a minimum:

- Magnetic Stripe
- Proximity
- Biometrics
- Wiegand
- Vehicle Identification

d. Support multiple technologies simultaneously.

e. Maintain the expiration date for each cardholder. Once the date is reached, the card will automatically be disabled. No access shall be authorized.

f. Maintain three (3) access times for each door location: Standard, Long, and Egress.

g. Have the ability to maintain an automatic door unlock during specific hours and days.

h. Support a minimum of (2) “levels” of Anti-Passback: Global and Area.

2. Panels shall have additional input modules as necessary to accommodate devices as shown on project drawings.

3. Panels shall use Mercury EP2500 controller with MR52 interface panels. Contractor shall provide adequate number of access control panels, controllers, door interface panels and I/O panels for a complete turnkey system to support all components as indicated on project drawings.

2.03 SYSTEM SOFTWARE

A. Supports integration with Video Insight as the primary graphical user interface (GUI).

B. Operating System Requirements: Shall operate in conjunction with and be compatible with Microsoft Windows 7 x64 Professional operating systems.

C. Support for Microsoft Active Directory (LDAP).

1. Provide all licenses required for LDAP integration.

D. Support for virtualization.

1. System shall support Microsoft Hyper V virtualization.

2. The contractor shall provide the owner with server requirements.

E. Software shall include:

1. Graphical user interface to show pull-down menus and a menu tree format.

2. Password-protected operator login and access.

F. Access Control Application Software: Shall provide interface between the ACS Host Workstation, IP based Reader-Controllers, inputs, and outputs in order to monitor sensors operate displays, report alarms, generate reports and provide all other system functions as follows:

1. Overall Access Control System Parameters:

a. Number of access control readers per system: Unlimited

b. Number of client work stations per system: Unlimited

c. Number of cardholders: 64,000 per reader stand-alone mode, unlimited in network mode.

d. Number of credentials per cardholders: Unlimited

e. Number of cardholder groups: Unlimited

f. Number of system inputs: Unlimited

g. Number of system outputs: Unlimited

h. Reader Inputs: Door sense, request to exit, auxiliary, optical tamper, RS-232

i. Reader Outputs: (2) outputs; TTL1 and TTL2

2. Access Control Software Functions: The system software shall provide for the following features and functions:

   a. Door Programming Functions

      i. Extended open alarms Individual Extended open timers per door.

      ii. Personal Identification Number (PIN) Codes – Up to 9 digits.

      iii. Device Support: Supports selected serial RS-232 and Wiegand devices.

      iv. Number of Door Groups: Unlimited

   b. Shifts

      i. Number of shifts: Unlimited

      ii. Interval assignments: Any day of the week.

   c. Permissions

      i. Number of Permissions: Unlimited

   d. Holidays: The software shall provide for an unlimited number of holidays.

   e. Door Control: The software shall provide the following types of area control functions:

      i. Door control based on dual-authentication rules.

      ii. Support requiring credentials belonging to two people

      iii. Support requiring two credentials belong to same person

      iv. Cardholder use limits

      v. Elapsed Time based

      vi. Number of usage based

      vii. Configurable individual door strike times.

      viii. Configurable extended individual door hold open times.

   f. Elevator Control: The software shall provide elevator control for an unlimited number of floors.

   g. System Graphical Tree: The software shall provide for graphical tree displays of the configured field hardware.

h. Alarm and Event Logging: The software shall provide for logging of all system alarms and events chronologically including time and date stamp.

i. System Scheduling: The system shall provide for scheduling of events including:

   i. Open Door, Open Door Group

   ii. Deactivate Badges

j. Help Documentation: The software shall include complete documentation on CD.

k. Alarm attributes: The software shall provide for programming of the following alarm and monitoring attributes:

   i. Display of alarm events at the ACS Host workstation, or support networked workstation.

   ii. Require the reader-controller, which generated the alarm to be restored to its normal state before the alarm is cleared.

   iii. Require acknowledgment of an alarm to clear the alarm.

   iv. Support auto-clearing of network related communication alarms.

   v. Trigger a programmed system actions(s) when the alarm is acknowledged.

   vi. Require a User Logon for Acknowledgment.

l. Programming Downloads: The software shall provide for downloading of programming from the ACS Host to the Reader-controller-controllers as follows:

   i. Credential holders and authorized time zones

   ii. Time zones.

   iii. Alarm configurations.

   iv. Latch intervals.

   v. TTL output on REX, Tamper, Unauthorized.

   vi. Beep on events (REX, Tamper, Reject)

   vii. Complete database download of 10,000 cardholder records in less than 15 minutes with system continuing to operate normally during this time.

m. Reader-controller Programming Options: Provide the following minimum reader-controller programming functions:

i. Request to exit and door position switch: Provide programming for independent supervision of request to exit and door position switch.

ii. Manual activation of outputs: Provide for configurable activation of outputs from a credential presentation.

iii. User definable door strike time: Provide user definable/ programmable door strike functionality for each reader-controller.

iv. In/ out Reader-controller configuration: Reader-controller programmed as either an in reader or out reader for recording of time in and time out data.

v. Program use Limits: Limiting the number of times that cardholders may use their credential to gain access at the Reader-controller.

vi. Input/output linking: Provide programming for linking of reader outputs with inputs.

3. ACS Host Software Functions: The system ACS Host software shall provide for the following features and functions:

a. Device Status Monitoring

i. Alarm Status Indication: Provide real time status display that indicates the current status of all devices in the device tree.

ii. Reader-controller status: Provide display of Reader-controllers that are off line.

b. Device Group Programming

i. Reader-controller Groups: Provide for programming of Reader-controller groups.

ii. Input Groups: Provide for programming of input groups.

iii. Output Groups: Provide for programming of output groups.

c. Trace

i. Historical Trace: Provide for historical trace on any Reader-controller or cardholder.

d. Test Utilities: Provide system test utilities to allow for testing of the following functions:

i. Alarm inputs status.

ii. Output operations.

iii. Credential Presentations.

iv. LED and buzzer operations

e. Real-Time Graphical Maps: Provide graphical maps that display reader-controller status and allow for manual operation of the reader-controller..

   i. Map Device Icons: Icons shall dynamically change to reflect the current state of the devices.

f. Map Formats: Support import of maps to include the following file formats:

   i. JPEG (.jpg)

   ii. Windows Metafile (.wmf)

   iii. Windows Bitmap (.bmp)

g. Web- Browser Support

   i. Support commonly used ACS functions from a standard workstation internet browser

   ii. Support commonly used ACS functions from a standard mobile phone internet browser

4. Credential Management Software Functions: The system credential management software shall provide for the following features and functions:

   a. Modification of cardholder records: Add, Modify and Delete records based upon permissions.

   b. Access and Credential Management: Provide for the following credential management functions:

      i. Assignment of single or multiple active badges.

      ii. Programming personnel groups.

      iii. Programming of group access permissions.

      iv. Programming of individual access permissions

   c. Badge Design: Provide badge design software that is integral to the access control source code with the following badge layout tools:

      i. Complete Badge design and Layout.

      ii. Image Import.

   a. ID Printers: Provide support for industry standard printers and Microsoft Certified Windows 7 printer drivers and the following badge print formats:
      iii. Double-sided full color printing.

      iv. Edge to edge printing.

G. Client Software

1. The contractor shall install the client software on 10 concurrent workstations of the owners choosing.
2. The software shall be configured to only allow access to certain zones as defined by the owner.
3. The software and web interface shall support at a minimum, 10 concurrent connections.

H. Acceptable Manufacturers:

1. S2
2. Lenel
3. Open Options

2.04 CONTACTLESS SMART CARD READERS

A. Utilize Wiegand communication.

B. Credentials:

1. Smart Card Model:
   a. Operating Frequency: 13.56 MHz (ISO 15693, 14443A & 14443B)
   b. Contactless smart card reader shall implement the following high security 13.56 MHz applications out-of-box.
   c. Secure Identity Object on HID iCLASS SE
   d. Secure Identity Object on MIFARE Classic SE
   e. Secure Identity Object on MIFARE DESFire EV1 SE
   f. Able to read 37 bit card format.

C. Operating voltage range: 5-16 VDC

D. Current draw: 45mA average and 105mA peak @ 12VDC.

E. Color: Black

F. IP 55 exterior rated.

G. With attached pigtail

H. Provide adapter plate to mount on a single-gang backbox as required.

I. Firmware upgradable via pre-programmed cards.

J. Provide the ability to transmit an alarm signal via an integrated optical tamper switch if an attempt is made to remove the reader.

K. An audio beeper and RGB light bar shall provide various tone and light sequences to signify: access granted, access denied, power up, and diagnostics.

L. Card readers shall be HID iCLASS SE R40 (920NNNNEK2037P) for standard applications and HID iCLASS SE R15 (910NNNNEK2037P) for mullion applications.

1. No non HID iCLASS SE substitutions.

2.05 POWER SUPPLIES

A. Provide an 8 output, fused power supply located next to the access control panels with the minimum following features:

1. 115 VAC input rated at 1.9 amps
2. 12 or 24 VDC fail-safe and/or fail-secure outputs at 6 total continuous amps.
3. UL 294 listed sub-assembly for access control.
4. Grey wall mountable enclosure with ground stud.
5. Eight (8), fuse protected, fail-safe and/or fail-secure access control outputs.
6. Eight (8) normally open and/or open collector access control trigger inputs.
7. Form "C" supervision contacts for AC fail, battery presence and battery fail.
8. Fire Alarm Disconnect:
   a. Fire Alarm Disconnect (latching or non-latching) is individually selectable for any or all of the eight (8) outputs.
   b. Normally open (NO) or normally closed (NC) dry contact input.
   c. Polarity reversal input FACP signaling circuit.
   d. LED indicates that the Fire Alarm Disconnect has been activated.
   e. Fire Alarm output relay for triggering auxiliary reporting devices.
9. Provide batteries and charger to provide a minimum of four (4) hours of backup time.
10. Power supply shall be Altronix AL600ULACM.
    a. Or approved equal

2.06 CABLES

A. Provide cabling per manufacturer's recommendations and code requirements for riser rated, plenum, and non-plenum cable types.

B. UTP data cabling required will be provided, installed, terminated and tested by the Division 27 structured cabling contractor.

C. UTP patch cables will be provided and installed by the owner in the IDF and provided by owner and installed by contractor at the door. The EACS contractor shall provide the owner a list of patch cable lengths at the door side.

D. Cables for electronic access controlled doors shall be bundled and include the followings conductor counts:

   1. Card reader – 6 conductor, 22 awg shielded.
   2. Lock power – 4 conductor, 18 awg unshielded.
   3. Door contact – 2 conductor, 22 awg unshielded
   4. Request to exit/spare – 4 conductor, 22 awg unshielded

E. Manufacturer:

   1. Belden #658AFS
   2. Convergent #725116
   3. General Cable #4EPL1S
   4. Or approved equal

2.07 DOOR CONTACTS/DOOR POSITION SWITCHES

A. Sealed and potted magnetic reed switch in contact housing

B. Provide DPDT for applications with multiple security systems (Access Control/Intrusion Detection) utilizing a single door contact.

C. Provide color that matches door as close as possible.

D. Provide recessed switch whenever possible.

E. Armored whip for surface mount contacts.

F. Provide GE Interlogix 1078 Series for recessed applications.

   1. Or approved equal.

G. Provide GE Interlogix 2500 Series for surface mount applications.

   1. Or approved equal.

H. Provide GE Interlogix 2200 Series for overhead door applications.

1. Or approved equal.

2.08 REQUEST TO EXIT (REX) DEVICES

A. Request to Exit devices shall be integral to the door hardware whenever possible. The contractor shall refer to the door hardware schedule and coordinate with the door hardware contractor on locations and requirements. Motion based Request to Exit devices shall only be used when not available in the door hardware.

B. The motion based REX shall be a dual technology device with Passive Infrared (PIR) and Range-Controlled Radar (RCR) motion detector.

C. Reduces false alarms by sensing both heat and physical motion.

D. Independent adjustable beam pattern and radar depth.

E. Provide with mounting plate or wall mounting plate to mount over a single-gang backbox when required.

F. Provide color that matches door as close as possible.

G. DPDT output.

H. DC Power draw: 28mA max @ 12 VDC, 17mA max @ 24 VDC.

I. AC Power draw: 38mA max @ 12 VAC, 29mA max @ 24 VAC.

J. Dimensions: 1.76”H x 7.395”W x 1.85”D.

K. Utilize contact closure REX hardware built into the handle or crashbar whenever possible.

L. Provide GE RCR-REX.

1. Or approved dual technology equal.

2.09 SERVER

A. Servers will be owner provided and installed. The EACS contractor shall provide the owner with minimum server configurations, operating system requirements and required operating system services for the remote servers and the master server.

B. The contractor shall be responsible for installing and configuring the server software.

2.10 WORKSTATIONS

A. Workstations will be owner provided and installed. The EACS contractor shall provide the owner with minimum workstation configurations and operating system requirements for the remote workstations and the master workstation.

B. The EACS contractor shall be responsible for installing and configuring client software on 5 workstations. The contractor shall include an additional 5 software installs to be used at the owners or consultants directions.

2.11 BADGES AND CREDENTIALS

A. Provide 100 badge credentials with the following features:

1. Operating Frequency: 13.56 MHz
2. 2k bit with 2 application areas.
3. Composite material printable on both sides.
4. Standard CR-80 size, 30 mil thick.
5. Programmable Magnetic stripe on back.
6. Sequential matching internal/external numbering.
7. Provide with rubber Gripper with clear vinyl strap and bulldog clip for each badge provided.
   a. HID 10685 (Gripper) with 10650 (Clip).
   b. Or approved equal.
8. The credential shall be HID iCLASS SE #3050PGGMN (use 3050PG1MN for Mag Stripe) with 37 bit and format number H10302.
   a. No substitutions.

B. Provide 50 fob credentials with the following features:

1. Operating Frequency: 13.56 MHz
2. 2k bit with 2 application areas
3. Sequential matching internal/external numbering
4. The credential shall be HID iCLASS SE #3250PNNMN with 37 bit and format number H10302.
   a. No substitutions.

C. Provide 50 non-technology badge credentials with the following features:

1. Non-technology card for general badging.

2. Composite material printable on both sides, suitable for HDP printers.
3. Standard CR-80 size, 30 mil thick.
4. Provide with rubber Gripper with clear vinyl strap and bulldog clip for each badge provided.
    a. HID 10685 (Gripper) with 10650 (Clip).
    b. Or approved equal.
5. The credential shall be HID Fargo #82136
    a. Or approved equal.

2.12 MASTER BADGE PRINTERS AND BADGING STATIONS

A. The contractor shall provide a color badge printer and badging station at the following locations:
    1. City Hall.

B. Provide a color badge station with the minimum following features:
    1. Resin Thermal Transfer dual sided printing at 300 dpi
    2. 16.7 million colors and 256 shades per pixel
    3. 75 cards per hour @ YMCKK with transfer and dual-sided printing
    4. Accepts standard CR-80 card sizes
    5. Accepts card thicknesses from 0.03” – 0.05”
    6. 100 card capacity input card hopper
    7. USB and Ethernet with internal print server
    8. Provide with embedded HID OMNIKEY 5127 13.56 MHz contactless smart card encoding for HID iCLASS SE credentials.
    9. Provide with Magnetic stripe encoding.
    10. GSA FIPS-201 approved
    11. 3.2” touch screen display
    12. Three-year printer warranty and lifetime print head warranty.

C. The contractor shall supply enough HDP film ribbons and other necessary supplies to be able to print dual sided badges. Supplies shall be certified by HID Fargo.

D. The badge printer shall be an HID Fargo HDP5000 Photo ID System.
    1. Or approved equal.

E. Provide with a HD USB camera and tripod for face capture.

1. 1080P video capture
2. Minimum of 8 megapixel still capture
3. Autofocus
4. Logitech C920 or approved equal

F. Provide with card design and production software.

1. HID Asure ID 7 Exchange #086414.
2. Or equal provided by access control manufacturer.

G. Provide with backdrop and portable stand.

1. HID #086102 (stand)
2. HID #086100 (blue backdrop).

H. Provide a fully functional card reader and IP single door controller near the printer for card functionality and verification testing.

PART 3 – EXECUTION

3.01 INSTALLATION PRACTICES

A. All services provided shall be professional and conform to the highest standards for industry practices. The Owner reserves the right to halt any installation due to poor workmanship. All work shall be defect free, and the installer shall replace, at their expense, any work found to be defective.

B. The owner reserves the right to halt any installation due to failure of contractor to observe installation-free periods due to instructional or administrative requirements. To the maximum extent possible, the owner will provide advance notice of such periods.

C. Contractor is responsible for providing a complete and functional video surveillance system.

D. All manufactured items, materials, and equipment shall be applied, installed, connected, erected, used, and adjusted as recommended by the manufacturers, or as indicated in their published literature, unless specifically noted herein to the contrary.

E. Contractor shall follow these standards and approved submittals for locations of power supplies. The Owner intends to limit the number and location of power supplies to facilitate more effective long-term support and maintenance of the system.

3.02 COORDINATION

A. Contractor shall provide up to 8 hours (up to four, 2-hour sessions) of scheduled and dedicated coordination time to assist Owner with sequence of operation, rule creation and coordination as requested by owner or consultant.

3.03 PROGRAMMING

A. Contractor shall provide up to 36 hours of scheduled programming time to assist Owner with any miscellaneous programming or integration requests by the Owner or Consultant.

3.04 TRAINING

A. Provide system operations, administration, and maintenance training by factory-trained personnel qualified to instruct.

1. Contractor shall provide up to 6 hours of scheduled and dedicated training time in three (3) four (2) hour sessions for administration and investigation.
2. The contractor shall provide up to 2 hours of dedicated training time for badge creation, printing and printer maintenance.
3. Provide printed training materials for each trainee, including product manuals, course outline, workbook or student guides, and written examinations for certification.
4. Provide hands-on training with operational equipment.
5. Training shall be oriented to the specific system being installed under this contract as designed and specified.
6. Contractor shall provide all necessary documentation of system operating parameters prior to scheduled training sessions.

3.05 AESTHETICS

A. All cables and equipment terminating at panels frames shall be vertically straight, with no cables crossing each other, from twelve inches inside the ceiling area to the termination block.

B. All cable bundles shall be combed and bundled to accommodate individual termination block rows and panels.

C. For any given telecom room, a horizontal and vertical alignment for all mounting hardware will be maintained to provide a symmetrical and uniform appearance to the distribution frame.

D. All surface-mounted devices shall be firmly secured level and plumb

E. All rack mount equipment shall be securely installed.

3.06 HARDWARE LAYOUT

A. Hardware positioning and layout shall be reviewed and approved by the Owner prior to construction. The review does not exempt Contractor from meeting any of the requirements stated in this document.

3.07 SERVER INSTALLATION PRACTICES

A. Verify that the manufacturer approved server hardware, OS meets the Owner's IT standards prior to ordering.

B. Coordinate server power, cooling, and mounting requirements with owner prior to installation.

C. Coordinate virus scan/security software requirements with owner and manufacturer prior to installation.

3.08 DEVICE CABLING/WIRING INSTALLATION PRACTICES

A. All external wire and cables shall be supported at least every five feet from the structure or as required to maintain not more than 12" cable sag between supports and without over tensioning the cables. Provide j-hooks as needed where cable tray or raceway is not available.

B. This Contractor shall coordinate installation with Division 27 cabling Contractor to ensure there is at least 2-inches of physical separation between security cabling and voice/data cabling throughout cable path. Voice/data cabling Contractor has first claim to cable tray.

C. All cables, regardless of length, shall be labeled within 18" of both ends with an identifier that is keyed to the door, room, or corridor number as identified.

D. All cables shall have 6-foot service loops neatly coiled in the equipment room. During initial cable rough-in, this Contractor shall have sufficient slack to route anywhere within the equipment room.

E. Cabling shall be adequately supported with Velcro wire wraps and horizontal support cable managers fastened to rack frame. Cables shall be dressed in a neat and orderly fashion. Any cabling or equipment installation that is deemed unacceptable by the Owner or Consultant shall be replaced or corrected by the Contractor at no additional cost. Plastic zip ties are not allowed.

F. All cables are to run at right angles to the structure, placed above the ceiling in halls or corridors.

G. Cables shall not run above red iron joist.

H. Contractor shall make every effort to conceal wiring and other apparatus into walls, floors, and ceilings, assuming code and good engineering practice allows and suggests.

I. Ties and straps shall be installed snugly without deforming cable insulation. Ties shall be spaced at uneven intervals not to exceed four feet. No sharp burrs shall remain where excess length of the cable tie has been cut.

J. Contractor shall notify Owner immediately if obstruction or hazard is discovered in a pathway provided by others.

K. Cable shall be stored and handled to assure that it is not stretched, kinked, crushed, or abraded in any way. Bend radiuses shall meet manufacturer specifications and/or recommendations. Cable shall not be installed in ambient temperatures or moisture conditions above or below the manufacturer's rating.

L. No splices shall be installed in any cable.

3.09 CABLE TERMINATION

A. Termination hardware (blocks and patch panels) positioning and layout shall be reviewed and approved by the Owner prior to construction. The review does not exempt Contractor from meeting any of the requirements stated in this document.

3.10 ACCESS CONTROL/VIDEO SURVEILLANCE/INTRUSION DETECTION INTEGRATION

A. The electronic access control system shall be integrated with the video surveillance system and intrusion detection system.

1. The access control/intrusion detection interface shall be via an RS-232 or Ethernet interface. Contact closure integration shall only be utilized if the system is existing and cannot be upgraded to support RS-232 or Ethernet. The contractor shall supply all necessary expansion boards if contact closure integration will be required.

2. The access control/video surveillance integration shall be via a native IP interface.

3. The video surveillance /intrusion detection interface shall be via an RS-232 or Ethernet interface. Contact closure integration shall only be utilized if the system is existing and cannot be upgraded to support RS-232 or Ethernet. The contractor shall supply all necessary expansion boards if contact closure integration will be required.

B. The contractor shall provide any and all licensing to integrate the systems together including any additional items to be added to the yearly maintenance agreement.

C. The following minimum features shall be included in the integration; the following list is not all inclusive or exhaustive. The integration shall be a turn-key solution:

1. Call up live and/or recorded video from an alarm or event.

2. Graphical maps showing camera icons.
3. "Mouse over" camera viewing through the DVR/NVR browser and graphical maps.
4. Playback controls for recorded video.
5. Camera names brought in from the VMS.
6. PTZ camera mouse control.
7. Database entries for intrusion arm/disarm events on individual keypads.
8. Database entries for intrusion alarm events.
9. Graphical map symbols for intrusion keypads tied to camera views.
10. Intrusion devices or zones tied to camera views.
11. Alarm pop-ups and events shall include instructions and a sequence of operation to deal with events on the Intrusion Detection System, Video Management System and Electronic Access Control System.
12. Time syncing via common NTP server.

D. The contractor shall set up a meeting between the owner, consultant and manufacturer to determine the exact functionality of the integration before the integration starts.

3.11 FIRE STOPPING

A. Fire stopping of openings between floors, fire-rated walls, and smoke-rated walls, created by others for This Contractor to pass cable through, shall be the responsibility of the This Contractor. Sealing material and application of this material shall be accomplished in such a manner that is acceptable to the local fire and building authorities having jurisdiction over this work.

B. Any openings created by or for This Contractor and left unused shall be sealed up by This Contractor.

C. This Contractor shall be responsible for creating a waterproof seal in and around any openings that This Contractor creates from the structure to the outside environment.

3.12 SYSTEM TESTING PROCEDURES

A. Prior to energizing or testing the system, ensure the following:

1. All products are installed in a proper and safe manner per the manufacturer's instructions.
2. Dust, debris, solder, splatter, etc., is removed.

3. Cable is dressed, routed, and labeled; connections are consistent with regard to polarity.

4. All products are neat, clean, and unmarred, and parts are securely attached.

B. Contractor shall ensure that each device in the security system is functioning normally and in such a manner as to meet the functional and performance requirements in this specification.

3.13 SYSTEM INSPECTION

A. Contractor shall coordinate with project representative for inspection after Contractor has completed testing of entire system.

B. Contractor shall have trained Contractor representative and testing equipment on site during inspection to assist with spot verification of tests.

C. Contactor shall verify with Project Representative the precise positioning of camera aim and shall make fine adjustments as requested.

3.14 LABELING

A. Contractor shall neatly label all security devices and cabling at both ends. All labels shall be on Project as-built drawings.

3.15 DOCUMENTATION

A. Upon completion of the installation, Contractor shall provide full documentation sets to the Consultant for approval as described in section 27 60 00. All documentation shall become the property of the Owner.

B. Documentation shall include the additional specific items detailed in the subsections below:

1. Contractor shall provide hard copy and electronic forms of the final test results.

2. Contractor shall provide a document including the following:

a. Door label/identifier

b. Location of each drop by orientation/permanent landmark in the room

c. Contractor shall provide accurate as-built Construction Drawings. The drawings are to include cable routes and device locations.

3.16 PRE-CHECK OUT

A. The Contractor shall demonstrate the following to Owner during system demonstration.

1. The card readers are fully installed and functional.

3.17 FINAL ACCEPTANCE

A. In addition to closeout requirements in section 27 60 00, This Contractor shall demonstrate the following before final approval.

1. Owner training is complete.
2. Punch list items are complete.
3. As-built documentation is complete and submitted to Owner/Consultant.

3.18 ANNUAL SUPPORT AGREEMENT

A. An annual support agreement (after the 1st year full of support/warranty) shall not be part of the bid. The contractor shall work directly with the owner at the end of the project to determine the ongoing hardware/software support. The contractor shall send the consultant a copy of the support agreement for review prior to finalization.

3.19 FINAL PROCEDURES

A. Perform final procedures in accordance with section 27 60 00.

END OF SECTION

SECTION 27 66 00 INTRUSION DETECTION SYSTEM

PART 1 – GENERAL

Unless noted otherwise, "Contractor" refers to the Security Contractor.

1.01 SUMMARY

A. This section describes the requirements, criteria, and scope of work to install Intrusion Alarms Systems.

1.02 SCOPE OVERVIEW

A. The Contractor shall provide and install a fully functional Intrusion Detection System (IDS) with software and hardware functionality as described herein.

B. The Scope-of-work shall include, but not be limited to the following:

1. Provide necessary materials, hardware, software and cabling required to furnish a fully functional system as described by this specification document and depicted on accompanying project drawings.
2. Provide low voltage signal, control, and power cables to and from power supplies, remote panels, expansion panels, and other devices as required for a complete turnkey installation explicitly indicated on drawings and fully described by this document.
3. Coordinate with Electrical Contractor (EC) for provision of conduits and high voltage power where necessary.
4. Install all System devices, materials, and equipment, and program and/or adjust as indicated by the equipment manufacturers' published literature, unless specifically noted herein to the contrary by this document.
5. Contractor shall be responsible for any and all related system programming.
6. Furnish the following, as needed, to provide a complete and fully functional system:
   a. Control Panel(s)
   b. Expansion Panel(s)
   c. Wall mounted Key pads
   d. Signal Devices
   e. Motion Detectors
   f. Door contacts
   g. Wire and Cable

h. Audible Alarm/Sirens audio alert devices

i. Cabinets and enclosures

j. UPS and Batteries

k. Hangers, supports and cable management devices

l. Other necessary equipment to meet the installation need as implied

1.03 REFERENCE

A. Previous sections and Construction Documents are included as a part of this section as though bound herein.

1.04 RELATED WORK

A. Section 27 00 00 – General Technology Requirements

B. Section 27 11 00 – Communications Equipment Rooms

C. Section 27 15 00 – Communications Horizontal Cabling

D. Section 27 16 00 – Communications Connecting Cords

E. Section 27 18 00 – Communications Labeling and Identification

F. Section 27 60 00 – Physical Security General Requirements

G. Section 27 62 00 – Video Surveillance System

H. Section 27 64 00 – Electronic Access Control System

1.05 GENERAL SUMMARY

A. This section includes products and execution requirements relating to furnishing and installing a complete and functional Intrusion Alarm system as described in this specification, and indicated on project drawings.

B. Contractor shall provide low voltage power and control lines to and from power supplies, remotely controlled equipment, and other devices, even though not explicitly indicated on drawings or listed in equipment tables.

C. Contractor shall be responsible for the coordination and provision of high voltage power and conduits where necessary.

D. Contractor is responsible for providing own cable and sleeve penetrations, coring, and other infrastructure work unless specifically noted otherwise. Contractor shall coordinate with the General Contractor prior to doing penetrations and coring.

E. All manufactured items, materials, and equipment shall be applied, installed, connected, erected, used, and adjusted as recommended by manufacturers, or

as indicated in their published literature, unless specifically noted herein to the contrary.

F. The system shall include all computer hardware and software, control panels, interfaces, communication devices, cable/wire, raceways, enclosures, mounting hardware, and all other equipment as required for a "turn-key" Intrusion Alarm system.

G. A general description, as well as detailed functional and technical drawings, for the complete intrusion alarm system at all site locations. This also includes all manuals, documentation, and operational information necessary for the maintenance, training, and operation of the intrusion alarm system.

H. The Contractor shall be responsible for any and all related programming.

I. The system shall include, but not be limited to:

1. Alarm Control panels
2. Motion detectors
3. Acoustic glass break detectors
4. Door contacts
5. Control keypads
6. Multi zone expansion panels as required

J. System Functions:

1. The intent of the system is to detect intrusion and motion events within the building and to notify the Owner's monitoring company of such events.
2. The system shall provide both silent and audible intrusion alerts that can be used together or separately.
3. The system shall be zoned (programmed) with logical (Owner defined) multiple access zones or sections while not deactivating the total system.
4. All motion detectors shall be on an individual zone.
5. Door contacts shall be individual zones, except for multiple sensors or detectors motion the same door set or window/glass set.

K. Additionally, the IDS shall include and meet the following requirements:

1. Type Class B
2. Multi-zone
3. Annunciated
4. Combination manual and automatic

5. Supervised circuitry
6. Single stage
7. Local Protective Signaling
8. Remote telephone monitoring interface
9. Sequence of operation by devices activation
10. Alarm system activation
11. Enunciator activation
12. Control lock-in
13. Automatic dialer contacts monitoring company with required information
14. Activation acknowledged operation
15. Visual signals remain activated
16. Subsequent device activation
17. Alarm system resounds

1.06 SYSTEM ARCHITECTURE

A. The intrusion alarm system shall provide zoned detection and primary and secondary notification of unwanted and forced entries into a facility. Security devices such as door contacts and motion detectors will be installed at specified areas and provide on and off-site detection, and in-turn notification of these unwanted events. The Owner will provide the 24-hour alarm monitoring company information to the Contractor for programming.

B. The intrusion alarm system shall provide motion detection and door contact coverage of all egress and ingress doors and roof hatches of the facility.

C. Network

1. The intrusion alarm system hardware shall be capable of interfacing to an IEEE 802.3 standard local area network (LAN).
2. The LAN shall use standard network cables. The following are the acceptable cable types:
   a. Fiber Optic
   b. Category 6

1.07 PRODUCT SUBSTITUTION PROCEDURES

A. Requests for Substitutions: Should the Contractor request a change in the material that is to be supplied, from that which was specified in the contract,

the Contractor shall provide the Owner and the Consultant with a written request for said change that includes the reason(s) for the substitution request.

B. Requirements: The Request for Substitution shall include the following:

1. Reason for substitution.
2. Material data sheets for both the proposed item(s) and the item(s) to be replaced.
3. Cost savings to the Owner, if any.

C. Approval: The Owner may approve or deny the Request for Substitution. The Owner reserves the right to govern over and proclaim whether proposed products are equal to the specifications. The Contractor shall not procure any substitute materials until the Owner has approved and signed the Request for Substitution and passed copies to the Contractor and the Consultant. Any procurement or work performed prior to this approval is at the Contractor's own risk.

1.08 WARRANTY

A. Contractor shall guarantee all materials, equipment, etc., for two (2) years from date of substantial completion of work. This guarantee shall include labor, material, and travel time.

B. All Intrusion Alarm systems, materials, and labor shall be under warranty for 12 months from date of final acceptance.

PART 2 – PRODUCTS

2.01 ALARM CONTROL PANEL

A. Shall be fully programmable 574 zone UL listed, Commercial intrusion alarm panel. Other features shall include 506 Form C relays, 32 areas and 10,000 users. The panel shall include Ethernet connectivity with a digital dialer for backup.

B. The panel shall be compatible with wireless modules.

C. Provide zone expansion modules as needed.

D. Provide support for up to 16 keypads.

E. The Intrusion Detection System shall be compatible and fully integrated with the Electronic Access Control system via Ethernet.

F. The system shall have battery backup for a minimum of 4 hours of operation.

G. The panel shall be hardwired to a dedicated electrical circuit. Wall warts are not acceptable.

H. Provide with management software.

I. The system shall be integrated with the Owner's Active Directory.

J. Manufacturer:

1. DMP XR500N

2. Or approved equal

2.02 KEYPADS

A. The keypads shall interface directly with the intrusion control panel.

B. The keypad shall be a backlit LCD touch screen.

C. The keypad LCD screen shall display zone status and enable control for setting the system.

D. Manufacturer:

1. DMP 7760

2. Or approved equal

2.03 DOOR CONTACTS/DOOR POSITION SWITCHES

A. Sealed and potted magnetic reed switch in contact housing.

B. Provide DPDT for applications with multiple security systems are utilizing a single door contact.

C. Provide color that matches door as close as possible.

D. Provide recessed switch whenever possible.

E. Provide GE Interlogix 1078 Series for recessed applications.

1. Or approved equal.

F. Provide GE Interlogix 1045 Series for surface mount applications.

1. Or approved equal.

G. Provide GE Interlogix 2200 Series for overhead door applications.

1. Or approved equal.

2.04 MOTION DETECTORS

A. The motion detector shall be a dual technology device with Passive Infrared (PIR) and Range-Controlled Radar (RCR) motion detector.

B. Reduces false alarms by sensing both heat and physical motion.

C. 65’, 360 degree detection radius with 18 curtains.

D. Can be mounted up to 16.4’ AFF.

E. Provide with ceiling mounting plate when required.

F. White.

G. Provide GE Interlogix DD669-U.

1. Or approved dual technology equal.

2.05 ACOUSTIC GLASS BREAK DETECTORS

A. 25’, 360 degree detection radius.

B. Form A contacts.

C. White.

D. Manufacturer:

1. GE Interlogix 5812-RND

2. Or approved equal

2.06 PANIC AND DURESS BUTTONS

A. Stainless steel

B. DPDT contacts for connecting to multiple systems

C. Fully supervised

D. Reset key for testing and resetting alarms

E. Recessed button to prevent accidental activation

F. Coordinate exact mounting location with owner prior to purchase and installation

G. Manufacturer:

1. Honeywell 269R

2. Or approved equal

2.07 AUDIBLE ALARM

A. The intrusion system shall connect to the PA system in the MER via contact closure to trigger a zoned alarm over the PA system. The Intrusion contractor shall coordinate with the PA contractor on connection and pre-configured messages.

2.08 DEVICE CABLE TYPES BY USE

A. Door Contacts, Panic/Duress Buttons: 22-gauge, two-conductor, unshielded, stranded cable shall be provided for all door contacts. The cable shall be white in color and plenum rated (West Penn, General Cable, and Genesis). Door contact cabling shall not exceed 500 feet from the nearest panel.

B. Motion Detectors: 22-gauge, four-conductor, shielded, stranded cable shall be provided for all motion detectors. The cable shall be white in color and plenum rated (West Penn, General Cable, and Genesis). Motion detector cabling shall not exceed 500 feet from the intrusion alarm expansion model or nearest alarm panel on 22-guage.

C. Keypads: 18-guage, four-conductor, non-shielded, non-twisted, stranded cable shall be provided for keypads. The cable shall be white in color and plenum rated (West Penn, General Cable, and Genesis). Keypad cabling shall not exceed 1000 feet from the intrusion alarm expansion model or nearest alarm panel on 18-guage.

D. Follow manufacturer's recommendations for all systems cabling.

PART 3 – EXECUTION

3.01 GENERAL

A. Prerequisites

1. The Contractor shall maintain a competent (single point of contact) project supervisor, along with competent technical personnel acceptable to the Owner and Consultant, during the entire installation process. Best efforts shall be made to avoid change of the project supervision during the project without prior written approval from the Owner and/or Consultant.

2. The Contractor installing any equipment/devices shall be responsible for providing all interconnecting cables to and/or between same equipment that may be required to make equipment fully operational.

B. Requirements and Responsibilities

1. The Contractor shall provide, furnish, deliver, transport, erect, install, configure, and connect completely all of the material and equipment described herein or depicted on project drawings. The contractor shall supply all other incidental material required, such as interconnecting cables, to make the work complete, and to install all systems in first class operating condition.

2. Perform this work in accordance with acknowledged industry and professional standards and practices, existing build conditions, and as

specified herein. Proved and install all materials, devices, components, and equipment for complete, operational systems.

3. Coordinate all efforts and verify field conditions with those of related trades. In the event of any conflicts, delays or improper preparatory work by others, notify the Owner or Owner's Consultant: the Owner and Owner's Consultant's decision will be binding.

3.02 INSTALLATION PRACTICES

A. All services provided shall be professional and conform to the highest standards for industry practices. The Owner and Owner's Consultant reserve the right to halt any installation due to poor workmanship. All work shall be defect free, and the installer shall replace, at their expense, any work found to be defective.

B. The Contractor shall exercise care during installation - damage to cables or equipment will not be accepted. The Contractor will be required to remove any damaged cabling or equipment and replace with new.

C. Contractor is responsible for providing a complete and functional intrusion alarm system.

D. Contractor shall provide low voltage power and control lines to and from power supplies, remotely controlled equipment, and other devices, even though not explicitly indicated on drawings or listed in equipment tables.

E. All manufactured items, materials, and equipment shall be applied, installed, connected, erected, used, and adjusted as recommended by the manufacturers, or as indicated in their published literature, unless specifically noted herein to the contrary.

F. The Contractor shall follow these standards and approved submittals for locations of power supplies. The Owner intends to limit the number and location of power supplies to facilitate more effective long-term support and maintenance of the system.

G. The Contractor shall provide rack shelves or rack mounting ears for any equipment that is not rack mountable. All equipment installed using shelves shall be fastened to the rack shelf.

H. Install plates as required on back boxes where they exist. Provide cut-in back boxes where boxes do not exist.

I. Install surface mounted cable raceway systems that match the surface color and/or the other surface mounted raceways, where cables cannot run within fishable walls.

J. The Contractor installing any RF devices shall be aware that RF devices may cause interference to equipment, and shall take whatever precautions necessary to avoid causing interference.

K. The Owner will provide programming information needed to help Contractor with configuration of system. The Contractor shall have the responsibility to program the system, assure proper communications between controlling points and any monitoring companies, and to adjust any system or device causing false alarm conditions.

L. The Contractor shall be responsible for interfacing to existing alarm system as required by the Owner. Programming the alarm system with codes and zones will be done by the Owner.

M. Consideration shall be given not only to operation efficiency, but also to overall aesthetic factors.

3.03 COORDINATION

A. Contractor shall provide up to 4 hours (up to two, 2-hour sessions) of scheduled and dedicated coordination time to assist Owner with sequence of operation, zone coordination, rule creation and coordination as requested by owner or consultant.

3.04 TRAINING

A. Provide system operations, administration, and maintenance training by factory-trained personnel qualified to instruct.

1. Contractor shall provide up to 4 hours of scheduled and dedicated training time in two (2) two (2) hour sessions for administration and investigation.
2. Provide printed training materials for each trainee, including product manuals, course outline, workbook or student guides, and written examinations for certification.
3. Provide hands-on training with operational equipment.
4. Training shall be oriented to the specific system being installed under this contract as designed and specified.
5. Contractor shall provide all necessary documentation of system operating parameters prior to scheduled training sessions.

3.05 SUPPORT

A. The Contractor shall make available technical resources, as deemed necessary by the Owner, for database integration projects.

3.06 AESTHETICS

A. All cables terminating at the panel frames shall be vertically straight, with no cables crossing each other, from twelve inches inside the ceiling area to the termination block.

B. All cable bundles shall be combed and bundled to accommodate individual termination block rows and panels.

C. In MDF, a horizontal and vertical alignment for all mounting hardware shall be maintained to provide a symmetrical and uniform appearance to the distribution frame.

D. All surface-mounted devices shall be firmly secured and level.

3.07 HARDWARE LAYOUT

A. Hardware positioning and layout shall be according to project drawings.

3.08 DEVICE CABLING/WIRING INSTALLATION PRACTICES

A. Contractor shall coordinate with the Electrical Contractor their requirements for conduits and proper AC power to service all equipment installed by Contractor, in locations where power is not available.

B. Contractor shall provide for proper ground system to all equipment.

C. Each cable group that can cause interference to another group shall be separated by sufficient distance so as not to cause signal contamination or interference.

D. All external wire and cables shall be supported at least every five feet from the structure, or as required to maintain not more than 12" cable sag between supports and without over tensioning the cables.

E. All cables, regardless of length, shall be marked with indelible color-coded labels within 18" of both ends with an identifier that is keyed to the door, room, or corridor number as identified. Labels shall be directly hot stamped or factory stamped, closed sleeve method. Adhesive strip labels may only be used if protected by transparent heat-shrink tubing. There shall be no unmarked cables at any place in any part of any system. Marking codes used on cables shall correspond and be shown clearly on as-built drawings.

F. Each cable shall be marked at all cable ends with a standard nomenclature (Device, #, closet letter). The MDF will be closet “A” and will match Owner closet designations. Include the cable nomenclature on as-built drawings.

G. All cables shall be separated into like groups, according to signal or power levels, and routed separately to eliminate signal contamination and crosstalk - this includes both inside and outside of equipment racks.

H. All cables shall have 6-foot service loops neatly coiled in accessible ceiling. During initial cable rough-in, the Contractor shall have sufficient slack to route anywhere within MDF. Coordinate exact panel and power supply mounting locations with Electrical Contractor.

I. Cabling shall be adequately supported with Velcro wire wraps and horizontal support cable managers fastened to rack frame. Velcro straps shall be installed snugly without deforming cable insulation. Cables shall be dressed in a neat and orderly fashion. Any cabling or equipment installation that is deemed unacceptable by the Owner or Consultant shall be replaced or corrected by the Contractor at no additional cost.

J. Cable Ties shall be installed snugly without deforming cable insulation. Ties shall be spaced at uneven intervals not to exceed four feet. No sharp burrs shall remain where excess length of the cable tie has been cut.

K. All cables are to run at right angles to the structure, placed above the ceiling in halls or corridors.

L. Cables shall not run above red iron joist.

M. Contractor shall make every effort to conceal wiring and other apparatus into walls, floors, and ceilings, assuming code and good engineering practice allows and suggests.

N. Contractor shall notify Owner or Owner's Consultant immediately if obstruction or hazard is discovered in a pathway provided by others.

O. Cable shall be stored and handled to assure that it is not stretched, kinked, crushed, or abraded in any way. Bend radiuses shall meet manufacturer specifications and/or recommendations. Cable shall not be installed in ambient temperatures or moisture conditions above or below the manufacturer's rating.

P. No splices shall be installed in any cable.

Q. Any exterior exposed will be contained in waterproof conduit with the appropriate waterproof fittings.

3.09 EQUIPMENT CABINET WIRE AND CABLE INSTALLATION

A. All power cables, control cables, and high level cables shall be grouped to one side of the equipment rack while low level cables grouped to the other side.

B. All equipment rack wiring and cabling shall be neatly laced, and ends dressed with heat shrink tubing, and all cables shall have service loops between the horizontal tie bar and the connection to equipment. Rack cabling shall be adequately supported with tie wraps or Velcro wire wraps, and horizontal support bars to rack frame as it enters or exits the front or back of equipment.

C. All equipment rack wiring and cabling shall be neatly dressed.

D. Rack cabling shall be adequately supported with Velcro wire wraps and horizontal support cable managers fastened to rack frame.

3.10 INFRASTRUCTURE WIRE AND CABLING INSTALLATION

A. All external equipment cabinet wire and cable shall be supported at a minimum every 5 feet from the structure, or as required to maintain not more than 12" cable sag between supports and without over tensioning the cables.

B. All cables, regardless of length, shall be labeled within 18" or less of each end with an identifier as described above (Section 3.07, paragraphs E and F) and listed on as-built drawings and floor plans.

C. All cables are to run at right angles to the structure, placed above the ceiling in halls and corridors.

D. Cables shall not run above red iron joist.

E. In MDF or IDF equipment closets, provide ladder cable tray vertically and horizontally to support cable bundles below ceiling to equipment cabinets.

F. Contractor shall make every effort to conceal wiring and other apparatus into walls, floors and ceilings, assuming any applicable codes and good engineering practice allows and suggests.

G. All cabling systems installed in public areas shall be installed within walls, ceiling or floors or within surface wiring pathways as dictated by codes and good engineering practices.

H. Contractor shall notify Owner or Owner's Consultant immediately if obstruction or hazard to cable paths are discovered and seek corrective actions

I. The cables shall be supported by properly insulated wire support hangers, bridal rings, "D" rings, ladder cable tray, or inner duct as may be necessary to support cables.

J. Contractor shall seal any cable penetrations they may use or make where the penetration is part of a firewall or acoustic barrier.

3.11 CABLE TERMINATION

A. Termination hardware (blocks and patch panels) positioning and layout are to be according project drawings.

3.12 CONNECTORS/CONNECTIONS

A. Moisture Resistance: All connectors shall be crimped or applied in such a way as to prevent moisture from entering the connector or cable.

B. Preparation: Cables shall be carefully prepared and connectors installed as directed by the manufacturer. Proper stripping devices and crimping tools shall be used.

C. Terminations: Connectors shall be carefully fitted to mating devices on equipment to avoid damage to mating contacts, inserts, or bodies. Specialized terminations shall be made in a neat and secure manner, suited to the service of the wire, and as directed by the manufacturer. In all cases, where the manufacturer specifies the terminations, those terminations shall be used.

D. Termination Testing: The strength of the termination shall be tested by manually pulling on the connector and cable. Any terminations that exhibit movement, loose cable, or insecure connections shall be re-terminated.

3.13 INTRUSION DETECTION/ACCESS CONTROL/VIDEO SURVEILLANCE INTEGRATION

A. The intrusion detection system shall be integrated with the electronic access control system and the surveillance system.

1. The access control/intrusion detection interface shall be via an RS-232 or Ethernet interface. Contact closure integration shall only be utilized if the system is existing and cannot be upgraded to support RS-232 or Ethernet. The contractor shall supply all necessary expansion boards if contact closure integration will be required.

2. The access control/video surveillance integration shall be via a native Ethernet interface.

3. The video surveillance /intrusion detection interface shall be via an RS-232 or Ethernet interface. Contact closure integration shall only be utilized if the system is existing and cannot be upgraded to support RS-232 or Ethernet. The contractor shall supply all necessary expansion boards if contact closure integration will be required.

B. The contractor shall provide any and all licensing to integrate the systems together including any additional items to be added to the yearly maintenance agreement.

C. Refer to the Electronic Access Control and Video Management System specification sections for specific integration requirements.

D. The Intrusion system shall be time syncing to common NTP server.

E. The contractor shall set up a meeting between the owner, consultant and manufacturer to determine the exact functionality of the integration before the integration starts.

3.14 SPECIAL TECHNIQUES

A. Waterproofing: Contractor shall be responsible for creating a waterproof seal in and around any openings the Contractor creates, or are created by others for use by Contractor, that enter or exist in a structure to the outside environment.

3.15 FIRE STOPPING

A. Fire stopping of openings between floors, fire-rated walls, and smoke-rated walls, created by others for the telecommunication contractor to pass cable through, shall be the responsibility of the security contractor. Sealing material and application of this material shall be accomplished in such a manner that is acceptable to the local fire and building authorities having jurisdiction over this work.

B. Any openings created by, or for Contractor, and left unused, shall be sealed up as part of this work by the telecommunication contractor.

3.16 TEST REQUIREMENTS FOR DEVICE CABLING

A. Contractor shall perform continuity tests to ensure cables are free of shorts within the pairs, and shall verify cables for continuity, pair validity and polarity, and conductor position.

3.17 SYSTEM TESTING PROCEDURES

A. Prior to energizing or testing the system, ensure the following:

1. All products are installed in a proper and safe manner per the manufacturer's instructions.
2. Dust, debris, solder, splatter, etc., is removed.
3. Cable is dressed, routed, and labeled; connections are consistent with regard to polarity.
4. All products are neat, clean, and unmarred, and parts are securely attached.

B. Contractor shall ensure that each device in the security system is functioning normally and in such a manner as to meet the functional and performance requirements in this specification.

3.18 SYSTEM INSPECTION

A. Contractor shall coordinate with Consultant for inspection after Contractor has completed testing of entire system.

B. Contractor shall have trained Contractor representative and testing equipment on site during inspection to assist with spot verification of tests.

C. Contractor shall demonstrate to Consultant the functionality of the system, including the selection of various display modes and accessing system functions.

D. Contractor shall verify with Consultant the precise positioning of all devices and shall make fine adjustments as requested.

3.19 LABELING

A. Contractor shall neatly label all security devices and cabling at both ends. All labels shall be on project as-built drawings.

B. Contractor shall label both ends of the cable within four (4) inches of the termination with the same label identifier. These will be machine printed, Brady (or equivalent) labels.

C. Panels shall have labels showing cable numbers and far end locations for each cable terminated in the cabinet.

3.20 DOCUMENTATION

A. Upon completion of the installation, Contractor shall provide full documentation sets to the Consultant for approval. All documentation shall become the property of the Owner.

B. Documentation shall include the items detailed in the subsections below:

1. Contractor shall provide hard copy and electronic forms of the final test results.

2. Contractor shall provide a document including the following:

a. Device label/identifier

b. Location of each device by room or corridor number

C. Contractor shall provide accurate as-built Construction Drawings. The drawings are to include cable routes and device locations.

D. Consultant will provide floor plans in paper and electronic formats (".dwg," AutoCAD rel. 2010 and ".dxf") on which as-built construction information can be added. The Contractor shall modify these documents accordingly to denote as-built information as defined above and then return the documents to the owner.

3.21 FINAL ACCEPTANCE

A. The Contractor shall demonstrate the following before final approval.

1. Owner training is complete.

2. Punch list items are complete.

3. As-built documentation is complete and submitted to Owner/Consultant.

3.22 CLOSEOUT PROCEDURES

A. Closeout Submittals: Contractor shall provide closeout documentation to the Consultant. The Consultant shall receive the closeout submittals no less than 72 hours prior to the scheduled inspection time.

B. Inspection: Contractor shall be present for the inspection by the Consultant. Contractor shall supply all testing equipment needed to verify compliance with the specifications.

C. Punch List: Work or materials found to be incomplete, of unsatisfactory quality, failing to meet written system specifications, and/or unacceptable to the Consultant, shall be documented by the Consultant and provided to Contractor to rectify.

D. Re-Inspection: If a re-inspection is necessary, the costs of the Consultant's additional travel, hours, and expenses may be deducted by the Owner from the contract amount due Contractor.

E. Punch List Approval: The punch list shall be considered complete only after having been signed by the Owner and Consultant.

3.23 CLEANING

A. Prior to system final turnover to Owner:

1. Remove all dirt and debris from equipment racks and equipment rooms.
2. Clean all equipment filters, vents, and fans.
3. Clean all enclosures and back box interiors thoroughly before installing plates, panels, or covers.

END OF SECTION