PROJECT MANUAL

PROJECT NAME:

NCF Fire Alarm & Security Systems Replacement

PROJECT ADDRESS:
Newton Correctional Facility (NCF)
307 South 60th Avenue West
Newton, IA 50208

PROJECT DATE: July 13, 2018

OWNER:
Iowa Department of Administrative Services
General Services Enterprise – Design & Construction Bureau
109 Southeast 13th Street
Des Moines, Iowa 50319

OWNER PROJECT NUMBER: 8994.00

OWNER REQUEST FOR BID NUMBER: RFB 0918335077

CONSTRUCTION MANAGER:
The Samuels Group
317 6th Ave.
Suite 720
Des Moines, IA
50309

CONSTRUCTION MANAGER PROJECT NUMBER: 7072

ARCHITECT:
KCL Engineering
300 4th Street
West Des Moines, IA
50265

ARCHITECT PROJECT NUMBER: 18032

SECTION 00 0105

CERTIFICATIONS PAGE

I hereby certify that the portion of this technical submission described below was prepared by me or under my direct supervision and responsible charge.

Discipline: ELECTRICAL

Company Name: KCL ENGINEERING

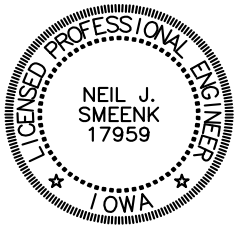
Address: 300 4TH STREET WEST DES MOINES

Telephone: 515-724-7938

Name: NEIL SMEENK

License#: 17959

Stamp:



Responsibility: SPECIFICATION DIVISIONS 26, 27 AND 28. ALL DRAWING SHEETS

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D.	T0.03	SITE PLAN- COMMUNICATIONS INFRASTRUCTURE
E.	T0.04	SITE PLAN- SECURITY SYSTEMS
F.	FA.A1	FIRE ALARM PLAN- BUILDING A- FIRST FLOOR
G.	FA.B1	FIRE ALARM PLAN- BUILDING B- FIRST FLOOR
H.	FA.B2	FIRE ALARM PLAN- BUILDING B- SECOND FLOOR
I.	FA.CD1	FIRE ALARM PLAN- BUILDING C AND D- FIRST FLOOR
J.	FA.CD2	FIRE ALARM PLAN- BUILDING C AND D- SECOND FLOOR
K.	FA.E1	FIRE ALARM PLAN- BUILDING E- FIRST FLOOR
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W.	T1.CD1	TECHNOLOGY PLAN- BUILDING C AND D- FIRST FLOOR
X.	T1.CD2	TECHNOLOGY PLAN- BUILDING C AND D- SECOND FLOOR
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Z.	T1.E2	TECHNOLOGY PLAN- BUILDING E- SECOND FLOOR
AA.	T1.H1	TECHNOLOGY PLAN- BUILDING H- FIRST FLOOR WEST
BB.	T1.H2	TECHNOLOGY PLAN- BUILDING H- FIRST FLOOR EAST
CC.	T1.H3	TECHNOLOGY PLAN- BUILDING H- SECOND FLOOR
DD.	T1.I1	TECHNOLOGY PLAN- BUILDING IPI- FIRST FLOOR
EE.	T1.J1	TECHNOLOGY PLAN- BUILDING J- FIRST AND MEZZ. FLOOR
FF.	T1.K1	TECHNOLOGY PLAN- BUILDING K- FIRST FLOOR
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SECTION 00 1113

NOTICE TO BIDDERS

RFB #0918335077

The Iowa Department of Administrative Services – Central Procurement Bureau, Hoover State Office Building, Level 3, 1305 East Walnut Street, Des Moines, Iowa 50319 will be receiving bids for the replacement of the following systems: communications infrastructure and network equipment, fire detection and alarm, detention controls, perimeter fence alarm, and video surveillance at Newton Correctional Facility at 307 South 60th Avenue West, Newton, Iowa 50208.

The Iowa Department of Administrative Services anticipates construction to begin on October 1st, 2018 and end on March 29, 2019.

Bids must be received no later than **2:00 pm, local time, Tuesday, August 14th, 2018**. Late bids will not be considered. Bids are to be delivered to the Office of the Department of Administrative Services – Central Procurement Bureau, Hoover State Office Building, Level 3, 1305 East Walnut Street, Des Moines, Iowa, 50319. Bids under $135,000.00 may also be delivered via e-mail to Steve Oberbroeckling at steve.oberbroeckling@iowa.gov. Bids shall be submitted on the Bid Form and shall be accompanied by a Bid Security as set forth in the Instructions to Bidders in the amount of 5% of the total bid amount. Scanned and emailed bids must be legible. For emailed bids, the bidder must include a scanned image of a bid bond prepared by a bonding company licensed to transact business in the State of Iowa. Each bid shall be accompanied by a bid bond, cashier's check or a certified check drawn upon a solvent bank chartered under the laws of the United States of America. If providing bid security in forms other than a bid bond, then the bid must be hand delivered and not emailed.

The Iowa Department of Administrative Services reserves the right to reject any and all bids, and to waive irregularities and to accept a bid that is deemed in the best interest of the State of Iowa.

Bidders must comply with all affirmative action/equal employment opportunity provisions of the State of Iowa and the Federal Government.

This project is exempt from Iowa Sales Tax. Davis Bacon Wages **will not** apply to this project.

An **optional** Pre-Bid meeting will be held on Tuesday, July 24th, 2018 at 10:00 am at Newton Correctional Facility at 307 South 60th Avenue West, Newton, Iowa 50208. This meeting is not mandatory but is highly recommended.

Bidding Documents may be obtained from Beeline and Blue by visiting www.beelineandblue.com or by calling (515) 244-1611 on Monday, July 16th, 2018.

For further information regarding this project contact:
Steve Oberbroeckling – Issuing Officer
Iowa Department of Administrative Services – Central Procurement Bureau
1305 East Walnut Street
Des Moines, Iowa 50319
Phone: (515) 725-2893
E-Mail: steve.oberbroeckling@iowa.gov

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SECTION 00 2113

INSTRUCTIONS TO BIDDERS

RFB #0918335077

PART 1 - **GENERAL**

1.01 SECTION INCLUDES

A. Project Description
B. Owner
C. State Agency Representatives and Contacts
D. Proposal Form and Submissions
E. Taxes
F. Alternate Bids
G. Drawings
H. Bid Security
I. Due Date and Time for Receipt of Bids
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N. Addenda and Interpretations of the Contract Documents
O. Substitutions
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Q. Public Records and Requests for Confidential Treatment
R. Withdrawal of Bid
S. Bid Closing
T. Basis of Bids
U. Informalities/Rejection of Bids
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W. Preference
X. Qualifications
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Z. Form of Agreement between Owner and Contractor
AA. Execution of Contract
BB. Laws and Regulations
CC. Contract Documents and Order of Precedence
DD. Conditions of the Work
EE. Subcontracts
FF. Project Manual/Drawings

1.02 PROJECT DESCRIPTION

A. Project Description: Replacement of the following systems: communications infrastructure and network equipment, fire detection and alarm, detention controls, perimeter fence alarm, and video surveillance at Newton Correctional Facility at 307 South 60th Avenue West, Newton, Iowa 50208.

1.03 OWNER

A. State of Iowa, Department of Administrative Services, Hoover State Office Building, Level 3, 1305 East Walnut Street, Des Moines, IA 50319

1.04 STATE AGENCY REPRESENTATIVES AND CONTACTS

A. PURCHASING AGENT: Steve Oberbroekling – Issuing Officer, State of Iowa, Department of Administrative Services, Central Procurement Bureau, Hoover State Office Building, 3rd floor, 1305 East Walnut Street, Des Moines, IA 50319-0105, Phone: 515-725-2893; email: steve.oberbroeckling@iowa.gov

B. OWNER REPRESENTATIVE: Brad Tonyan, State of Iowa, Department of Administrative Services State Design and Construction Resources Bureau, 109 SE 13th Street, Des Moines, IA 50319, Phone: 515-725-1259; email: brad.tonyan@iowa.gov

C. ON-SITE COORDINATOR: Mike Philby, Plant Operations Manager, Newton Correctional Facility Newton, IA 50208, Phone: 641-792-7552; email: michael.philby@iowa.gov and/or Jimmi Gustafson, Electronics Engineering Tech, Newton Correctional Facility, Newton, IA 50208, Phone: 641-792-7552; email: jimmi.gustafson@iowa.gov

D. CONSTRUCTION MANAGER CONTACT: Jerry Dehnke, The Samuels Group, 317 6th Ave, Suite 720 Des Moines, IA 50309, Phone: 515-661-7142; email: jdehnke@samuelsgroup.net

E. DESIGN PROFESSIONAL CONTACT: Chris Davis, KCL Engineering, 300 4th St West Des Moines, IA 50265, Phone: 515-724-7938; email: cdavis@kclengineering.com

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.01 PROPOSAL FORM AND SUBMISSION

A. A properly prepared and submitted bid document is the bidder's responsibility. Bids are to be made in accordance with these Instructions to Bidders and items included on the Bid Form. Failure to comply may be cause for rejection.

B. The Bid is to consist of the "Bid Form" (required) or exact copy of the form, together with the other documents specified below to be submitted with the Bid, in which copies are included with these Bidding Documents.

1. The total bid package submitted is required to include the following documents (properly completed) and submitted in properly labeled envelopes:
   a. A ***SEALED BID*** envelope (a regular envelope furnished by the Bidder) identified with the name and address of the company submitting the bid, the project name, the bid package name and/or number, sealed bid number, due date and time for bids' receipt, and clearly labeled ***SEALED BID*** containing:
      1) Bid Form (blank form included in Project Manual) (Required)
      2) Non-discrimination Clause form (blank form included in Project Manual)
      3) Targeted Small Business Pre-bid Contact form (blank form included in Project Manual)
      4) Bid Security (documentation provided by Bidder) (Is to be submitted in a separate envelope) (Required)
2. **BIDS LESS THAN $135,000.00 MAY BE EMAILED TO steve.oberbroeckling@iowa.gov ALONG WITH ALL REQUIRED BID DOCUMENTS. SCANNED AND EMAILED BIDS MUST BE LEGIBLE. SCANNED IMAGES OF CHECKS FOR BID SECURITY WILL NOT BE ACCEPTED FOR EMAILED BIDS. FOR EMAILED BIDS, THE BIDDER MUST INCLUDE A SCANNED IMAGE OF A BID BOND PREPARED BY A BONDING COMPANY LICENSED TO TRANSACT BUSINESS IN THE STATE OF IOWA. BIDS OVER $135,000.00 WILL BE**

CONSIDERED FORMAL BIDS AND MUST BE DELIVERED IN HARD COPY TO THE PURCHASING OFFICER LISTED ABOVE BEFORE THE BID DEADLINE.

C. All blank spaces on each document are to be completed, in ink or typewritten, unless the blank has otherwise been noted by Owner as “Not Applicable to this Project.” Erasures or corrections shall be initialed by the person signing the bid. Where requested, amounts shall be stated in both words and figures. If words and figures do not agree, the amount written in words shall be considered correct.

D. Include the amount for performing all work described in the drawings and specifications for Base Bid and for each Alternate Bid requested.

E. Acknowledge receipt of all Addenda issued, where so indicated on the Bid Form.

F. The Bid Form and other required documents are to be signed, where so indicated, by an officer of the company having authority to bind the company in a contract. The name of the person signing the bid and his/her title shall be typed or printed below the signature.

G. Commencement of the work of the contract shall begin with the Contractor’s receipt of a fully executed contract (signed by both parties).

H. The Owner reserves the right to award a contract for Base Bid only, or for Base Bid in combination with any, or all, identified Alternate Bids. The Owner reserves the right to award a contract for individual Bid Packages, or any combination of Bid Packages. Each Bidder must comply with all of the General Requirements of the project and any requirements of the Project manual that apply to their scope of work.

I. The company's Federal I.D. Number and the Iowa Contractors Registration Number shall be included in the Bid Form.

J. Unless indicated otherwise, the Bid shall be for a single responsibility contract for all work as indicated on the Drawings and specified in the Project Manual, and shall be a lump sum amount. All requested Alternate Bids are to be bid. Failure to do so may result in disqualification of your bid. If no change in the Base Bid amount is required with respect to consideration of a particular Alternate Bid, enter “No Change” in the blank for that Alternate Bid.

K. Where so requested, provide Unit Prices for the designated types of work and in the units specified, in which the Unit Prices would be used as adjustments to the quantities described in the Bidding Documents as the basis for the Base Bid and any Alternate Bid work. A Unit Price would be applicable in the event the Owner should request additional work of that type beyond the extent and quantity that has been established as the scope of the work by graphic delineation and notations on the Drawings, or by otherwise stipulating in the Bidding Documents a numerical quantity of the work, for the Bidder’s use in determining the lump sum bid amount for the Base Bid and any requested Alternate Bid containing such work. The Unit Prices shall also be used to adjust the Contract Amount for actual quantities of work involved when the work subject to Unit Price adjustment differs by being less in quantity than that contemplated by the Bidding Documents’ original scope of work for the respective Base Bid or Alternate Bid.

L. A Completed State of Iowa Nondiscrimination Clause form and Subcontractor Targeted Small Business Enterprise Pre-Bid Contact Information form, included in these Bidding Documents, are to accompany the Bid. Bidders shall comply with all affirmative action/equal opportunity provisions of State and Federal laws. The Owner seeks to provide opportunities for Targeted Small Businesses in accordance with the provisions of Chapter 73 of the Code of Iowa.

M. The completed Bid Form, and above referenced documents, are to be placed in the Sealed Bid envelope included with these Bidding Documents. Any required Bid Security shall be provided, in the form and amount specified elsewhere in these Instructions to Bidders, at the time of submission of the Bid. When a site visit is mandatory as specified elsewhere in these Instructions to Bidders, and a Certificate of Site Visit is required to be submitted with the Bid as evidence of such visit having occurred for purposes of observing the conditions of the site and the work proposed therein, the Certificate shall be enclosed in the Sealed Bid envelope containing the Bid Form, Bid Security and other documents.

3.02 **TAXES**

A. In accordance with Section 423 of the Code of Iowa and 701-19 of the Iowa Administrative Rules, Iowa Construction Sales Tax Exemption Certificates for this project will be issued. Do not include Iowa sales tax or use tax, or any local option sales tax, on construction materials in determining your bid

prices. The successful Contractor will be required to notify the Department of Administrative Services project manager of all Subcontractors within 48 hours of the determination of the apparent low bidder and receipt of the "Notification of Intent to Award a Contract" for the project's construction. Information on the Contractor and each Subcontractor shall include the firms' name, address, contact person, federal tax identification number, and the Iowa contractor registration number. For the Contractor and each Subcontractor, designate the type of trade or category of work that is to be provided on the project. The Construction Manager for the Department of Administrative Services must be informed when any Subcontractor is added to the project. Following receipt of the information, the Construction Manager for the Department of Administrative Services will arrange to have an authorization letter and certificate (please see sample, included in the Project Manual) issued on behalf of the Contractor and each Subcontractor and will forward the documents to the Contractor for distribution and use by each in purchasing construction materials for this project. Certificates issued for this project shall be used for tax-exempt purchasing construction materials for this project only.

3.03 ALTERNATE BIDS

A. Bidders are to bid all Alternates requested on the Bid Form. Alternates quoted will be reviewed and accepted or rejected at the option of the Department of Administrative Services. Accepted Alternates will be identified in the Owner-Contractor agreement. Indicate the price for Alternates described, as shown on the Drawings and specified in the Project Manual and identify in the correct location on the Bid Form.

3.04 DRAWINGS

A. All drawing sheets bearing the project name: Newton Correctional Facility (NCF), DOC NCF Fire Alarm and Security Systems, Dated 07/13/18

3.05 BID SECURITY

A. Each Bid shall be accompanied by Bid Security in a separate sealed envelope.
B. The Bid Security shall be in the form of a Certified check, Cashier’s check or a Bid Bond in an amount not less than five percent (5%) of the maximum value of the Bid, including any additive Alternates. **NOTE:** Checks other than Certified checks and Cashier’s checks will not be accepted. Bonds shall be issued by a bonding company licensed to transact business in the State of Iowa. The Attorney in Fact who signs the Bond shall file with the Bond a certified and effectively dated copy of their Power of Attorney. The Bid Security shall be made payable to the Iowa Department of Administrative Services and shall accompany the Bid. For emailed bids, a scanned copy of a Bid Bond may be submitted with the Bid. If a Bid Bond is not used, Certified checks or Cashier’s checks must be hand delivered or mailed in a sealed envelope even if the Bid is emailed. The Bid Security shall serve as a guarantee that a Bidder who is offered a contract will enter into an Agreement with the State of Iowa and will file an approved surety company’s Performance Bond, Payment Bond and the Insurance Certificates as evidence of the required Insurance within ten days of execution of the Contract for construction of this Project, but not later than the start of construction in any event. Upon failure to comply, the Bid Security shall be forfeited as liquidated damages. The governmental entity shall retain the bid security furnished by the successful bidder until the approved contract form has been fully executed, a bond has been filed by the bidder guaranteeing the performance of the contract, and the contract and bond have been approved by the governmental entity. The provisions of chapter 573, where applicable, apply to contracts awarded under this chapter. The governmental entity shall promptly return the checks or bidder's bonds of unsuccessful bidders to the bidders once the Notice of Intent to Award is issued.

3.06 DUE DATE AND TIME FOR RECEIPT OF BIDS

A. Properly completed Bids shall be received at the place, and not later than the time, specified below for receipt of Bids, or any extension thereof made by Addendum issued subsequent to issuing the Bidding Documents. Oral or telephonic Bids are invalid and will not receive consideration. The Bidder shall

assume full responsibility for the timely delivery and receipt of the Bid by the Procurement Division of the Department of Administrative Services at the location herein specified. Late bids will not be accepted and will be returned unopened to the Bidder.

B. Sealed Bids will be received at the time and location as follows:

1. On or before 2:00 pm Central Time, August 14, 2018
   State of Iowa, Department of Administrative Services
   Central Procurement Bureau
   Hoover State Office Building, Level 3
   1305 East Walnut Street
   Des Moines, Iowa 50319-0105
   Attention: Steve Oberbroekling – Issuing Officer
   Or by email: steve.oberbroeckling@iowa.gov

3.07 COMMENCEMENT AND COMPLETION DATES

A. Commencement of the Work of the Contract shall be the day of receipt by the selected Contractor of the fully-executed contract. Final completion of the Work of the contract shall be acknowledged as a part of the Contractor's proposal.

3.08 SITE VISIT

A. A site visit by the prospective bidder is highly recommended at the time of the Pre-Bid Meeting of this project.

3.09 PRE-BID MEETING

A. An **optional** Pre-Bid meeting will be held on Tuesday, July 24th 2018 at 10:00 am at Newton Correctional Facility at 307 South 60th Ave West, Newton, Iowa 50208. **This meeting is not mandatory but is highly recommended.**

3.010 QUESTIONS

A. Questions on this project may be raised and discussed at the time of the Pre-Bid Meeting. Questions should be submitted, in writing, by 2:00 pm, July 26, 2018, to the Purchasing Agent previously indicated in these Instructions to Bidders.

3.011 ADDENDA AND INTERPRETATIONS OF THE CONTRACT DOCUMENTS

A. Any person contemplating submitting a proposal for the proposed Contract, who is in doubt as to the true meaning of any part of the Bidding Documents, shall submit a written request for an interpretation thereof. The person submitting a request will be responsible for its prompt delivery. Every request for such interpretation should reference the Bid Number specified in the Bidding Documents, and shall be made in writing (email preferred). Questions shall be submitted to the previously identified Purchasing Agent for the Department of Administrative Services. To be given consideration, requests shall be received by 2:00 pm, July 26, 2018. Replies, which revise or correct the Bidding Documents, or provide necessary clarifications, will be issued in the form of a written Addendum to the Bidding Documents. Interpretations, corrections or changes of the Bidding Documents made in any other manner will not be binding, and Bidders shall not rely upon such interpretations, corrections, or changes. The Bidder is to include any resultant cost changes in the Bid Sum. Addenda will be posted electronically at the respective bid site where the bid is initially posted. Acknowledgment by the Bidder of each issued Addendum shall be noted on the Bidder's proposal, in the location so indicated on the Bid Form. All Addenda issued shall become part of the Contract Documents.

3.012 SUBSTITUTIONS

A. Where the Bidding Documents stipulate a specific product be provided by naming one or more manufacturer and model, and include a statement such as “or equal”, “equal to”, “equivalent to”, or “basis of design”, a substitute product will be considered when written request is received by 2:00 pm, July 26, 2018.
B. The written request shall be on the “Request for Substitution” form included in the Project Manual. If no such form is included, the request shall be provided on the letterhead of the company making the request.
C. **Subsequently, substitutions will be viewed in the context of a Change Order to the Contract, and consideration will only be given in the event a product becomes unavailable or not practical due to no fault of the Contractor, or the substitution is substantially to the Owner’s advantage (equal product for less cost or higher quality product at no change in Contract Sum).**
D. Document each substitution request with complete data substantiating compliance of the proposed substitution with the Bidding Documents. Each request shall identify the specified product for which the substitution is requested, and shall clearly describe the product for which approval is requested. The burden shall be on the requester to demonstrate the proposed substitute product’s suitability for use in the Work and its equivalency or superiority in function, appearance, quality, and performance with the product named in the Bidding Documents.
E. A description of any changes to the Bidding Documents that the proposed substitution will require shall be included with the request. The requester shall affirm that dimensions shown on the Drawings will not be affected by the substitute product, and that it will have no adverse affect on other trades, the construction schedule, or specified warranty requirements. The request for use of a substitute product shall be signed by an authorized representative of the firm submitting the request, who shall state that the firm will pay for any changes to the building design, including Design Professional’s design, detailing, and construction cost caused by the requested substitution if the substitution is approved for use in the Work.
F. All such substitute products approved for use in the Work during the established period of time before receipt of Bids will be identified in a subsequent Addendum to the Bidding Documents.

3.013 OBLIGATION OF BIDDER

A. It shall be the responsibility of each Bidder contemplating the submission of a Bid for the proposed Contract to fully acquaint himself/herself with conditions at the work site, project requirements, and to become acquainted thoroughly with the work, and all conditions that may be related to it. No considerations or revision in the contract price or scope of the project will be considered by the Owner for any item that could have been revealed by a thorough on-site inspection and examination.
B. By submission of a Bid, it shall be understood that the Bidder assures that he/she has reviewed and is thoroughly familiar with the project requirements, contract conditions and supplementary conditions, the drawings, specifications, addenda, and that the bidder is aware of the conditions existing at the site that may relate to the work of this project. Failure of any Bidder to examine any form, document, or other instrument shall in no way relieve the Bidder from any obligation in respect to his/her Bid.

3.014 PUBLIC RECORDS AND REQUESTS FOR CONFIDENTIAL TREATMENT

A. The Agency’s release of public records is governed by Iowa Code chapter 22. Contractors are encouraged to familiarize themselves with Chapter 22 before submitting a Proposal. The Agency will copy and produce public records upon request as required to comply with Chapter 22 and will treat all information submitted by a Contractor as non-confidential records unless Contractor requests specific parts of the Proposal be treated as confidential at the time of the submission as set forth herein AND the information is confidential under Iowa or other applicable law.
B. A Contractor requesting confidential treatment of specific information must: (1) fully complete Form 22 (Available at https://das.iowa.gov/sites/default/files/procurement/pdf/Form%2022-ConfidentialityRequest-RFB.pdf), (2) identify the request in the transmittal letter with the Contractor’s Proposal, (3) conspicuously mark the outside of its Proposal as containing confidential information, (4) mark each page upon which confidential information appears, and (5) submit a “Public Copy” from which the confidential information has been excised.

C. Form 22 will not be considered fully complete unless, for each confidentiality request, the Contractor: (1) enumerates the specific grounds in Iowa Code chapter 22 or other applicable law that supports treatment of the material as confidential, (2) justifies why the material should be maintained in confidence, (3) explains why disclosure of the material would not be in the best interest of the public, and (4) sets forth the name, address, telephone, and e-mail for the person authorized by Contractor to respond to inquiries by the Agency concerning the confidential status of such material.

D. The Public Copy from which confidential information has been excised is in addition to the number of copies requested in Section 3 of this RFP. The confidential material must be excised in such a way as to allow the public to determine the general nature of the material removed and to retain as much of the Proposal as possible.

E. **Failure to request information be treated as confidential as specified herein shall relieve Agency and State personnel from any responsibility for maintaining the information in confidence. Contractors may not request confidential treatment with respect to pricing information and transmittal letters. A contractor's request for confidentiality that does not comply with this section or a contractor's request for confidentiality on information or material that cannot be held in confidence as set forth herein are grounds for rejecting contractor's Proposal as non-responsive. Requests to maintain an entire Proposal as confidential will be rejected as non-responsive.**

F. If Agency receives a request for information that Contractor has marked as confidential and if a judicial or administrative proceeding is initiated to compel the release of such material, Contractor shall, at its sole expense, appear in such action and defend its request for confidentiality. If Contractor fails to do so, Agency may release the information or material with or without providing advance notice to Contractor and with or without affording Contractor the opportunity to obtain an order restraining its release from a court possessing competent jurisdiction. Additionally, if Contractor fails to comply with the request process set forth herein, if Contractor's request for confidentiality is unreasonable, or if Contractor rescinds its request for confidential treatment, Agency may release such information or material with or without providing advance notice to Contractor and with or without affording Contractor the opportunity to obtain an order restraining its release from a court possessing competent jurisdiction.

3.015 WITHDRAWAL OF BID

A. A Bid may be modified or withdrawn only before the time and date for receipt of Bids. Said request for modification or withdrawal of formal sealed bid must be made in writing and delivered to the previously designated Purchasing Agent for the Department of Administrative Services in a sealed envelope, properly identifying the bid that is to be modified. A Bid shall remain valid for consideration by the Owner for the following period(s) of time after the date specified for receipt of Bids, or until such time following that period that the apparent low bidder requests in writing that the Bid be withdrawn, after which the Bid may be withdrawn without forfeiture of any required Bid Security. The Base Bid shall be valid for not less than thirty (30) calendar days after the date Bids are specified to be due. With the approval of the Department of Administrative Services, a bid may be withdrawn after opening, but only if the bidder provides prompt written notification that adequately documents the commission of an honest error that may cause undue financial loss.

3.016 BID CLOSING

A. Bids received prior to the time of opening will be securely kept, unopened. The Purchasing Agent for the Department of Administrative Services designated to receive Bids will determine when the specified time has arrived. No bid received thereafter will be considered.

3.017 BASIS OF BIDS

A. The Bidder shall include all additional documents or appendices that are requested to be submitted concurrent with the Bid Form; failure to comply may be cause for rejection.

B. In accordance with Iowa law, Section 8A.311: A bidder, to be considered for an award of a state construction contract, shall disclose to the state agency awarding the contract the names of all

subcontractors and suppliers who will work on the project being bid, within forty-eight (48) hours after the published date and time by which bids must be submitted. A bidder shall not replace a subcontractor or supplier disclosed without the approval of the state agency awarding the contract.

1. A bidder, prior to an award or who is awarded a state construction contract, shall disclose all of the following, as applicable:
    a. If a subcontractor or supplier disclosed (under the preceding) by a bidder is replaced, the reason for replacement and the name of the new subcontractor or supplier;
    b. If the cost of work to be done by a subcontractor or supplier is changed or if the replacement of a subcontractor or supplier results in a change in the cost, the amount of the change in cost.
    c. Any reduction in subcontractor or supplier price as a result of the change, if the change is approved by the Owner, shall be deducted from the Trade Contract via a deductive Change Order. Any such changes, if approved by the Owner, which result in an increase in the Trade Contract Price shall be borne by the Trade Contractor.

C. The Bidder is specifically advised that any person, firm or other party to whom it is proposed to award a subcontract under this contract must:
    1. Be registered in the State of Iowa and have an Iowa Contractor's Registration number, and
    2. Be acceptable to the Owner.

3.018 INFORMALITIES/ REJECTION OF BIDS

A. The Iowa Department of Administrative Services reserves the right to waive any irregularities or informalities and to enter into a Contract with a Bidder, or to reject any or all bids as it deems to be in the best interest of the State, without penalty.

3.019 CONSIDERATION OF BIDS

A. It is the intent of the Department of Administrative Services to award a Contract to the lowest responsible Bidder, provided the Bid has been submitted in accordance with the requirements of the Bidding Documents and is determined to be compliant with all Bidding Requirements, and does not exceed the funds available for construction.

B. Bidder is to bid on each Alternate Bid requested. Failure to do so may result in disqualification of the bid. The Department of Administrative Services reserves the right to accept any, or no, Alternate Bid. Alternate Bids may be considered in any order or combination, and the low successful Bidder will be determined on the basis of the sum of the Base Bid and the Alternate(s) accepted at the time of the Contract award.

C. In evaluating Bids, any proposal offered by a Bidder for an alternate design, or for materials other than those shown or specified for the Base Bid or for Alternate Bid construction under the proposed Construction Documents or called for by any issued Addenda to those Construction Documents, will not be considered in determining the low successful Bidder. However, the Department of Administrative Services reserves the right to consider any such Bidder-proposed (Contractor's Alternate) alternate designs or materials with the low successful Bidder, after the low successful Bidder is determined in the manner described above (A and B).

3.020 PREFERENCE

A. By virtue of statutory authority, a preference shall be given to Iowa domestic labor, products produced and provisions grown within the state of Iowa, in accordance with the provisions of Chapter 73, Code of Iowa and any amendments thereto.

B. Enforcement of reciprocal resident bidder preference and resident labor force preference codified at Iowa Code Section 73A.21.
    1. NOTICE: Failure on the part of the bidder to carefully read the following paragraphs and to provide the information requested below may make the bidder's bid materially nonresponsive and therefore ineligible for contract award. Violations of Iowa Code Section 73A.2l may, among other things, result in civil penalties assessed by the Commissioner of the Division of Labor of Iowa

Workforce Development. The bidder should seek out the advice of an attorney if he or she has questions about Iowa Code Section 73A.21.

As a part of the competitive procurement of contracts for Public Improvements that must be awarded to the low bidder (if the bid is responsive and the bidder is deemed responsible), Public Bodies shall allow a preference to Resident Bidders if a Nonresident Bidder places a bid for the contract for the Public Improvement and that Nonresident Bidder's state or foreign country gives resident bidders of that state or foreign country a preference (including a labor force preference or any type of preferential treatment). The preference allowed, or reciprocally applied, shall be equal to the preference given or required by the state or foreign country in which the Nonresident Bidder is a resident bidder.

"Public Body" means the State of Iowa (and its agencies) and any of its political subdivisions, including school districts, public utilities, and the state board of regents.

"Public Improvement" means a building or other construction work to be paid for in whole or in part by the use of funds of the State of Iowa, its agencies, and any of its political subdivisions and includes road construction, reconstruction, and maintenance projects.

"Resident Bidder" means a person or entity authorized to transact business in of the State of Iowa and having a place of business for transacting business within the State of Iowa at which it is conducting and has conducted business for at least three years prior to the date of the first advertisement for the public improvement. Note, however, that if a nonresident bidder's state or foreign country has a more stringent definition of a resident bidder, the more stringent definition is applicable as to bidders from that state or foreign country.

"Nonresident Bidder" means a person or entity who does not meet the definition of a resident bidder.

C. Nonresident bidders shall be required to certify on the Bid Form, where so indicated, the state or foreign country in which the firm is a resident, and if that state or foreign country uses a percentage for in-state bidders and the amount of the preference.

D. If it is determined that this may cause denial of federal funds which would otherwise be available, or would otherwise be inconsistent with requirements of federal law, this section shall be suspended, but only to the extent necessary to prevent denial of the funds or to eliminate the inconsistency with federal requirements.

3.021 **QUALIFICATIONS**

A. In accordance with Iowa Code 26.9(2) and 26.16, no potential bidder shall be required to provide confidential or proprietary information or meet any class requirements as a precondition to submitting a responsive bid. However, as noted in Iowa Code 26.9(2), the lowest responsive bidder may be required to provide additional information to verify responsibility prior to and as a condition of obtaining final award of the contract. Any qualification requirements contained in any bid document indicates on preferred qualifications, not a precondition to bid, and the lowest responsive bidder’s qualifications will be evaluated individually based on all information provided.

B. The Owner may make such investigations as he or she deems necessary to determine the ability of the awarded Bidder to perform the required work, and the awarded Bidder shall furnish to the Owner all such information and data for this purpose. The Owner reserves the right to rescind any awarded Bid if the evidence submitted by, or in investigation of, such Bidder fails to satisfy the Owner that the Bidder is properly qualified to carry-out the obligations of the Contract and to complete the Work contemplated therein.

C. Bidders shall be registered as a Construction Contractor with the Labor Commissioner, Iowa Workforce Development Department, as required by Chapter 91C of the Code of Iowa. Bidder’s Iowa Contractor Registration Number shall be included in the location provided in the Bid Form.

D. Non-resident corporations submitting bids must be in compliance with Section 490.1501 of the Code of Iowa and legally authorized thereby to carry-on such business in the State of Iowa as is required by the Contract Documents.

E. An out-of-state Bidder, if awarded a contract, will be required to submit evidence of authorization to do business in the State of Iowa.

3.022 INSURANCE

A. Insurance Requirements
   1. The Contractor shall maintain in effect, with insurance companies of recognized responsibility, at its expense, insurance covering its work of the type and in amounts required by this Contract. The Contractor's insurance shall, among other things, insure against any loss or damage resulting from the Contractor's performance of this Contract. All such insurance policies shall remain in full force and effect for the entire life of this Contract and shall not be canceled or changed except after thirty (30) days written notice to the Owner.
   2. **Amounts of Insurance Required – Refer to ConsensusDOCS 802 (see template in Project Manual)**

B. Certificates of Coverage
   1. Certificates of the insurance described above shall be submitted to the Owner before starting any construction activities and shall be subject to approval by the Owner. The Contractor shall provide certificates for the insurance required. The insurer shall state in the certificate that no cancellation of the insurance will be made without at least thirty (30) days prior written notice to the Contractor. Upon receipt of any notice of cancellation or alteration, Contractor shall within ten (10) days procure other policies of insurance, similar in all respects to the policy or policies, about to be canceled or altered, and, if the Contractor fails to provide, procure, and deliver acceptable policies of insurance, or satisfactory evidence thereof, in accordance with the terms hereof then, at the Owner's option, Owner may obtain such insurance at the cost and expense of Contractor, without the need of any notice to Contractor.

C. No Limitation of Liability
   1. Acceptance of the insurance certificates by the Owner shall not act to relieve the Contractor of any obligation under this Contract. All insurance policies and certificates shall be issued only by companies authorized to transact business in the State of Iowa. It shall be the responsibility of the Contractor to keep the respective insurance policies and coverage's current and in force during the life of this agreement.
   2. A Sample Certificate of Insurance is attached for reference following this Section.

3.023 FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

A. The Agreement for the Work will be written on ConsensusDOCS 802 Form of Agreement between Owner and Contractor (sample of the document with modifications incorporated is bound in this Project Manual).

3.024 EXECUTION OF CONTRACT

A. Contract documents shall mean and include the following:
   1. Contract: ConsensusDOCS 802
   2. Performance and Payment Bonds
   3. Project Manual
   4. Drawings
   5. Numbered Addenda issued after initial publication of Bid Documents
   6. Numbered Modifications (Change Orders) issued after Contract is signed

3.025 LAWS AND REGULATIONS

A. The Bidder's attention is directed to the fact that all applicable laws and regulations of Federal and State agencies having jurisdiction over the construction of this project shall apply to any contract resulting from this proposal, and it shall be deemed that those rules and regulations are made a part of such contract the same as if set forth in their entirety therein. By submitting a Bid, the Bidder confirms that he/she is familiar with and understands the Contractor's responsibility under all Federal and State of Iowa laws and regulations with respect to the Work described by the proposed Contract Documents.

3.026 CONTRACT DOCUMENTS AND ORDER OF PRECEDENCE

A. Where an irreconcilable conflict exists among Applicable Legal Requirements, this Contract, the specifications in the Materials and the Drawings, the earliest item mentioned in this sentence involving a conflict shall control over any later mentioned item or items subject to such conflict unless doing so would result in reducing the Bidder's duty of care or obligations under this Contract, in which case the terms resulting in the highest requirements for Bidder performance shall control.

3.027 CONDITIONS OF THE WORK

A. Each bidder must fully inform him/herself of the conditions under which the work is to be performed at the site of the work, the obstacles which may be encountered, and all other relevant matters concerning the work to be performed. Failure to do so will not relieve a successful bidder of the obligation to furnish all material and labor necessary to carry out the provisions of the contract. When a site visit is required by provisions located elsewhere in these Instructions to Bidders, as a site tour in conjunction with a mandatory Pre-Bid Meeting, it shall be the Bidder's responsibility to fulfill this obligation as a condition of bidding the Work described in the Bidding Documents.

B. No allowance will be made for any additional compensation by reason of any matter or condition with which the bidder might have fully informed him/herself, but failed to do so prior to bidding. Insofar as possible, the Contractor and all subcontractors shall employ such methods or means in carrying out the work so as not to cause any interruption of, or interference with, the work of any other subcontractor or trade.

3.028 SUBCONTRACTS

A. The Prime Contractor shall be responsible for notifying all subcontractors and suppliers and informing them that they are bound in each case by all applicable provisions of the bidding information and those of the proposed Form of Agreements as defined in the Contract Documents.

3.029 PROJECT MANUAL/ DRAWINGS

A. This Project Manual is intended to supplement the Project Drawings prepared by KCL Engineering dated 07-13-2018.

END OF SECTION

SAMPLE

ACORD

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): xx/xx/xxxx

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME: Agent's Information
Agent's Name Agent's Address	PHONE (A/C, No, Ext): / FAX (A/C, No):
	E-MAIL ADDRESS:

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A : Company A (AM Best Rated A/VI or Better)	Admitted Carriers
INSURER B :	
INSURER C :	
INSURER D :	
INSURER E :	
INSURER F :	

INSURED: Trade Contractor's Name, Trade Contractor's Mailing Address

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS (Minimum)	
* A	COMMERCIAL GENERAL LIABILITY CLAIMS-MADE [X] OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: POLICY [X] PRO-JECT [ ] LOC OTHER:	X	X	#TBD- CGL	3/1/17	3/1/18	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$ 1,000,000 $ $ $1,000,000 $2,000,000 $1,000,000
B	AUTOMOBILE LIABILITY [X] ANY AUTO ALL OWNED AUTOS HIRED AUTOS SCHEDULED AUTOS NON-OWNED AUTOS	X	X	#TBD-AL	3/1/17	3/1/18	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$ 1,000,000
C	UMBRELLA LIAB [X] OCCUR EXCESS LIAB CLAIMS-MADE DED RETENTION $	X	X	#TBD-UMB	3/1/17	3/1/18	EACH OCCURRENCE AGGREGATE	$10,000,000
D	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y / N [ ] N / A If yes, describe under DESCRIPTION OF OPERATIONS below		X	#TBD-WC	3/1/17	3/1/18	[X] PER STATUTE [ ] OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	 $500,000 $500,000 $500,000
* E	Owners Contrators Protective Liability			#TBD-OCP	3/1/17	3/1/18	*Limits equal to CGL (or) as required by owner (Note- Would be either CGL or OCP, not both)	

amount varies based on paragraph 10.2.2 of the ConsensusDocs 802 contract

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

Additional Insured on a Primary & Non-Contributory basis (CGL;AL;UMB/Excess) in favor of : (Owner) Iowa Department of Administrative Services (DAS), Officers, Directors, Members, Consultants, Agents, and Employees.
Waiver of Subrogation (CGL;AL;WC/EL;UMB/Excess) in favor of: (Owner) Iowa Department of Administrative Services (DAS), Officers, Directors, Members, Consultants, Agents, and Employees.

CERTIFICATE HOLDER

Iowa Department of Administrative Services (DAS)
109 SE 13th Street
Des Moines, IA 50319

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Signature

SECTION 00 3113

PRELIMINARY SCHEDULE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Preliminary Construction Schedule
B. Schedule Durations

1.02 PRELIMINARY SCHEDULE

A. A preliminary schedule has been identified by the Owner for the implementation of the Project. Refer to the schedule following this Section for references to anticipated milestones and construction duration.
B. Each step of the Preliminary Schedule is subject to receipt of acceptable bids, Owner's decision process and date of commencement.
C. A proposed construction schedule shall be submitted by all Trade Contractors to the Construction Manger no later than 48 hours prior to the pre-construction meeting. A revised Construction Schedule will be submitted by the Construction Manager once all preliminary schedules are reviewed and approved by the Owner.
D. The final construction schedule will be established post award of bids with the cooperation of all contractors.

1.03 SCHEDULE DURATIONS

A. Anticipated Notice of Intent to Award – 08/16/18
B. Anticipated Date of Commencement – 08/31/18
C. Anticipated Start of Construction – 10/01/18
D. Substantial Completion by – 03/29/19
E. Final Completion by – 04/30/19

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

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SECTION 00 3143

PERMIT APPLICATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Permit Application Information
B. Licenses, Permits, and Related Inspections

1.02 PERMIT APPLICATION INFORMATION

A. State Building Code Plan Review: The plan review and inspections for this project have been applied for by the Architect. Please contact your inspector prior to construction and occupancy.
B. Other Applicable inspections: Trade Contractor is responsible for any other applicable project specific permits and inspections.

1.03 LICENSES, PERMITS, AND RELATED INSPECTIONS

A. The Bidder shall comply with all codes, laws, ordinances, rules and regulations of any public authority having jurisdiction that bears on the performance of its work. All construction, materials and methods shall comply with the State Building Codes, except where plans and specifications establish a higher standard.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

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SECTION 00 4116

BID FORM

RFB #0918335077

BID FORM for CONSTRUCTION CONTRACT
For
Newton Correctional Facility (NCF)
307 South 60th Avenue West, Newton, Iowa 50208
Project 8994.00

Iowa Department of Administrative Services
GSE-Central Procurement Bureau
Hoover State Office Building, Level 3
1305 East Walnut Street
Des Moines, Iowa 50319-0105

The following documents are to be completed and submitted with your bid.

1. Bid Proposal Form (Required)
2. Non Discrimination Clause Form
3. Contractor Targeted Small Business Enterprise Pre-Bid Contract Information Form
4. Bid Security – 5% of total Bid amount (Is to be submit in separate envelope) (Required)

Authorized Representative:
The undersigned Bidder, in response to your Request for Bid for construction of the above project, having examined the Drawings, Specifications, and other Bidding Documents dated July 13th, 2018, and Addenda issued and acknowledged below as received and being familiar with all the conditions surrounding the construction of the proposed project including the availability of materials and labor, hereby proposes to furnish all labor, materials, equipment and supplies to perform all work to construct the project in strict accordance with the proposed Contract Documents, within the time and at the prices stated below. Prices are to cover all expenses incurred in performing the work required under the proposed Contract Documents, of which this bid is a part.

Bidder acknowledges receipt of the following Addenda which are a part of the Bidding Documents and for which any effect on cost of the Work is included in the bid amounts indicated:

Number _____ _____ _____ _____ _____

Dated _____ _____ _____ _____ _____

Note that the State of Iowa is exempt from State and Local sales and use taxes (including local option and school option) for this project. Taxes on construction materials shall NOT be included in the bid amounts.

Amounts shall be indicated in both words and figures. In case of discrepancy, the amount indicated in words shall govern.

<u>BID PACKAGES</u>:

BP 01

Description: Communications Infrastructure and Network Equipment

Bidder proposes and agrees to perform all work as described in the Construction Documents for the sum of: _____Dollars ($_____).

BP 02

Description: Fire Detection and Alarm System

Bidder proposes and agrees to perform all work as described in the Construction Documents for the sum of: _____Dollars ($_____).

BP 03

Description: Detention Controls

Bidder proposes and agrees to perform all work as described in the Construction Documents for the sum of: _____Dollars ($_____).

BP 04

Description: Perimeter Fence Alarm System

Bidder proposes and agrees to perform all work as described in the Construction Documents for the sum of: _____Dollars ($_____).

BP 05

Description: Video Surveillance

Bidder proposes and agrees to perform all work as described in the Construction Documents for the sum of: _____Dollars ($_____).

ALTERNATES:

ALT 01

Description: Core Network Redundancy (Add)

Bidder proposes and agrees to perform all work as described in the Construction Documents for the sum of: _____Dollars ($_____).

ALT 02

Description: Fire Detection and Alarm System Alarm Interface (Deduct)

Bidder proposes and agrees to perform all work as described in the Construction Documents for the sum of: _____Dollars ($_____).

Bidder hereby certifies that:

1. This bid is genuine and is not made in the interest of or on behalf of any undisclosed person, firm or corporation;
2. Bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid; Bidder has not solicited or induced any person, firm or corporation to refrain from bidding; and Bidder has not sought by collusion to obtain any advantage over any other bidder or over the Owner.
3. Bidder hereby certifies that the Bidder is registered with the Iowa Labor Commissioner as a Contractor as required by Chapter 91C, Code of Iowa.
4. Bidder agrees to comply with all Federal and State Affirmative Action/Equal Employment Opportunity requirements concerning fair employment and will not discriminate between or among them by reason of race, color, religion, sex, national origin or physical handicap.
5. All construction under this Contract shall conform to the requirements of the *Iowa State Building Code*.
6. Bidder agrees that this bid shall remain valid and shall not be withdrawn for a period of thirty (30) calendar days after the date for receipt of bids.
7. Bidder agrees that if written notice of acceptance of this bid is mailed, emailed, or delivered to the undersigned within thirty (30) days after the date in which bids are due, or at any time thereafter before it is withdrawn, the undersigned will sign and return the Contract Agreement, prepared in accord with the Bidding Documents and this bid as accepted; and will also provide proof of insurance coverage and required surety bonds.
8. Bidder understands that the Owner reserves the right to reject any and all bids, and to waive irregularities or informalities and enter into a contract for the work, as the Owner deems to be in the best interest of the State.
9. Bidder understands that the Owner reserves the right to accept any, or no, Alternate Bid, if requested, and that the Alternate Bids may be considered in any order or combination, and the low Bidder shall be determined on the basis of the sum of the base bid and any Alternate(s) accepted.

Subcontractors:
The Trade Contractor must identify all Subcontractors and Suppliers within 48 hours of the published date and time for which bids must be submitted, in accordance with Iowa Code Section 8A311, as amended by House File 646 in 2011. Subcontractors and suppliers may not be changed without the approval of the Owner. Requests for changing a Subcontractor or supplier must identify the reason for the proposed change, the name of the new Subcontractor or supplier, and the change in the subcontractor or supplier price as a result of the change. Any reduction in subcontractor or supplier price as a result of the change, if the change is approved by the Owner, shall be deducted from the Trade Contract Price via a deductive Change Order. Any such changes, if approved by the Owner, which result in an increase in the Trade Contract Price shall be borne by the Trade Contractor.

Enforcement of Reciprocal Resident Bidder Preference, per Iowa Code 73A.21.

All bidders shall either check the box next to “Resident Bidder” or check the box next to “Nonresident Bidder” and by doing so and signing thereafter certifies and attests to the same. All information requested must be provided. Seek out the advice of an attorney if you have questions.

“Resident Bidder” means a person or entity authorized to transact business in of the State of Iowa and having a place of business for transacting business within the State of Iowa at which it is conducting and has conducted business for at least three years prior to the date of the first advertisement for the

public improvement. Note, however, that if a nonresident bidder's state or foreign country has a more stringent definition of a resident bidder, the more stringent definition is applicable as to bidders from that state or foreign country.

Resident Bidder ☐

Name of Resident Bidder: _____

By: _____
Authorized Agent and Signatory of Resident Bidder

OR:

Nonresident Bidder ☐

Name of Nonresident Bidder: _____

Name of State or Foreign Country of Nonresident Bidder: _____

Particularly identify and describe any preference, labor preference, or any other type of preferential treatment, in effect in the nonresident bidder's state or foreign country at the time of this bid:
_____
_____
_____
_____

NOTICE: Nonresident Bidders domiciled in a state or country with a resident labor force preference shall make and keep, for a period of not less than three years, accurate records of all workers employed on the public improvement. The records shall include each worker's name, address, telephone number when available, social security number, trade classification, and the starting ending time of employment.

By: _____
Authorized Agent and Signatory of Nonresident Bidder

Bid Form shall be signed by an officer of the company with authority to bind in a contract.
Notice of acceptance of this bid, or request for additional information by the Department of Administrative Services, may be addressed to the undersigned at the address set forth below:

Legal Name of Firm: _____

Date: _____

Signature of Bidder: _____

Title: _____

Typed Name of Signatory: _____

Email: _____

Business Address:

_____
_____
_____

Telephone Number: _____ Fax Number: _____

Federal Tax Identification Number: _____

Iowa Contractor Registration Number: _____

Bidder Safety Manager Name:_____

For an out-of-state Bidder, Bidder certifies that the Resident Preference given by the State or Foreign Country of Bidder's residence, _____, is _____ %.

END OF SECTION

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SECTION 00 4116.01

NON-DISCRIMINATION CLAUSE FORM

PART 1 - GENERAL

All contractors, subcontractors, vendors and suppliers of goods and services doing business with the State of Iowa and value of said business equals or exceeds $10,000 annually, agree as stated below.

1.01 NONDISCRIMINATION CLAUSE

A. The contractor, subcontractor, vendor and supplier of goods and services will not discriminate against an employee or applicant for employment because of race, creed, color, sex, national origin, ancestry, religion, economic status, age, disability, political opinion, or affiliations of an applicant or employee based upon the nature of the job occupation. The contractor, subcontractor, vendor and supplier will develop an Affirmative Action Program to insure that applicants are employed and that employees are treated during employment without regard to their race, creed, color, sex, national origin, ancestry, religion, economic status, age, disability, political opinions or affiliations. Such action shall include, but not be limited to the following:
   1. Employment.
   2. Upgrading.
   3. Demotion or transfer.
   4. Recruitment and advertising.
   5. Layoff or termination.
   6. Rates of pay or other forms of compensation.
   7. Selection for training, including apprenticeship.

B. The contractor, subcontractor, vendor and supplier of goods and services will, in all solicitations or advertisements for employees, state that all qualified applicants will receive consideration for employment without regard to race, creed, color, sex, national origin, ancestry, religion, economic status, age, disability, political opinion or affiliations.

C. The contractor, subcontractor, vendor and supplier or their collective bargaining representative will send to each labor union or representative or workers with which they have a collective bargaining agreement or other contract or understanding, a notice advising the said labor union or workers' representative of the contractor's commitments under this section.

D. The contractor, subcontractor, vendor and supplier of goods and services will comply with all published rules, regulations, directives and orders of the State of Iowa Affirmative Action Program Contract Compliance Provisions.

E. The contractor, subcontractor, vendor and supplier of goods and services will furnish and file compliance reports within such time and upon such forms as provided by the Equal Employment Opportunity Officer, said forms may elicit information as to the policies, procedures, patterns, and practices of each subcontractor as state as the contractor themselves and said contractor, subcontractor, vendor and supplier will permit access to their employment books, records and accounts to the State's Equal Employment Opportunity Officer, for the purpose of investigation to ascertain compliance with this Contract and with rules regulations of the State's Affirmative Action Program.

F. In the event of the contractor's noncompliance with the nondiscrimination clauses of this Contract or with any of such rules, regulations and orders; this Contract may be canceled, terminated or suspended in whole or in part and the Contractor may be declared ineligible for further contracts in accordance with procedures authorized by the State of Iowa.

G. The contractor, subcontractor, vendor and supplier of goods and services will include, or incorporate by reference, the provisions of the nondiscrimination clause in every contract, subcontract or purchase order unless exempted by the rules, regulations or orders of the State's

Affirmative Action Program, and will provide in every subcontract or purchase order that said provisions will be binding upon each contractor, subcontractor or seller.

H. The parties agree to comply with "Compliance with the Law; Nondiscrimination in Employment" of the current Terms and Conditions at the award of this contract. Current Terms and Conditions may be found on the following web site and are, by this reference, made a part of this Agreement. https://das.iowa.gov/procurement/terms-and-conditions

I. We, the undersigned, recognize that we are morally and legally committed to nondiscrimination in employment. Any person who applies for employment with our company will not be discriminated against because of race, creed, color, sex, national origin, ancestry, religion, economic status, age or disabilities, unless disabilities are based upon the nature of the job occupation.

1.02 SIGNATURE

A. _____
Signature of Appropriate Official

_____
Title

_____
Date

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

SECTION 00 4116.02

TARGETED SMALL BUSINESS FORM

PART 1 - GENERAL

1.01 TARGETED SMALL BUSINESS FORM

A. A Subcontractor Targeted Small Business Enterprise Pre-Bid Contact Information form, included in this section, is to accompany the Bid. Bidders shall comply with all affirmative action/equal opportunity provisions of State and Federal laws. The Owner seeks to provide opportunities for Targeted Small Businesses in accordance with the provisions of Chapter 73 of the Code of Iowa.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTON

IOWA DEPARTMENT OF ADMINISTRATIVE SERVICES
SUBCONTRACTOR
TARGETED SMALL BUSINESS ENTERPRISE
PRE-BID CONTRACT INFORMATION

CONTRACTOR	**BID NO.**	**PAGE #**

(to be completed by bidder)

You are requested to provide the information on this form showing your targeted Small Business enterprises contacts made prior to your bid submission. This information is subject to verification and confirmation. NOTE: The Department of General Services will not regard your acceptance or use of a low quote or bid from a non-targeted Small Business Enterprise on any subcontract item as evidence itself of any lack of good faith effort to solicit targeted Small Business Enterprise subcontractors on this project. However, every effort shall be made to solicit quotes or bids on as many subcontractable items as necessary to evidence affirmative action in contracting.

TABLE OF INFORMATION SHOWING BIDDER'S PRE-BID TARGETED SMALL BUSINESS ENTERPRISE CONTACTS

SUBCONTRACTOR	TSB	DATES CONTACTED	QUOTES RECEIVED		QUOTATION USED IN BID	
			YES/NO	DATES	YES/NO	DOLLAR AMOUNT PROPOSED TO BE SUBCONTRACTED

Total dollar amount proposed to be subcontracted to TSB on this project $ _____
List items to be subcontracted. *(If more space is needed, use reverse side.)*

SECTION 00 4313

BID SECURITY FORMS

PART 1 - GENERAL

1.01 BID SECURITY FORMS

A. A Bid Bond form will be required on this project. An amended ConsensusDocs 262 is attached for reference following this page. ConsensusDocs bid bond form is not required (other standard forms are acceptable to the State of Iowa).

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

CONSENSUSDOCS 262

BID BOND

(AMENDED BY STATE OF IOWA)

This document was developed through a collaborative effort of organizations representing a wide cross-section of the design and construction industry. The organizations endorsing this document believe it represents a fair allocation of risk and responsibilities for all project participants.

Endorsing organizations recognize that this document must be reviewed and adapted to meet specific needs and applicable laws. This document has important legal and insurance consequences. You are encouraged to consult legal, insurance and surety advisors before completing or modifying this document. The software includes a notes section indicating where information is to be inserted to complete this document. Further information and endorsing organizations' perspectives are available at www.consensusdocs.org/guidebook.

For Use with ConsensusDOCS 200, Standard Form of Agreement and General Conditions Between Owner and Constructor (Where the Contract Price is a Lump Sum) and ConsensusDOCS 500, Standard Agreement and General Conditions Between Owner and Construction Manager.

The Trade Contractor, _____ (the "Trade Contractor") has submitted a Bid to the Owner, _____, (the "Owner") for the _____ (the "Project") in accordance with the Bidding Documents, including Drawings and Specifications prepared by _____ (the "Design Professional").

By virtue of this Bid Bond (the "Bond"), the Constructor as Principal and _____ as Surety ("Surety"), are bound to the Owner as Obligee in the maximum amount _____, Dollars ($_____) (the "Bond Sum"). The Constructor and Surety hereby bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein.

1. If the Obligee shall accept the bid of the Constructor, the Constructor shall enter into an Agreement with the Obligee in accordance with the terms of such Bid.

2. Constructor shall procure such bond or bonds as are specified in the Contract Documents for the faithful performance of the Work and for the prompt payment of labor and materials furnished in the performance of the Work.

3. If the Constructor fails to enter such Agreement and give such bonds, the Constructor shall pay to the Obligee the difference between the amount of Constructor's bid and the amount of such agreement the Obligee in good faith executes with another Party to perform the Work covered by Constructor's Bid, not to exceed the Bond Sum stated above.

4. If the Constructor shall fulfill its obligation under Articles 1 through 3, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

This Bond is entered into as of _____ (date)

SURETY: _____ (seal)

BY: .....

Print Name: _____

Print Title: _____ (Attach Power of Attorney)

Witness: .....

(Additional signatures, if any, appear on attached page)

Constructor: _____ (seal)

BY: .....

Print Name: _____

Print Title: _____

Witness: .....

(Additional signatures, if any, appear on attached page)

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SECTION 00 4393

BID SUBMITTAL CHECKLIST

PART 1 - GENERAL

1.01 BID SUBMITTAL CHECKLIST

A. The Bid Form shall be completed in full and signed by an officer of the bidder with authority to bind in a contract.
B. The Bid shall be submitted in a sealed envelope and shall be clearly identified on the outside by the Sealed Bid Number, Due Date, Time and Project Description.
C. The Bidder is responsible to see that the bid is received in the State of Iowa, Department of Administrative Services, Central Procurement Bureau, Hoover State Office Building, Level 3, Des Moines, Iowa 50319-0105, on or before the due date and time specified. Late bids shall not be accepted. Late bids shall be returned unopened to the bidder.
D. If a Bid Bond is called for, it shall accompany the Bid Form in a separate sealed envelope. Otherwise the bid will be ruled non-compliant with the specifications.
E. If a Non-discrimination Clause form is called for, it shall accompany the Bid Form.
F. If a Targeted Small Business Pre-bid Contact form is called for, it shall accompany the Bid Form.
G. If a Certificate of Site Visit form is called for, it shall accompany the Bid Form.
H. In all cases, no verbal communications by any party will override written communications from the issuing office.
I. Bids cannot be changed after the bid opening. Changes prior to bid opening shall be in writing.
J. Bids shall be typewritten or in ink. All information requested shall accompany the bid. All blocks shall be completed. Errors shall be lined out and initialed.
K. The right is reserved to reject any or all bids. The State may waive minor deficiencies or informalities in the best interest of the State of Iowa.
L. A properly prepared and submitted bid document is the bidder’s responsibility.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

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SECTION 00 5200

AGREEMENT FORM

PART 1 - GENERAL

1.01 AGREEMENT FORM

A. The Form of Agreement to be used on this project is a modified ConsensusDocs 802. A sample is attached following this page.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

ConsensusDocs 802

STANDARD FORM OF AGREEMENT BETWEEN OWNER AND TRADE CONTRACTOR

(Where the Construction Manager Is the Owner's Agent)

TABLE OF ARTICLES

This Agreement has important legal and insurance consequences. Consultations with an attorney and with insurance and surety consultants are encouraged with respect to its completion or modification. Notes indicate where information is to be inserted to complete this Agreement.

ARTICLE 1 AGREEMENT

This Trade Contractor Agreement is made effective as of the 22nd day of September, 2016, by and between the

OWNER
State of Iowa - DAS, Department of Administrative Services ("DAS"). DAS's principal office is located: 109 SE 13th Street, Des Moines, Iowa, 50319-0120.

and the

TRADE CONTRACTOR
Test
123 Main St
Des Moines, IA 99999

for work in connection with the following

PROJECT
XXXX.XX - Practice Project

The CONSTRUCTION MANAGER is
CM TBD
XXXX
XXX, XX XXXXX

The DESIGN PROFESSIONAL for the Project is

,

Notice to the Parties shall be given at the above addresses.

ARTICLE 2 GENERAL PROVISIONS

2.1 RELATIONSHIP OF PARTIES The Owner and the Trade Contractor agree to proceed with this Agreement on the basis of mutual trust, good faith and fair dealing and shall cooperate with each other and with the Construction Manager and Design Professional in furthering the Owner's interests. The Trade Contractor shall use its diligent efforts to perform the work in an expeditious manner consistent with the Trade Contract Documents. The Owner and the Trade Contractor will endeavor to promote harmony and cooperation among all Project participants.

2.1.1 The Owner and the Trade Contractor shall perform their obligations with integrity, ensuring at a minimum that

2.1.1.1 conflicts of interest shall be avoided or disclosed promptly to the other Party; and

2.1.1.2 the Trade Contractor and the Owner warrant that they have not and shall not pay nor receive any contingent fees or gratuities to or from the other Party, including its agents, officers and employees, Subcontractors or others for whom they may be liable, to secure preferential

treatment.

2.2 PROJECT ORGANIZATION This Agreement is for the performance of work described herein in connection with the construction of the Project. The Owner also may enter into separate agreements with other trade contractors for other portions of the Project. The Owner has entered or will enter into a Construction Management Agreement with the Construction Manager, and a design agreement with the Design Professional.

2.3 INDEPENDENT CONTRACTOR The Trade Contractor represents that it is an independent contractor and that its performance of the Trade Contract Work it shall act as an independent contractor. Neither Trade Contractor nor any of its agents or employees shall act on behalf of the Owner except as provided in this Agreement or unless authorized in writing by the Owner.

2.4 CONSTRUCTION MANAGER IS OWNER'S AGENT The Construction Manager will represent the Owner as its agent in the administration and management of this Agreement. Any instructions, reviews, approvals, orders or directions given to the Trade Contractor by the Construction Manager will be given on behalf of and as agent for the Owner. The Trade Contractor shall be obligated to respond or perform as if the same were given directly by the Owner. The Trade Contractor shall communicate and provide all requests and concerns regarding the Trade Contract Work to the Construction Manager. The Trade Contractor shall provide copies to the Construction Manager of all notices to the Owner required by and regarding this Agreement.

2.5 CONSTRUCTION MANAGER NOT IN PRIVITY WITH TRADE CONTRACTOR This Agreement shall not give the Trade Contractor any claim or right of action against the Construction Manager. The Trade Contractor and its subcontractors shall not be beneficiaries of any obligations of the Construction Manager. This Agreement shall not create a contractual relationship between any parties except the Owner and the Trade Contractor.

2.5A NO THIRD-PARTY BENEFICIARY There are no third-party beneficiaries of this Agreement.

2.6 DESIGN PROFESSIONAL The Owner, through its Design Professional, shall provide all architectural and engineering design services necessary for the completion of the Work, except the following:

No exceptions.

The Trade Contractor shall not be required to provide professional services which constitute the practice of architecture or engineering except as otherwise provided in section 3.15.

2.6.1 The Owner shall obtain from the Design Professional either a license for Trade Contractor and Subcontractors to use the design documents prepared by the Design Professional or ownership of the copyrights for such design documents, and shall defend, indemnify and hold harmless the Trade Contractor against any suits or claims of infringement of any copyrights or licenses arising out of the use of the design documents. To the extent portions of this paragraph are in conflict with SF 396 (codified at Iowa Code Section 537A.5) said portions are void and unenforceable.

2.7 EXTENT OF AGREEMENT This Agreement is solely for the benefit of the Parties, represents the entire integrated agreement between the Parties, and supersedes all prior negotiations, representations and agreements, either written or oral. This Agreement and each and every provision is for the exclusive benefit of the Owner and the Trade Contractor and not for the benefit of any third party except to the extent expressly provided in this Agreement. In the event of conflict between this Agreement and any of the Exhibits or any other documents incorporated into this Agreement, the terms and provisions of this Agreement shall control.

2.8 DEFINITIONS

2.8.1 Agreement means this ConsensusDocs 802 Standard Form of Agreement Between Owner and Trade Contractor (Where the Construction Manager is the Owner's Agent), as modified by the Parties, and Exhibits and Attachments made part of this Agreement upon its execution.

2.8.2 Design Professional means the Architect, Design Professional or Engineer identified in ARTICLE 1 and its consultants, retained by Owner to perform design services for the Project, and licensed in the State in which the Project is located. The use of the term Design Professional in this Agreement is for convenience and is not intended to imply or infer that the individual or entity named in ARTICLE 1 will provide design professional services in a discipline in which it is not licensed.

2.8.3 Construction Manager means the Construction Manager identified in ARTICLE 1 and its authorized representative.

2.8.4 The Construction Schedule is the document initially prepared by and updated by the Construction Manager and approved by the Owner that indicates proposed activity sequences, durations, or milestone dates for such activities as receipt and approval of pertinent information, issuance of the Construction Documents, the preparation and processing of shop drawings and samples, delivery of materials or equipment requiring long-lead-time procurement, Owner's occupancy requirements and estimated dates of Substantial Completion and Final Completion of the Project.

2.8.5 The term Day shall mean calendar day unless otherwise specifically defined.

2.8.6 Final Completion occurs on the date when the Trade Contractor's obligations under this Agreement are complete and accepted by the Owner and final payment becomes due and payable, as established in ARTICLE 6. This date shall be confirmed by a Certificate of Final Completion signed by the Owner and the Trade Contractor.

2.8.7 A Hazardous Material is any substance or material identified now or in the future as toxic or hazardous under any federal, state or local law or regulation, or any other substance or material which may be considered hazardous or otherwise subject to statutory or regulatory requirements governing handling, disposal or clean-up.

2.8.8 A Material Supplier is a person or entity retained by the Trade Contractor to provide material or equipment for the Trade Contract Work. This definition is not intended to, and shall not be interpreted to, expand or modify the definition(s) of materials or material suppliers contained in Iowa Code Chapter 573.

2.8.9 Others means other contractors, material suppliers, and persons at the Worksite who are not employed by the Trade Contractor or Subcontractors.

2.8.10 The term Overhead shall mean a) payroll costs and other compensation of Trade Contractor employees in the Trade Contractor's principal and branch offices; b) general and administrative expenses of the Trade Contractor's principal and branch offices including deductibles paid on any insurance policy and c) the Trade Contractor's capital expenses, including interest on capital used for the Work.

2.8.11 Owner is the person or entity identified in ARTICLE 1 as Owner, and includes the Owner's representative.

2.8.12 The Project, as identified in ARTICLE 1, is the building, facility or other improvements for which the Trade Contractor is to perform the Trade Contract Work.

2.8.13 A Subcontractor is a person or entity retained by the Trade Contractor as an independent contractor to provide the labor, materials, equipment or services necessary to complete a specific

portion of the Work. This definition is not intended to, and shall not be interpreted to, expand or modify the definition(s) of materials or material suppliers contained in Iowa Code Chapter 573.

2.8.14 2.8.14 Per Iowa Code Section 26.13, "substantially completed" means the first date on which any of the following occurs:(1) Completion of the Project (or Trade Contract Work, in the case of the multiple Trade Contractors) or when the Project (or Trade Contract Work in the case of multiple Trade Contractors) has been substantially completed in general accordance with the terms and provisions of the contract. (2) The work on the Project (or Trade Contract Work in the case of multiple Trade Contractors) or on the designated portion is substantially completed in general accordance with the terms of the contract so that the State Iowa can occupy or utilize the Project or designated portion of the Project for its intended purpose. 3) The Project (or Trade Contract Work in the case of multiple Trade Contractors) is certified as having been substantially completed by either of the following: (a) the architect or engineer authorized to make such certification (which is defined in this Agreement as the Design Professional). (b) The authorized contract representative (which is defined in this Agreement as the Owner's Representative). (4) The State of Iowa is occupying or utilizing the Project (or Trade Contract Work in the case of multiple Trade Contractors) for its intended purpose. This subparagraph shall not apply to highway, bridge, or culvert projects.

2.8.15 Terrorism means a violent act, or an act that is dangerous to human life, property or infrastructure, that is committed by an individual or individuals and that appears to be part of an effort to coerce a civilian population or to influence the policy or affect the conduct of any government by coercion. Terrorism includes, but is not limited to, any act certified by the United States government as an act of terrorism pursuant to the Terrorism Risk Insurance Act, as amended.

2.8.16 A Trade Contract Change Order is a written order signed by the Owner and the Trade Contractor after execution of this Agreement, indicating changes in the scope of the Trade Contract Work, the Trade Contract Price or Trade Contract Time, including substitutions proposed by the Trade Contractor and accepted by the Owner. Trade Contract Change Orders shall be executed using the ConsensusDOCS 813 Trade Contract Change Order (CM as Owner's Agent) form document with exhibits attached as necessary.

2.8.17 The Trade Contract Documents consist of this Agreement (as modified), the drawings, specifications, addenda issued prior to execution of this Agreement, approved submittals, information furnished by the Owner under subsection 4.1.3, the bid documents, other documents listed in this Agreement and any modifications issued after execution.

2.8.18 The Trade Contract Price is the amount indicated in section 7.1 of this Agreement.

2.8.19 The Trade Contract Time is the period between the Date of Commencement and Final Completion.

2.8.20 Trade Contract Work means the construction and services provided by the Trade Contractor.

2.8.20.1 Changed Work means work that is different from the original scope of Trade Contract Work; or work that changes the Trade Contract Price or Trade Contract Time.

2.8.20.2 Defective Work is any portion of the Trade Contract Work that is not in conformance with the Trade Contract Documents.

2.8.21 The Trade Contractor is the person or entity identified in ARTICLE 1 and includes the Trade Contractor's Representative.

2.8.22 The term Work means the construction and services necessary or incidental to fulfill the Trade

Contractors' obligations for the Project. The Work may refer to the whole Project or only a part of the Project.

2.8.23 Worksite means the geographical area at the location of the Project as identified in ARTICLE 1 where the Trade Contract Work is to be performed.

ARTICLE 3 TRADE CONTRACTOR'S OBLIGATIONS

3.1 GENERAL RESPONSIBILITIES

3.1.1 RESPONSIBILITIES The Trade Contractor shall provide all of the labor, materials, equipment and services necessary to complete the Trade Contract Work, all of which shall be provided in full accord with or as reasonably inferable from the Trade Contract Documents as being necessary to produce the indicated results.

3.1.2 The Trade Contractor shall be responsible for the supervision and coordination of the Trade Contract Work, including the construction means, methods, techniques, sequences and procedures utilized, unless the Trade Contract Documents give other specific instructions. In such case, the Trade Contractor shall not be liable to the Owner for damages resulting from compliance with such instructions unless the Trade Contractor recognized and failed to timely report to the Owner any error, inconsistency, omission or unsafe practice that it discovered in the specified constructionmeans, methods, techniques, safety, sequences or procedures.

3.1.3 The Trade Contractor shall perform Trade Contract Work only within locations allowed by the Trade Contract Documents, applicable permits and applicable local law.

3.2 COOPERATION WITH WORK OF OWNER AND OTHERS

3.2.1 The Owner may perform work at the Worksite directly or by Others. Any agreements with Others to perform construction or operations related to the Project shall include provisions pertaining to insurance, indemnification, waiver of subrogation, coordination, interference, clean up and safety which are substantively the same as the corresponding provisions of this Agreement.

3.2.2 In the event that the Owner elects to perform work at the Worksite directly or by Others, the Trade Contractor and the Owner shall, with the assistance of the Construction Manager, coordinate the activities of all forces at the Worksite and agree upon fair and reasonable schedules and operational procedures for Worksite activities. The Owner shall require each separate contractor to cooperate with the Trade Contractor and assist with the coordination of activities and the review of construction schedules and operations. The Trade Contract Price and Trade Contract Time shall be equitably adjusted, as mutually agreed by the Parties, for subsequent changes made necessary by the coordination of construction activities, and the Trade Contactor's construction schedule and the Construction Schedule shall be revised accordingly. The Trade Contractor, Owner and Others shall adhere to the revised Construction Schedule until it may subsequently be revised.

3.2.3 With regard to the work of the Owner and Others, the Trade Contractor shall (a) proceed with the Trade Contract Work in a manner which does not hinder, delay or interfere with the work of the Owner or Others or cause the work of the Owner or Others to become defective, (b) afford the Owner or Others reasonable access for introduction and storage of their materials and equipment and performance of their activities, and (c) coordinate the Trade Contractor's construction and operations with theirs as required by this section.

3.2.4 Before proceeding with any portion of the Trade Contract Work affected by the construction or operations of the Owner or Others, the Trade Contractor shall give the Owner and Construction

Manager prompt written notification of any defects the Trade Contractor discovers in their work which will prevent the proper execution of the Trade Contract Work. The Trade Contractor's obligations in this section do not create a responsibility for the work of the Owner or Others, but are for the purpose of facilitating the Trade Contract Work. If the Trade Contractor does not notify the Owner and Construction Manager of patent defects interfering with the performance of the Trade Contract Work, the Trade Contractor acknowledges that the work of the Owner or Others is not defective and is acceptable for the proper execution of the Trade Contract Work. Following receipt of written notice from the Trade Contractor of defects, the Owner, through the Construction Manager, shall promptly inform the Trade Contractor what action, if any, the Trade Contractor shall take with regard to the defects.

3.3 RESPONSIBILITY FOR PERFORMANCE

3.3.1 In order to facilitate its responsibilities for completion of the Work in accordance with and as reasonably inferable from the Trade Contract Documents, prior to commencing the Work the Trade Contractor shall examine and compare the drawings and specifications with information furnished by the Owner pursuant to subsection 4.1.3, relevant field measurements made by the Trade Contractor and any visible conditions at the Worksite affecting the Trade Contract Work.

3.3.2 If in the course of the performance of the obligations in subsection 3.3.1 the Trade Contractor discovers any errors, omissions or inconsistencies in the Contract Documents, the Trade Contractor shall promptly report them to the Owner and Construction Manager. It is recognized, however, that the Trade Contractor is not acting in the capacity of a licensed design professional, and that the Trade Contractor's examination is to facilitate construction and does not create an affirmative responsibility to detect errors, omissions or inconsistencies or to ascertain compliance with applicable laws, building codes or regulations. Following receipt of written notice from the Trade Contractor of defects, the Owner shall promptly inform the Trade Contractor what action, if any, the Trade Contractor shall take with regard to the defects.

3.3.3 The Trade Contractor shall have no liability for errors, omissions or inconsistencies discovered under subsections 3.3.1 and 3.3.2 unless the Trade Contractor fails to report a recognized problem to the Owner and Construction Manager.

3.3.4 The Trade Contractor may be entitled to additional costs or time if there are changes in the scope of the Trade Contract Work that increase the cost of the Work or increase the number of days required to perform the Work, respectively, because of clarifications or instructions arising out of the Trade Contractor's reports described in the three preceding Subsections.

3.4 CONSTRUCTION PERSONNEL AND SUPERVISION

3.4.1 The Trade Contractor shall provide competent supervision for the performance of the Trade Contract Work. Before commencing the Trade Contract Work, Trade Contractor shall notify Owner and Construction Manager in writing of the name and qualifications of its proposed superintendent(s) and project manager so Owner and Construction Manager may review the individual's qualifications. If, for reasonable cause, the Owner or Construction Manager refuses to approve the individual, or withdraws its approval after once giving it, Trade Contractor shall name a different superintendent or project manager for Owner's and Construction Manager's review. Any disapproved superintendent shall not perform in that capacity thereafter at the Worksite.

3.4.2 The Trade Contractor shall be responsible to the Owner for acts or omissions of parties or entities performing portions of the Trade Contract Work for or on behalf of the Trade Contractor or any of its Subcontractors.

3.4.3 The Trade Contractor shall permit only qualified persons to perform the Trade Contract Work. The

Trade Contractor shall enforce safety procedures, strict discipline and good order among persons performing the Trade Contract Work. If the Owner or Construction Manager determines that a particular person does not follow safety procedures, or is unfit or unskilled for the assigned work, the Trade Contractor shall immediately reassign the person on receipt of the Owner's or Construction Manager's written notice to do so.

3.4.4 TRADE CONTRACTOR'S REPRESENTATIVE The Trade Contractor's authorized representative is . The Trade Contractor's representative shall possess full authority to receive instructions from the Owner and to act on those instructions. The Trade Contractor shall notify the Owner and the Construction Manager in writing of a change in the designation of the Trade Contractor's representative. The Trade Contractor's representative is also authorized to bind the Trade Contractor in all matters relating to this Agreement including, without limitation, all matters requiring the Trade Contractor's approval, authorization, or written notice. The Trade Contractor's representative is also authorized to resolve disputes in accordance with Section 12.2 of this Agreement.

3.5 MATERIALS FURNISHED BY THE OWNER OR OTHERS

3.5.1 In the event the Trade Contract Work includes installation of materials or equipment furnished by the Owner or Others, it shall be the responsibility of the Trade Contractor to examine the items so provided and thereupon handle, store and install the items, unless otherwise provided in the Trade Contract Documents, with such skill and care as to provide a satisfactory and proper installation. Loss or damage due to acts or omissions of the Trade Contractor shall be the responsibility of the Trade Contractor and may be deducted from any amounts due or to become due the Trade Contractor. Any defects discovered in such materials or equipment shall be reported at once to the Owner and Construction Manager. Following receipt of written notice from the Trade Contractor of defects, the Owner shall promptly inform the Trade Contractor what action, if any, the Trade Contractor shall take with regard to the defects.

3.6 TESTS AND INSPECTIONS

3.6.1 The Trade Contractor shall schedule all required tests, approvals and inspections of the Trade Contract Work or portions thereof at appropriate times so as not to delay the progress of the Trade Contract Work or other work related to the Project. The Trade Contractor shall give proper notice to the Construction Manager and to all required parties of such tests, approvals and inspections. If feasible, the Owner and Others may timely observe the tests at the normal place of testing. Except as provided in subsection 3.6.3, the Owner shall bear all expenses associated with tests, inspections and approvals required by the Trade Contract Documents, which, unless otherwise agreed to, shall be conducted by an independent testing laboratory or entity retained by the Owner. Unless otherwise required by the Trade Contract Documents, required certificates of testing, approval or inspection shall be secured by the Trade Contractor and promptly delivered to the Owner and Construction Manager.

3.6.2 If the Owner, Construction Manager or appropriate authorities determine that tests, inspections or approvals in addition to those required by the Trade Contract Documents will be necessary, the Trade Contractor shall arrange for the procedures and give timely notice to the Owner, Construction Manager and Others who may observe the procedures. Costs of the additional tests, inspections or approvals are at the Owner's expense except as provided in subsection 3.6.3.

3.6.3 If the procedures described in subsections 3.6.1 and 3.6.2 indicate that portions of the Trade Contract Work fail to comply with the Trade Contract Documents, the Trade Contractor shall be responsible for costs of correction and retesting.

3.7 WARRANTY

3.7.1 The Trade Contract Work shall be executed in accordance with the Trade Contract Documents in a workmanlike manner. The Trade Contractor warrants that all materials and equipment shall be furnished in sufficient quantities to facilitate the proper and expeditious execution of the Trade Contract Work and shall be new unless otherwise specified, of good quality, in conformance with the Trade Contract Documents, and free from defective workmanship and materials. At the Owner's or Construction Manager's request, the Trade Contractor shall furnish satisfactory evidence of the quality and type of materials and equipment furnished. The Trade Contractor further warrants that the Trade Contract Work shall be free from material defects not intrinsic in the design or materials required in the Trade Contract Documents. The Trade Contractor's warranty does not include remedies for defects or damages caused by normal wear and tear during normal usage, use for a purpose for which the Project was not intended, improper or insufficient maintenance, modifications performed by the Owner or Others, or abuse. The Trade Contractor's warranty pursuant to this section shall commence on the Date of Substantial Completion.

3.7.2 The Trade Contractor shall obtain from its Subcontractors and material suppliers any special or extended warranties required by the Trade Contract Documents. All such warranties shall be listed in an attached Exhibit to this Agreement.

3.8 CORRECTION OF TRADE CONTRACT WORK WITHIN ONE YEAR

3.8.1 If, prior to Substantial Completion and within one year after the date of Substantial Completion of the Trade Contract Work, any Defective Work is found, the Owner shall promptly notify the Trade Contractor in writing. Unless the Owner provides written acceptance of the condition, the Trade Contractor shall promptly correct the Defective Work at its own cost and time and bear the expense of additional services required for correction of any Defective Work for which it is responsible. If within the one-year correction period the Owner discovers and does not promptly notify the Trade Contractor or give the Trade Contractor an opportunity to test or correct Defective Work as reasonably requested by the Trade Contractor, the Owner waives the Trade Contractor's obligation to correct that Defective Work as well as the Owner's right to claim a breach of the warranty with respect to that Defective Work.

3.8.2 With respect to any portion of Trade Contract Work first performed after Substantial Completion, the one-year correction period shall be extended by the period of time between Substantial Completion and the actual performance of the later Trade Contract Work. Correction periods shall not be extended by corrective work performed by the Trade Contractor.

3.8.3 If the Trade Contractor fails to correct Defective Work within a reasonable time after receipt of written notice from the Owner prior to final payment, the Owner may correct it in accordance with the Owner's right to carry out the Trade Contract Work in section 11.2. In such case, an appropriate Trade Contract Change Order shall be issued deducting the cost of correcting such deficiencies from payments then or thereafter due the Trade Contractor. If payments then or thereafter due Trade Contractor are not sufficient to cover such amounts, the Trade Contractor shall pay the difference to the Owner.

3.8.4 If after the one-year correction period but before the applicable limitation period the Owner discovers any Defective Work, the Owner shall, unless the Defective Work requires emergency correction, promptly notify the Trade Contractor. If the Trade Contractor elects to correct the Defective Work, it shall provide written notice of such intent within fourteen (14) Days of its receipt of notice from the Owner. The Trade Contractor shall complete the correction of Defective Work within a time frame mutually agreed upon by the Trade Contractor and the Owner. If the Trade Contractor does not elect to correct the Defective Work, the Owner may have the Defective Work corrected by itself or Others and charge the Trade Contractor for the reasonable cost of the correction and other directly related

expenses. Owner shall provide Trade Contractor with an accounting of correction costs it incurs.

3.8.5 If the Trade Contractor's correction or removal of Defective Work causes damage to or destroys other completed or partially completed Work or existing buildings, the Trade Contractor shall be responsible for the cost of correcting the destroyed or damaged property.

3.8.6 The one-year period for correction of Defective Work does not constitute a limitation period with respect to the enforcement of the Trade Contractor's other obligations under the Trade Contract Documents.

3.8.7 Prior to final payment, at the Owner's option and with the Trade Contractor's agreement, the Owner may elect to accept Defective Work rather than require its removal and correction. In such case the Contract Price shall be equitably adjusted for any diminution in the value of the Project caused by such Defective Work. Before the Owner accepts any such change it must be documented in writing with a Change Order signed by both the Trade Contractor and Owner.

3.9 CORRECTION OF COVERED TRADE CONTRACT WORK

3.9.1 On request of the Owner or Construction Manager, Trade Contract Work that has been covered without a requirement that it be inspected prior to being covered may be uncovered for the Owner's or Construction Manager's inspection. The Owner shall pay for the costs of uncovering and replacement if the Work proves to be in conformance with the Trade Contract Documents, or if the defective condition was caused by the Owner or Others. If the uncovered Trade Contract Work proves to be defective, the Trade Contractor shall pay the costs of uncovering and replacement.

3.9.2 If contrary to specific requirements in the Trade Contract Documents or contrary to a specific request from the Owner or Construction Manager, a portion of the Trade Contract Work is covered, the Owner or Construction Manager, by written request, may require the Trade Contractor to uncover the Trade Contract Work for the Owner's or Construction Manager's observation. In this circumstance the Trade Contract Work shall be uncovered and recovered at the Trade Contractor's expense and with no adjustment to the Trade Contract Time. Costs incurred by the Owner as a direct result of the above shall be deducted from the Trade Contract Price.

3.10 SAFETY OF PERSONS AND PROPERTY

3.10.1 SAFETY PRECAUTIONS AND PROGRAMS The Trade Contractor shall have overall responsibility for safety precautions and programs in the performance of the Trade Contract Work. While this section establishes the responsibility for safety between the Owner and Trade Contractor, it does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with the provisions of applicable laws and regulations.

3.10.2 The Trade Contractor shall seek to avoid injury, loss or damage to persons or property by taking reasonable steps to protect:

3.10.2.1 its employees and other persons at the Worksite;

3.10.2.2 materials and equipment stored at on-site or off-site locations for use in the Trade Contract Work; and

3.10.2.3 property located at the site and adjacent to Trade Contract Work areas, whether or not the property is part of the Trade Contract Work.

3.10.3 TRADE CONTRACTOR'S SAFETY REPRESENTATIVE The Trade Contractor's Worksite Safety Representative is Contactor Contact Name who shall act as the Trade Contractor's authorized safety

representative with a duty to prevent accidents in accordance with subsection 3.10.2 If no individual is identified in this section, the authorized safety representative shall be the Trade Contractor's Representative. The Trade Contractor shall report immediately in writing to the Owner and Construction Manager all recordable accidents and injuries occurring at the Worksite. When the Trade Contractor is required to file an accident report with a public authority, the Trade Contractor shall furnish a copy of the report to the Owner and Construction Manager.

3.10.4 The Trade Contractor shall provide the Owner and Construction Manager with copies of all notices required of the Trade Contractor by law or regulation. The Trade Contractor's safety program shall comply with the requirements of governmental and quasi-governmental authorities having jurisdiction.

3.10.5 Damage or loss not insured under property insurance which may arise from the Trade Contract Work, to the extent caused by the negligent acts or omissions of the Trade Contractor, or anyone for whose acts the Trade Contractor may be liable, shall be promptly remedied by the Trade Contractor.

3.10.6 If the Owner or Construction Manager deems any part of the Trade Contract Work or Worksite unsafe, the Owner or Construction Manager, without assuming responsibility for the Trade Contractor's safety program, may require the Trade Contractor to stop performance of the Trade Contract Work or take corrective measures satisfactory to the Owner, or both. If the Trade Contractor does not adopt corrective measures, the Owner may perform them and deduct their cost from the Trade Contract Price. The Trade Contractor agrees to make no claim for damages, for an increase in the Trade Contract Price or for a change in the Trade Contract Time based on the Trade Contractor's compliance with the Owner's or Construction Manager's reasonable request.

3.11 EMERGENCIES

3.11.1 In an emergency, the Trade Contractor shall act in a reasonable manner to prevent personal injury or property damage. Any change in the Trade Contract Price or Trade Contract Time resulting from the actions of the Trade Contractor in an emergency situation shall be determined as provided in ARTICLE 8.

3.12 HAZARDOUS MATERIALS

3.12.1 The Trade Contractor shall not be obligated to commence or continue Trade Contract Work until any Hazardous Material discovered at the Worksite has been removed, rendered or determined to be harmless by the Owner as certified by an independent testing laboratory and approved by the appropriate government agency.

3.12.2 If after the commencement of the Trade Contract Work a Hazardous Material is discovered at the Worksite, the Trade Contractor shall be entitled to immediately stop Trade Contract Work in the affected area. The Trade Contractor shall report the condition to the Owner, the Construction Manager, and, if required, the government agency with jurisdiction.

3.12.3 The Trade Contractor shall not be required to perform any Trade Contract Work relating to or in the area of Hazardous Material without written mutual agreement.

3.12.4 The Owner shall be responsible for retaining an independent testing laboratory to determine the nature of the Hazardous Material encountered and whether the material requires corrective measures or remedial action. Such measures shall be the sole responsibility of the Owner, and shall be performed in a manner minimizing any adverse effects upon the Trade Contract Work. The Trade Contractor shall resume Trade Contract Work in the area affected by any Hazardous Material only upon written agreement between the Parties after the Hazardous Material has been removed or rendered harmless

and only after approval, if necessary, of the governmental agency with jurisdiction.

3.12.5 If the Trade Contractor incurs additional costs or is delayed due to the presence or remediation of Hazardous Material, the Trade Contractor shall be entitled to an equitable adjustment in the Trade Contract Price or the Trade Contract Time.

3.12.6 To the extent not caused by the negligent acts or omissions of the Trade Contractor, its Subcontractors and Sub-subcontractors, and the agents, officers, directors and employees of each of them, the Owner shall defend, indemnify and hold harmless the Trade Contractor, its Subcontractors and Sub-subcontractors, and the agents, officers, directors and employees of each of them, from and against any and all direct claims, damages, losses, costs and expenses, including but not limited to attorney's fees, costs and expenses incurred in connection with any dispute resolution process, to the extent permitted pursuant to section 6.6, arising out of or relating to the performance of the Trade Contract Work in any area affected by Hazardous Material. To the extent portions of this paragraph are in conflict with SF 396 (codified at Iowa Code Section 537A.5) said portions are void and unenforceable.

3.12.7 MATERIALS BROUGHT TO THE WORKSITE

3.12.7.1 Material Safety Data (MSD) sheets as required by law and pertaining to materials or substances used or consumed in the performance of the Trade Contract Work, whether obtained by the Trade Contractor, Subcontractors, the Owner or Others, shall be maintained at the Worksite by the Trade Contractor and made available to the Owner, Construction Manager, Subcontractors and Others.

3.12.7.2 The Trade Contractor shall be responsible for the proper delivery, handling, application, storage, removal and disposal of all materials and substances brought to the Worksite by the Trade Contractor in accordance with the Trade Contract Documents and used or consumed in the performance of the Trade Contract Work.

3.12.7.3 The Trade Contractor shall indemnify and hold harmless the Owner, Construction Manager, their agents, officers, directors and employees, from and against any and all claims, damages, losses, costs and expenses, including but not limited to attorney's fees, costs and expenses incurred in connection with any dispute resolution procedure, arising out of or relating to the delivery, handling, application, storage, removal and disposal of all materials and substances brought to the Worksite by the Trade Contractor in accordance or not in accordance with the Trade Contract Documents. To the extent portions of this paragraph are in conflict with SF 396 (codified at Iowa Code Section 537A.5) said portions are void and unenforceable.

3.12.8 The terms of this section shall survive the completion of the Trade Work or any termination of this Agreement.

3.13 SUBMITTALS

3.13.1 The Trade Contractor shall submit to the Construction Manager, and the Design Professional, for review and approval all shop drawings, samples, product data and similar submittals required by the Trade Contract Documents. Submittals may be submitted in electronic form if required in accordance with ConsensusDocs 200.2 and subsection 4.4.1. The Trade Contractor shall be responsible to the Owner for the accuracy and conformity of its submittals to the Trade Contract Documents. The Trade Contractor shall prepare and deliver its submittals in a manner consistent with the Construction Schedule and in such time and sequence so as not to delay the performance of the Trade Contract Work or the work of the Owner and Others. When the Trade Contractor delivers its submittals the Trade Contractor shall identify in writing for each submittal all changes, deviations or substitutions from the requirements of the Trade Contract Documents. The review and approval of any Trade Contractor

submittal shall not be deemed to authorize changes, deviations or substitutions from the requirements of the Trade Contract Documents unless express written approval is obtained from the Owner specifically authorizing such deviation, substitution or change. To the extent a change, deviation or substitution causes an impact to the Contract Price or Contract Time, such approval shall be promptly memorialized in a Change Order. Further, the Construction Manager and Design Professional shall not make any change, deviation or substitution through the submittal process without specifically identifying and authorizing such deviation to the Trade Contractor. In the event that the Trade Contract Documents do not contain submittal requirements pertaining to the Trade Contract Work, the Trade Contractor agrees upon request to submit in a timely fashion to the Construction Manager and the Design Professional for review and approval any shop drawings, samples, product data, manufacturers' literature or similar submittals as may reasonably be required by the Owner, Construction Manager, or Design Professional.

3.13.2 The Owner shall be responsible for review and approval of submittals with reasonable promptness to avoid causing delay.

3.13.3 The Trade Contractor shall perform all Trade Contract Work strictly in accordance with approved submittals. Approval of shop drawings is not authorization to Trade Contractor to perform Changed Work, unless the procedures of ARTICLE 8 are followed. Approval does not relieve the Trade Contractor from responsibility for Defective Work resulting from errors or omissions of any kind on the approved Shop Drawings.

3.13.4 Record copies of the following, incorporating field changes and selections made during construction, shall be maintained by the Trade Contractor at the Project site and available to the Owner upon request: drawings, specifications, addenda, Trade Contract Change Order and other modifications, and required submittals including product data, samples and shop drawings.

3.13.5 No substitutions shall be made in the Trade Contract Work unless permitted in the Trade Contract Documents and then only after the Trade Contractor obtains approvals required under the Trade Contract Documents for substitutions. All such substitutions shall be promptly memorialized in a Change Order no later than seven (7) Days following approval by the Owner and, if applicable, provide for an adjustment in the Contract Price or Contract Time.

3.13.6 The Trade Contractor shall prepare and submit to the Construction Manager for submission to the Owner

(Check one only)

☒ final marked up as-built drawings

☐ updated electronic data, in accordance with ConsensusDocs 200.2 and section 4.4.1

☐ such documentation as defined by the Parties by attachment to this Agreement,

in general documenting how the various elements of the Trade Contract Work were actually constructed or installed.

3.14 PROFESSIONAL SERVICES

3.14.1 The Trade Contractor may be required to procure professional services in order to carry out its responsibilities for construction means, methods, techniques, sequences and procedures for such services specifically called for by the Contract Documents. The Trade Contractor shall obtain these professional services and any design certifications required from State of Iowa licensed design professionals. All drawings, specifications, calculations, certifications and submittals prepared by such

design professionals shall bear the signature and seal of such design professionals and the Owner and the Design Professional shall be entitled to rely upon the adequacy, accuracy and completeness of such design services. If professional services are specifically required by the Contract Documents, the Owner shall indicate all required performance and design criteria. The Trade Contractor shall not be responsible for the adequacy of such performance and design criteria. The Trade Contractor shall not be required to provide such services in violation of existing laws, rules and regulations in the jurisdiction where the Project is located.

3.15 WORKSITE CONDITIONS

3.15.1 WORKSITE VISIT The Trade Contractor acknowledges that it has visited, or has had the opportunity to visit, the Worksite to visually inspect the general and local conditions which could affect the Trade Contract Work.

3.15.2 CONCEALED OR UNKNOWN SITE CONDITIONS If the conditions at the Worksite are (a) subsurface or other concealed physical conditions which are materially different from those indicated in the Trade Contract Documents, or (b) unusual and unknown physical conditions which are materially different from conditions ordinarily encountered and generally recognized as inherent in Trade Contract Work provided for in the Trade Contract Documents, the Trade Contractor shall stop Trade Contract Work and give immediate written notice of the condition to the Owner, Construction Manager and the Design Professional. The Trade Contractor shall not be required to perform any work relating to the unknown condition without the written mutual agreement of the Parties. Any change in the Contract Price or the Contract Time as a result of the unknown condition shall be determined as provided in this article. The Trade Contractor shall provide the Owner and the Construction Manager with written notice of any claim as a result of unknown conditions within the time period set forth in section 8.4.

3.16 PERMITS AND TAXES

3.16.1 Trade Contractor shall give public authorities all notices required by law and, except for permits and fees which are the responsibility of the Owner pursuant to section 4.2, shall obtain and pay for all necessary permits, licenses and renewals pertaining to the Trade Contract Work. Trade Contractor shall provide to Owner copies of all notices, permits, licenses and renewals required under this Agreement.

3.16.2 Trade Contractor shall pay all applicable taxes legally enacted when bids are received or negotiations concluded for the Trade Contract Work provided by the Trade Contractor.

3.16.3 The Contract Price or Contract Time shall be equitably adjusted by Trade Contract Change Order for additional costs resulting from any changes in laws, ordinances, rules and regulations enacted after the date of this Agreement, including increased taxes.

3.16.3 (Deleted)

3.17 CUTTING, FITTING AND PATCHING

3.17.1 The Trade Contractor shall perform cutting, fitting and patching necessary to coordinate the various parts of the Trade Contract Work and to prepare its Trade Contract Work for the work of the Owner or Others.

3.17.2 Cutting, patching or altering the work of the Owner or Others shall be done with the prior written approval of the Owner. Such approval shall not be unreasonably withheld.

3.18 CLEANING UP

3.18.1 The Trade Contractor shall regularly remove debris and waste materials at the Worksite resulting

from the Trade Contract Work. Prior to discontinuing Trade Contract Work in an area, the Trade Contractor shall clean the area and remove all rubbish and its construction equipment, tools, machinery, waste and surplus materials. The Trade Contractor shall minimize and confine dust and debris resulting from construction activities. At the completion of the Trade Contract Work, the Trade Contractor shall remove from the Worksite all construction equipment, tools, surplus materials, waste materials and debris.

3.18.2 If the Trade Contractor fails to commence compliance with cleanup duties within two (2) business Days after written notification from the Owner or the Construction Manager of noncompliance, the Owner may implement appropriate cleanup measures without further notice and the cost shall be deducted from any amounts due or to become due the Trade Contractor in the next payment period.

3.19 ACCESS TO TRADE CONTRACT WORK The Trade Contractor shall facilitate the access of the Owner, Construction Manager, Design Professional and Others to Trade Contract Work in progress.

3.20 COST MONITORING The Trade Contractor shall provide the Construction Manager with cost monitoring information appropriate for the manner of Trade Contractor's compensation, to enable the Construction Manager to develop and track construction and project budgets, including amounts for work in progress, uncompleted work and proposed changes.

3.21 ROYALTIES, PATENTS AND COPYRIGHTS The Trade Contractor shall pay all royalties and license fees which may be due on the inclusion of any patented or copyrighted materials, methods or systems selected by the Trade Contractor and incorporated in the Trade Contract Work. The Trade Contractor shall defend, indemnify and hold the Owner harmless from all suits or claims for infringement of any patent rights or copyrights arising out of such selection. The Owner agrees to indemnify and hold the Trade Contractor harmless from any suits or claims of infringement of any patent rights or copyrights arising out of any patented or copyrighted materials, methods or systems specified by the Owner, Construction Manager and Design Professional. To the extent portions of this paragraph are in conflict with SF 396 (codified at Iowa Code Section 537A.5) said portions are void and unenforceable.

3.22 CONFIDENTIALITY The Owner shall treat as confidential information all of the Trade Contractor's estimating systems and historical and parameter cost data that may be disclosed to the Owner in connection with the performance of this Agreement if they are specified and marked as confidential and shall mark them. If a document is not marked as "Confidential" it will not be treated as such. Nothing contained herein, however, shall be interpreted in a manner that modifies or is in conflict with the purpose and application of the open records laws contained in the Code of Iowa.

ARTICLE 4 OWNER'S RESPONSIBILITIES

4.1 INFORMATION SERVICES

4.1.1 FULL INFORMATION Any information or services to be provided by the Owner shall be provided in a timely manner so as not to delay the Trade Contract Work.

4.1.2 FINANCIAL INFORMATION Upon the written request of the Trade Contractor, the Owner shall provide the Trade Contractor with evidence of Project financing. If requested in writing, evidence of such financing shall be a condition precedent to the Trade Contractor's commencing or continuing the Trade Contract Work. The Trade Contractor shall be notified by the Owner prior to any material change in Project financing.

4.1.3 WORKSITE INFORMATION Except to the extent that the Trade Contractor knows of any inaccuracy, the Trade Contractor is entitled to rely on Worksite information furnished by the Owner pursuant to this subsection. To the extent the Owner has obtained, or is required elsewhere in the

Trade Contract Documents to obtain, the following Worksite information, the Owner shall provide at the Owner's expense and with reasonable promptness:

4.1.3.1 information describing the physical characteristics of the site, including surveys, site evaluations, legal descriptions, data or drawings depicting existing conditions, subsurface conditions and environmental studies, reports and investigations;

4.1.3.2 tests, inspections and other reports dealing with environmental matters, Hazardous Material and other existing conditions, including structural, mechanical and chemical tests, required by the Trade Contract Documents or by law; and

4.1.3.3 any other information or services requested in writing by the Trade Contractor which are relevant to the Trade Contractor's performance of the Trade Contract Work and under the Owner's control. The information required by subsection 4.1.3 shall be provided in reasonable detail. Legal descriptions shall include easements, title restrictions, boundaries, and zoning restrictions. Worksite descriptions shall include existing buildings and other construction and all other pertinent site conditions. Adjacent property descriptions shall include structures, streets, sidewalks, alleys, and other features relevant to the Trade Contract Work. Utility details shall include available services, lines at the Worksite and adjacent and connection points. The information shall include public and private information, subsurface information, grades, contours, and elevations, drainage data, exact locations and dimensions, and benchmarks that can be used by the Trade Contractor in laying out the Trade Contract Work. The Trade Contractor shall in writing request from the Owner any information identified in Paragraph 4.1.3 that the Trade Contractor believes the Owner has obtained but has not provided to the Trade Contractor.

4.1.3.4 OWNER'S REPRESENTATIVE The Owner's representative is test. The Owner's representative shall have authority to bind the Owner in all matters relating to this Agreement including, without limitation, all matters requiring the Owner's approval, authorization or written notice. If the Owner changes its representative as listed above, the Owner shall notify the Trade Contractor in advance in writing. The Owner's Representative is also authorized to resolve disputes in accordance with Section 12.2 of this Agreement. The Construction Manager, while unauthorized to modify the Agreement or settle a dispute without the Owner's approval, however, does have the requisite authority to act as the Owner's agent throughout the construction of the Project in accordance with the contract between the Owner and the Construction Manager (ConsensusDOCS 801 as modified by the State of Iowa).

4.2 BUILDING PERMIT, FEES AND APPROVALS Except for those permits and fees related to the Trade Contract Work which are the responsibility of the Trade Contractor pursuant to subsection 3.16.1, the Owner shall secure and pay for all other permits, approvals, easements, assessments and fees required for the development, construction, use or occupancy of permanent structures or for permanent changes in existing facilities, including the building permit.

4.3 Deleted

4.4 TRADE CONTRACT DOCUMENTS Unless otherwise specified, Owner shall provide One (1) copies of the Trade Contract Documents to the Trade Contractor without cost. Additional copies will be provided to the Trade Contractor at cost. This paragraph is not intended to be in conflict with Iowa Code Section 26.3 requirement that a sufficient number of copies of the contract documents be made available to bidders without charge (but a deposit not to exceed $250 per set may be required). If the Trade Contractor was required to make a deposit for a set of Trade Contract Documents for purposes of bidding then the Trade Contractor may elect to have the deposit returned instead of being provided with an additional copy.

4.4.1 DIGITIZED DOCUMENTS If the Owner requires that the Owner, Design Professional, Construction Manager and Trade Contractor exchange documents and data in electronic or digital form, prior to any such exchange, the Owner, Design Professional, Construction Manager and Trade Contractor shall agree on a written protocol governing all exchanges in ConsensusDocs 200.2 or a separate Agreement, which, at a minimum, shall specify: (a) the definition of documents and data to be accepted in electronic or digital form or to be transmitted electronically or digitally; (b) management and coordination responsibilities; (c) necessary equipment, software and services; (d) acceptable formats, transmission methods and verification procedures; (e) methods for maintaining version control; (f) privacy and security requirements; and (g) storage and retrieval requirements. Except as otherwise agreed to by the Parties in writing, the Parties shall each bear their own costs as identified in the protocol. In the absence of a written protocol, use of documents and data in electronic or digital form shall be at the sole risk of the recipient.

4.5 OWNER'S CUTTING AND PATCHING Cutting, patching or altering the Trade Contract Work by the Owner or Others shall be done with the prior written approval of the Trade Contractor, which approval shall not be unreasonably withheld.

4.6 OWNER'S RIGHT TO CLEAN UP In case of a dispute between the Trade Contractor and Others with regard to respective responsibilities for cleaning up at the Worksite, the Owner may implement appropriate cleanup measures after two (2) business Days' notice and allocate the cost among those responsible during the following pay period.

4.7 COST OF CORRECTING DAMAGED OR DESTROYED WORK With regard to damage or loss attributable to the acts or omissions of the Owner or Others and not to the Trade Contractor, the Owner may either (a) promptly remedy the damage or loss or (b) accept the damage or loss. If the Trade Contractor incurs additional costs or is delayed due to such loss or damage, the Trade Contractor shall be entitled to an equitable adjustment in the Trade Contract Price or Trade Contract Time.

ARTICLE 5 SUBCONTRACTS

5.1 SUBCONTRACTORS The Trade Contract Work not performed by the Trade Contractor with its own forces shall be performed by Subcontractors.

5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE TRADE CONTRACT WORK

5.2.0 The Trade Contractor must identify all Subcontractors and suppliers within 48 hours of the published date and time for which bids must be submitted, in accordance with Iowa Code Section 8A.311, as amended by House File 646 in 2011. Subcontractors and suppliers may not be changed without the approval of the Owner. Requests for changing a Subcontractor or supplier must identify the reason for the proposed change, the name of the new Subcontractor or supplier, and the change in the subcontractor or supplier price as a result of the change. Any reduction in subcontractor or supplier price as a result of the change, if the change is approved by the Owner, shall be deducted from the Trade Contract Price via a deductive Change Order. Any such changes, if approved by the Owner, which result in an increase in the Trade Contract Price shall be borne by the Trade Contractor.

5.2.1 If the Owner has a reasonable objection to any proposed subcontractor or material supplier, the Owner shall notify the Trade Contractor in writing.

5.2.2 If the Owner has reasonably and promptly objected as provided in subsection 5.2.1, the Trade Contractor shall not contract with the proposed subcontractor or material supplier, and the Trade Contractor shall propose another Subcontractor acceptable to the Owner. To the extent the substitution results in an increase or decrease in the Trade Contract Price or Trade Contract Time, an appropriate

Trade Contract Change Order shall be issued as provided in ARTICLE 8.

5.3 BINDING OF SUBCONTRACTORS The Trade Contractor agrees to bind every Subcontractor (and require every Subcontractor to so bind its subcontractors) to all the provisions of this Agreement and the Trade Contract Documents as they apply to the Subcontractor's portion of the Trade Contract Work.

5.4 Deleted

5.5 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

5.5.1 If this Agreement is terminated, each subcontract agreement shall be assigned by the Trade Contractor to the Owner, subject to the prior rights of any surety, provided that:

5.5.1.1 this Agreement is terminated by the Owner pursuant to sections 11.3 or 11.4; and

5.5.1.2 the Owner accepts such assignment after termination by notifying the Subcontractor and Trade Contractor in writing, and assumes all rights and obligations of the Contractor pursuant to each subcontract agreement.

5.5.2 If the Owner accepts such an assignment, and the Work has been suspended for more than thirty (30) consecutive Days, following termination, if appropriate, the Subcontractor's compensation shall be equitably adjusted as a result of the suspension.

ARTICLE 6 TRADE CONTRACT TIME

6.1 PERFORMANCE OF THE TRADE CONTRACT WORK

6.1.1 DATE OF COMMENCEMENT The Date of Commencement is the date of Owner's written notice to proceed unless otherwise set forth below:

6.1.2 TIME Substantial Completion of the Trade Contract Work shall be achieved in Zero (0) Days from the Date of Commencement. Unless otherwise specified in the Certificate of Substantial Completion, the Trade Contractor shall achieve Final Completion within Thirty (30) Days after the date of Substantial Completion, subject to adjustments as provided for in the Trade Contract Documents.

6.1.3 Time limits stated above are of the essence of this Agreement.

6.1.4 Unless instructed by the Owner in writing, the Trade Contractor shall not knowingly commence the Trade Contract Work before the effective date of insurance to be provided by the Trade Contractor and Owner as required by the Trade Contract Documents.

6.2 CONSTRUCTION SCHEDULE Prior to the commencement of the construction of the Trade Contract Work, the Trade Contractor shall submit a copy of its critical path method (CPM) construction schedule showing the completion of the Trade Contract Work within the allowable number of days identified above. The Trade Contractor shall regularly update its CPM construction schedule for the Trade Contract Work and promptly furnish the Construction Manager on an ongoing basis scheduling information requested by the Construction Manager for the Trade Contract Work. In consultation with the Trade Contractor, the Construction Manager shall incorporate the Trade Contract Work and work of other trade contractors into an overall Construction Schedule for the entire Project. The Trade Contractor shall be bound by the Construction. Nothing in this Trade Contractor Agreement shall relieve the Trade Contractor of any liability for any unexcused failure to comply with its original schedule, the Construction Schedule, or any completion dates. The Construction Manager shall have the right to coordinate the Trade Contractors, including the right, if necessary, to change the time, order and priority in which the various portions of the Trade Contract Work and the other work associated with the Project shall be performed.

6.3 DELAYS AND EXTENSIONS OF TIME

6.3.1 If the Trade Contractor is delayed at any time in the commencement or progress of the Work by any cause beyond the control of the Trade Contractor, the Trade Contractor shall be entitled to an equitable extension of the Trade Contract Time if the Trade Contractor is able to show that the critical path of the Trade Contract Work was delayed by causes beyond the control of the Trade Contractor. Examples of causes beyond the control of the Trade Contractor include, but are not limited to, the following: acts or omissions of the Owner, the Design Professional, Construction Manager or Others; changes in the Work or the sequencing of the Work ordered by the Owner, or arising from decisions of the Owner that impact the time of performance of the Work; transportation delays not reasonably foreseeable; labor disputes not involving the Trade Contractor; general labor disputes impacting the Project but not specifically related to the Worksite; fire; terrorism, epidemics, adverse governmental actions, unavoidable accidents or circumstances; adverse weather conditions not reasonably anticipated; encountering Hazardous Materials; concealed or unknown conditions; delay authorized by the Owner pending dispute resolution; and suspension by the Owner under section 11.1. The Trade Contractor shall submit any requests for equitable extensions of Contract Time in accordance with the provisions of ARTICLE 8.

6.3.2 In addition, if the Trade Contractor is able to show that it incurred additional costs because the critical path of the Trade Contract Work was delayed by acts or omissions of the Owner, the Design Professional, Construction Manager or Others, changes in the Work or the sequencing of the Work ordered by the Owner, or arising from decisions of the Owner that impact the time of performance of the Work, encountering Hazardous Materials, or concealed or unknown conditions, delay authorized by the Owner pending dispute resolution or suspension by the Owner under section 11.1, then the Trade Contractor shall be entitled to an equitable adjustment in the Trade Contract Price subject to section 6.6.

6.3.3 NOTICE OF DELAYS In the event delays to the Trade Contract Work are encountered for any reason, the Trade Contractor shall provide prompt written notice to the Owner and the Construction Manager of the cause of such delays after Trade Contractor first recognizes the delay. The Owner and Trade Contractor agree to undertake reasonable steps to mitigate the effect of such delays.

6.4 NOTICE OF DELAY CLAIMS If the Trade Contractor believes it is due an equitable extension of Trade Contract Time or an equitable adjustment in Trade Contract Price as a result of a delay described in subsection 6.3.1, the Trade Contractor shall give the Owner and the Construction Manager written notice of the claim in accordance with section 8.4. If the Trade Contractor causes delay in the completion of the Trade Contract Work, the Owner shall be entitled to recover its additional costs subject to subsection 6.6. The Owner shall process any such claim against the Trade Contractor in accordance with ARTICLE 8.

6.5 LIQUIDATED DAMAGES

6.5.1 SUBSTANTIAL COMPLETION The Owner and the Trade Contractor agree that this Agreement ☐ shall / ☒ shall not (indicate one) provide for the imposition of liquidated damages based on the Date of Substantial Completion.

6.5.1.1 The Trade Contractor understands that if the Date of Substantial Completion established by this Agreement, as may be amended by subsequent Trade Change Order, is not attained, the Owner will suffer damages which are difficult to determine and accurately specify. The Trade Contractor agrees that if the Date of Substantial Completion is not attained the Trade Contractor shall pay the Owner Zero Dollars and No Cents ($0.00) as liquidated damages and not as a penalty for each day that Substantial Completion extends beyond the Date of Substantial Completion. The liquidated damages provided herein shall be in lieu of all liability for any and all

extra costs, losses, expenses, claims, penalties and any other damages of whatsoever nature incurred by the Owner which are occasioned by any delay in achieving the Date of Substantial Completion.

6.5.2 FINAL COMPLETION The Owner and the Trade Contractor agree that this Agreement ☐ shall / ☒ shall not (indicate one) provide for the imposition of liquidated damages based on the Date of Final Completion.

6.5.2.1 The Trade Contractor understands that if the Date of Final Completion established by this Agreement, as may be amended by subsequent Trade Change Order is not attained, the Owner will suffer damages which are difficult to determine and accurately specify. The Trade Contractor agrees that if the Date of Final Completion is not attained the Trade Contractor shall pay the Owner Zero Dollars and No Cents ($0.00) as liquidated damages and not as a penalty for each day that Final Completion extends beyond the Date of Final Completion. The liquidated damages provided herein shall be in lieu of all liability for any and all extra costs, losses, expenses, claims, penalties and any other damages of whatsoever nature incurred by the Owner which are occasioned by any delay in achieving the Date of Final Completion.

6.5.3 OTHER LIQUIDATED DAMAGES The Owner and the Trade Contractor may agree upon the imposition of liquidated damages based on other project milestones or performance requirements. Such agreement shall be included as an exhibit to this Agreement.

6.6 LIMITED MUTUAL WAIVER OF CONSEQUENTIAL DAMAGES Except for damages mutually agreed upon by the Parties as liquidated damages in Section 6.5 and excluding losses covered by insurance required by the Trade Contract Documents, the Owner and the Trade Contractor agree to waive all claims against each other for any consequential damages that may arise out of or relate to this Agreement, except for those specific items of damages excluded from this waiver as mutually agreed upon by the Parties and identified below. The Owner agrees to waive damages including but not limited to the Owner's loss of use of the Project, any rental expenses incurred, loss of income, profit or financing related to the Project, as well as the loss of business, loss of financing, principal office overhead and expenses, loss of profits not related to this Project, loss of reputation, or insolvency. The Trade Contractor agrees to waive damages including but not limited to loss of business, loss of financing, principal office overhead and expenses, loss of profits not related to this Project, loss of bonding capacity, loss of reputation, or insolvency. The provisions of this section shall also apply to the termination of this Agreement and shall survive such termination.

6.6.1 The following items of damages are excluded from this mutual waiver: The provisions of this section shall also apply to the termination of this Agreement and shall survive such termination. The Owner and the Trade Contractor shall require similar waivers in contracts with Subcontractors and Others retained for the Project.

ARTICLE 7 TRADE CONTRACT PRICE

7.1 LUMP SUM As full compensation for performance by the Trade Contractor of the Work in conformance with the Contract Documents, the Owner shall pay the Trade Contractor the lump sum price of: Zero Dollars and No Cents ($0.00). The lump sum price is hereinafter referred to as the Trade Contract Price, which shall be subject to increase or decrease as provided in article 8.

Lump Sum Price includes Base Bid of $XXXXXX and Alternate #XX for $XXXXXX for a total Lump Sum Price of $XXXXXXX

7.2 ALLOWANCES

7.2.1 All allowances stated in the Trade Contract Documents shall be included in the Trade Contract

Price. The Owner shall select allowance items in a timely manner so as not to delay the Trade Contract Work.

7.2.2 Allowances shall include the costs of materials, supplies and equipment delivered to the Worksite, less applicable trade discounts and including requisite taxes, unloading and handling at the Worksite, and labor and installation, unless specifically stated otherwise. The Trade Contractor's Overhead and profit for the allowances shall be included in the Trade Contract Price, but not in the allowances. The Trade Contract Price shall be adjusted by Trade Contract Change Order to reflect the actual costs when they are greater than or less than the allowances.

ARTICLE 8 CHANGES

Changes in the Trade Contract Work that are within the general scope of this Agreement shall be accomplished, without invalidating this Agreement, by Trade Contract Change Order, and Trade Contract Interim Directed Change.

8.1 TRADE CHANGE ORDER

8.1.1 The Owner may order or the Trade Contractor may request changes in the Trade Contract Work or the timing or sequencing of the Trade Contract Work that impacts the Trade Contract Price or the Trade Contract Time. All such changes in the Trade Contract Work that affect Trade Contract Time or Trade Contract Price shall in the form of a Trade Contract Change Order. Any such requests for a change in the Trade Contract Price or the Trade Contract Time shall be processed in accordance with this article 8. Trade Contract Change Orders shall be executed on the ConsensusDOCS 813 - Trade Contract Change Order (CM as Owner's Agent) with attachments as necessary.

8.1.2 The Owner, with the assistance of the Construction Manager, and the Trade Contractor shall negotiate in good faith an appropriate adjustment to the Trade Contract Price or the Trade Contract Time and shall conclude these negotiations as expeditiously as possible. Acceptance of the Trade Contract Change Order and any adjustment in the Trade Contract Price or Trade Contract Time shall not be unreasonably withheld.

8.2 TRADE CONTRACT INTERIM DIRECTED CHANGE

8.2.1 The Construction Manager may issue a written Trade Contract Interim Directed Change signed by the Owner directing a change in the Trade Contract Work prior to reaching agreement with the Trade Contractor on the adjustment, if any, in the Trade Contract Price or the Trade Contract Time.

8.2.2 The Owner, with the assistance of the Construction Manager, and the Trade Contractor shall negotiate expeditiously and in good faith for appropriate adjustments, as applicable, to the Trade Contract Price or the Trade Contract Time arising out of a Trade Contract Interim Directed Change. As the Trade Contract Changed Work is performed, the Trade Contractor shall submit its costs for such work with its application for payment beginning with the next application for payment within thirty (30) Days of the issuance of the Trade Contract Interim Directed Change. If there is a dispute as to the cost to the Owner, the Trade Contractor shall continue to perform the, Trade Contract Changed Work set forth in the Trade Contract Interim Directed Change and the Owner shall pay the requirements Trade Contractor the Cost of the Work, defined in 8.3.1.3 below upon receipt of an application for payment and the Owner's (and the Architect's and construction manger's) determination that the work has been completed. The Parties reserve their rights as to the disputed amount, subject to the requirements ARTICLE 12.

8.2.3 When the Owner and the Trade Contractor agree upon the adjustment in the Trade Contract Price or the Trade Contract Time, for a change in the Trade Contract Work directed by a Trade Contract

Interim Directed Change, such agreement shall be the subject of a Trade Contract Change Order. The Trade Contract Change Order shall include all outstanding Trade Contract Interim Directed Changes on which the Owner and Trade Contractor have reached agreement on Contract Price or Contract Time issued since the last Trade Contract Change Order.

8.3 DETERMINATION OF COST

8.3.1 An increase or decrease in the Trade Contract Price or the Trade Contract Time resulting from a change in the Trade Contract Work shall be determined by one or more of the following methods:

8.3.1.1 unit prices set forth in this Agreement or as subsequently agreed;

8.3.1.2 a mutually accepted, itemized lump sum;

8.3.1.3 COST OF THE WORK Cost of the Work as defined by this subsection plus 10.00% for Overhead and 5.00% for profit. "Cost of the Work" shall include the following costs reasonably incurred to perform a change in the Work

8.3.1.3.1 wages paid for labor in the direct employ of the Constructor in the performance of the Work;

8.3.1.3.2 salaries of the Trade Contractor's employees when stationed at the field office to the extent necessary to complete the applicable Work, employees engaged on the road expediting the production or transportation of material and equipment, and supervisory employees from the principal or branch office performing the functions listed below;

8.3.1.3.3 cost of applicable employee benefits and taxes, including but not limited to, workers' compensation, unemployment compensation, social security, health, welfare, retirement and other fringe benefits as required by law, labor agreements, or paid under the Trade Contractor's standard personnel policy, insofar as such costs are paid to employees of the Trade Contractor who are included in the Cost of the Work in subsections .1 and .2 immediately above;

8.3.1.3.4 reasonable transportation, travel, and hotel expenses of the Trade Contractor's personnel incurred in connection with the Work;

8.3.1.3.5 cost of all materials, supplies, and equipment incorporated in the Work, including costs of inspection and testing if not provided by the Owner, transportation, storage, and handling;

8.3.1.3.6 payments made by the Trade Contractor to Subcontractors for Work performed under this Agreement;

8.3.1.3.7 cost, including transportation and maintenance of all materials, supplies, equipment, temporary facilities, and hand tools not owned by the workers that are used or consumed in the performance of the Work, less salvage value or residual value; and cost less salvage value of such items used, but not consumed that remain the property of the Trade Contractor;

8.3.1.3.8 rental charges of all necessary machinery and equipment, exclusive of hand tools owned by workers, used at the Worksite, whether rented from the Trade Contractor or Others, including installation, repair and replacement, dismantling, removal, maintenance, transportation, and delivery costs. Rental from unrelated third parties shall be reimbursed at actual cost. Rentals from the Trade Contractor or its affiliates, subsidiaries, or related parties shall be reimbursed at the prevailing rates in the locality of the Worksite up to eighty-five percent (85%) of the value of the piece of equipment;

8.3.1.3.9 cost of the premiums for all insurance and surety bonds which the Trade Contractor is required to procure or deems necessary, and approved by the Owner including any additional premium incurred as a result of any increase in the cost of the Work;

8.3.1.3.10 sales, use, gross receipts or other taxes, tariffs, or duties related to the Work for which the Trade Contractor is liable;

8.3.1.3.11 permits, fees, licenses, tests, and royalties;

8.3.1.3.12 reproduction costs, photographs, facsimile transmissions, long-distance telephone calls, data processing costs and services, postage, express delivery charges, data transmission, telephone service, and computer-related costs at the Worksite to the extent such items are used and consumed in the performance of the Work or are not capable of use after completion of the Work;

8.3.1.3.13 all water, power, and fuel costs necessary for the Work;

8.3.1.3.14 cost of removal of all nonhazardous substances, debris, and waste materials;

8.3.1.3.15 all costs directly incurred to perform a change in the Work which are reasonably inferable from the Contract Documents for the Changed Work;

8.3.1.3.16 DISCOUNTS All discounts for prompt payment shall accrue to the Owner to the extent such payments are made directly by the Owner. To the extent payments are made with funds of the Constructor, all cash discounts shall accrue to the Constructor. All trade discounts, rebates and refunds, and all returns from sale of surplus materials and equipment, shall be credited to the Cost of the Work;

8.3.1.3.17 COST REPORTING The Trade Contractor shall maintain in conformance with generally accepted accounting principles a complete and current set of records that are prepared or used by the Trade Contractor to calculate the Cost of Work. The Owner and Construction Manager shall be afforded access to the Trade Contractor's records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda and similar data relating to requested payment for Cost of the Work. The Trade Contractor shall preserve all such records for a period of three years after the final payment or longer where required by law;

8.3.1.3.18 COST AND SCHEDULE ESTIMATES The Trade Contractor shall use reasonable skill and judgment in the preparation of a cost estimate or schedule for a change to the Work, but does not warrant or guarantee their accuracy

8.3.1.4 If an increase or decrease cannot be agreed to as set forth in Clauses .1 through .3 above, and the Owner or the Construction Manager issues a Trade Contract Interim Directed Change, the cost of the change in the Trade Contract Work shall be determined by the reasonable actual expense and savings of the performance of the Work resulting from the change. If there is a net increase in the Trade Contract Price, the Trade Contractor's Fee shall be adjusted accordingly. In case of a net decrease in the Trade Contract Price, the Trade Contractor's Fee shall not be adjusted unless ten percent (10%) or more of the Project is deleted. The Trade Contractor shall maintain a documented, itemized accounting evidencing the expenses and savings.

8.3.2 If unit prices are set forth in the Trade Contract Documents or are subsequently agreed to by the Parties, but the character or quantity of such unit items as originally contemplated is so different in a proposed Trade Change Order that the original unit prices will cause substantial inequity to the Owner or the Trade Contractor, such unit prices shall be equitably adjusted.

8.4 CLAIMS FOR ADDITIONAL COST OR TIME Except as provided in subsection 6.3.2 and section 6.4 for any claim for an increase in the Trade Contract Price or the Trade Contract Time, the Trade Contractor shall give the Owner and the Construction Manager written notice of the claim within fourteen (14) Days after the occurrence giving rise to the claim or within fourteen (14) Days after the Trade Contractor first recognizes (or should have recognized) the condition giving rise to the claim, whichever is later. Except in an emergency, notice shall be given before proceeding with the Trade Contract Work. Thereafter, the Trade Contractor shall submit written documentation of its claim, including appropriate supporting documentation, within twenty-one (21) Days after giving notice, unless the Parties mutually agree upon a period of time. The Owner or Construction Manager shall respond in writing denying or approving the Trade Contractor's claim no later than fourteen (14) Days after receipt of the Trade Contractor's claim. Any change in the Trade Contract Price or the Trade Contract Time resulting from such claim shall be authorized by Trade Contract Change Order.

ARTICLE 9 PAYMENT

9.1 GENERAL PROVISIONS Within fourteen (14) calendar Days from the date of execution of this Agreement, the Trade Contractor shall prepare and submit to the Construction Manager for approval a Schedule of Values apportioned to the various divisions or phases of the Trade Contract Work. Each line item contained in the Schedule of Values shall be assigned a monetary price such that the total of all such items shall equal the Trade Contract Price. The Schedule of Values shall be prepared in such detail and be supported by such documents and proof as may be required by the Construction Manager.

9.2 PROGRESS PAYMENTS

9.2.1 APPLICATIONS The Trade Contractor shall submit to the Construction Manager monthly notarized applications for payment. Trade Contractor's applications for payment shall be itemized and supported by the Trade Contractor's Schedule of Values and any other substantiating data as required by this Trade Contractor Agreement or requested by the Construction Manager or Design Professional. Payment applications may include payment requests on account of properly authorized Trade Contract Change Orders and Interim Directed Changes. The progress payment application shall include Trade Contract Work performed through the preceding calendar month. The Construction Manager will review the application and recommend to the Design professional and the Owner amounts payable by the Owner to the Trade Contractor. The Owner, in accordance with the determination of the Design Professional, shall pay the amount otherwise due on any payment application, less any amounts as set forth below, no later than thirty (30) calendar Days after the payment application, or portion thereof, is approved the Design Professional. The Owner may deduct, from any progress payment, such amounts as may be retained pursuant to subsection 9.2.4 below.

9.2.2 STORED MATERIALS AND EQUIPMENT Unless otherwise provided in the contract documents, applications for payment may include materials and equipment not yet incorporated into the Work but delivered to and suitably stored onsite or offsite including applicable insurance, storage and costs incurred transporting the materials to an offsite storage facility. Approval of payment applications for stored materials and equipment stored offsite shall be conditioned on submission by the Trade Contractor of bills of sale and proof of required insurance, or such other procedures satisfactory to the Owner to establish the proper valuation of the stored materials and equipment, the Owner's title to such materials and equipment, and to otherwise protect the Owner's interests therein, including transportation to the site.

9.2.3 CLAIM WAIVERS

9.2.3.1 PARTIAL CLAIMWAIVERS AND AFFIDAVITS As a prerequisite for payment, the Trade Contractor shall provide, in a form satisfactory to the Owner and the Construction Manager, partial claim waivers in the amount of the application for payment and affidavits from the Trade

Contractor, and its Subcontractors, Material Suppliers for the completed Trade Contract Work. Such waivers shall be effective upon payment. In no event shall the Trade Contractor be required to sign an unconditional waiver of claim, either partial or final, prior to receiving payment or in an amount in excess of what it has been paid.

9.2.4 RETAINAGE From each progress payment made to the Trade Contractor has the Owner shall retain FIVE (5) percent of the amount otherwise due after deduction of any amounts as provided in section 9.3 and in no event shall such percentage exceed any applicable statutory requirements of this Agreement. Retainage shall be withheld and administered in accordance with Iowa Code Chapter 572:

9.3 ADJUSTMENT OF TRADE CONTRACTOR'S PAYMENT APPLICATION The Owner or the Construction Manager, upon notification of the Design Professional, may reject or adjust a Trade Contractor payment application or nullify a previously approved Trade Contractor payment application, in whole or in part, as may reasonably be necessary to protect the Owner from loss or damage based upon the following, to the extent that the Trade Contractor is responsible therefor under this Trade Contractor Agreement:

9.3.1 the Trade Contractor's repeated failure to perform the Trade Contract Work as required by the Trade Contractor Agreement;

9.3.2 loss or damage arising out of or relating to the Trade Contractor Agreement and caused by the Trade Contractor to the Owner, or to the Construction Manager or others to whom the Owner may be liable;

9.3.3 the Trade Contractor's failure to properly pay for labor, materials, equipment or supplies furnished in connection with the Trade Contract Work;

9.3.4 nonconforming or defective Trade Contract Work which has not been corrected in a timely fashion;

9.3.5 reasonable evidence of delay in performance of the Trade Contract Work such that the work will not be completed within the Trade Contract Time, and that the unpaid balance of the Trade Contract Price is not sufficient to offset any liquidated damages or actual damages that may be sustained by the Owner as a result of the anticipated delay caused by the Trade Contractor;

9.3.6 reasonable evidence demonstrating that the unpaid balance of the Trade Contract Price is insufficient to cover the cost to complete the Trade Contract Work; and

9.3.7 third-party claims involving the Trade Contractor or reasonable evidence demonstrating that third-party claims are likely to be filed unless and until the Trade Contractor furnishes the Owner with adequate security in the form of a surety bond, letter of credit or other collateral or commitment which are sufficient to discharge such claims if established. No later than thirty (30) Days after receipt of an application for payment, the Owner or Construction Manager shall give written notice to the Trade Contractor, disapproving or nullifying it or a portion thereof, specifying the reasons for the disapproval or nullification. When the above reasons for disapproving or nullifying an application for payment are removed, payment will be made for amounts previously withheld.

9.4 PAYMENT NOT ACCEPTANCE Payment to the Trade Contractor does not constitute or imply acceptance of any portion of the Trade Contract Work.

9.5 PAYMENT DELAY If for any reason not the fault of the Trade Contractor, the Trade Contractor does not receive a progress payment from the Owner sixty (60) calendar Days after the time such payment is due, as defined in Subparagraph 9.2.1, then the Trade Contractor, upon giving within seven (7) calendar Days after written notice to the Owner, and without prejudice to and in addition to any other legal remedies, may stop its

Trade Contract Work until payment of the full amount owing to the Trade Contractor has been received. The Trade Contract Price and Trade Contract Time shall be equitably adjusted by a Trade Contract Change Order to reflect reasonable cost and delay resulting from shutdown, delay and start-up.

9.6 SUBSTANTIAL COMPLETION

9.6.1 The Trade Contractor shall notify the Owner, the Construction Manager and the Design Professional when it considers Substantial Completion of the Trade Contract Work or a designated portion to have been achieved. The Construction Manager and the Design Professional shall promptly conduct an inspection to determine whether the Trade Contract Work or designated portion can be occupied or utilized for its intended use by the Owner without excessive interference in completing any remaining unfinished Trade Contract Work by the Trade Contractor. If the Construction Manager and the Design Professional determine that the Trade Contract Work or designated portion has not reached Substantial Completion, the Design Professional, and the Construction Manager, shall promptly compile a list of items to be completed or corrected so the Owner may occupy or utilize the Trade Contract Work or designated portion for its intended use. The Trade Contractor shall promptly complete all items on the list.

9.6.2 When Substantial Completion of the Trade Contract Work or a designated portion is achieved, the Construction Manager and the Design Professional shall prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, and the respective responsibilities of the Owner and Trade Contractor for interim items such as security, maintenance, utilities, insurance and damage to the Trade Contract Work. The Owner shall assume all responsibilities for items such as security, maintenance, utilities, and insurance, and damage to the Work. The certificate shall also list the items to be completed or corrected, and establish the time for their completion or correction. The Certificate of Substantial Completion shall be submitted to the Trade Contractor for written acceptance of responsibilities assigned in the Certificate.

9.6.3 Unless otherwise provided in the Certificate of Substantial Completion, warranties required by the Trade Contract Documents shall commence on the date of Substantial Completion of the Trade Contract Work or a designated portion.

9.6.4 Uncompleted items shall be completed by the Trade Contractor by the Final Completion date set forth in the Agreement and/or Construction Schedule. The Trade Contractor may request early release of retainage in accordance with Iowa Code Section 26.13. Payment for completed work and retainage shall be made in accordance with Iowa Code Chapters 26 and 573.

9.7 PARTIAL OCCUPANCY OR USE The Owner may occupy or use completed or partially completed portions of the Trade Contract Work when (a) the portion of the Trade Contract Work is designated in a Certificate of Substantial Completion, (b) appropriate insurer(s) consent to the occupancy or use, and (c) appropriate public authorities authorize the occupancy or use. Such partial occupancy or use shall constitute Substantial Completion of that portion of the Trade Contract Work.

9.8 FINAL PAYMENT

9.8.1 APPLICATION Upon acceptance of the Trade Contract Work by the Construction Manager, and approval by the Design Professional, and upon the Trade Contractor furnishing evidence of fulfillment of the Trade Contractor's obligations in accordance with the Trade Contract Documents, the Trade Contractor shall submit its application for final payment. The Construction Manager will review the Trade Contractor's final payment application and recommend to the Design Professional and the Owner an amount payable by the Owner to the Trade Contractor. The Design Professional shall then recommend an amount to be paid by the Owner. Final payment shall be made in accordance with Iowa

Code Chapters 26 and 573.

9.8.2 REQUIREMENTS Along with its application for final payment, the Trade Contractor shall furnish to the Construction Manager:

9.8.2.1 an affidavit that all payrolls, bills for materials and equipment, and other indebtedness connected with the Trade Contract Work for which the Owner or its property or the Construction Manager or the Owner's surety might in any way be liable, have been paid or otherwise satisfied;

9.8.2.2 consent of the Trade Contractor's surety to final payment;

9.8.2.3 satisfaction of closeout procedures as may be required by the Trade Contractor Agreement;

9.8.2.4 certification(or other writing indicating) that insurance required by the Trade Contractor Agreement is and will remain effect beyond final payment pursuant to this Trade Contractor Agreement and

9.8.2.5 other data if required by the Owner or Construction Manager, such as receipts, releases, and waivers of liens effective upon payment to the extent and in such form as may be designated by the Owner or Construction Manager. Acceptance of final payment by the Trade Contractor shall constitute a waiver of all claims by the Trade Contractor except those previously made in writing and identified by the Trade Contractor as unsettled at the time of final application for payment.

9.8.3 TIME OF PAYMENT Final payment of the balance of the Trade Contract Price, less any amount retained pursuant to subsection 9.2.4 of this Agreement, and as required by Iowa Code Chapters 26 and 573, which among other things requires that twice the amount of an Iowa Code Chapter 573 subcontractor claim be withheld from final payment, shall be made to the Trade contractor within sixty (60) Days after the Trade Contractor has submitted a complete and accurate application for final payment.

9.8.4 LATE PAYMENT INTEREST Progress payments or final payment due and unpaid under this Trade Contractor Agreement shall bear interest from the date payment is due at the statutory rate prevailing at the place of the Project.

9.9 PAYMENT USE AND VERIFICATION The Trade Contractor is required to pay for all labor, materials and equipment used in the performance of the Trade Contract Work through the most current period applicable to progress payments received. Reasonable evidence, satisfactory to the Construction Manager, may be required to show that all obligations relating to the Trade Contract Work are current before releasing any payment due on the Trade Contract Work. If required by the Construction Manager, before final payment is made for the Trade Contract Work, the Trade Contractor shall submit evidence satisfactory to the Construction Manager that all payrolls, bills for materials and equipment, and all known indebtedness connected with the Trade Contract Work, have been paid or otherwise satisfied as set forth in subsection 9.8.2.

ARTICLE 10 INDEMNITY, INSURANCE, WAIVERS AND BONDS

10.1 INDEMNITY

10.1A To the extent portions of this Article are in conflict with SF 396 (codified at Iowa Code Section 573A.5) said portions are void and unenforceable.

10.1.1 TRADE CONTRACTOR'S INDEMNITY To the fullest extent permitted by law, the Trade

Contractor shall indemnify and hold harmless the Owner, the Owner's officers, directors, members, consultants, agents and employees, from all claims for bodily injury and property damage, other than to the Work itself and other property insured under subsection 10.3.1, including reasonable attorneys' fees, costs and expenses, that may arise from the performance of the Work, but only to the extent caused by the negligent acts or omissions of the Trade Contractor, Subcontractors or anyone employed directly or indirectly by any of them or by anyone for whose acts any of them may be liable. The Trade Contractor shall be entitled to reimbursement of any defense costs paid above the Trade Contractor's percentage of liability for the underlying claim to the extent provided for under subsection 10.1.2.

10.1.2 OWNER'S INDEMNITY To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Trade Contractor, its officers, directors, members, consultants, agents, and employees, from all claims for bodily injury and property damage, other than property insured under subsection 10.3.1, including reasonable attorneys' fees, costs and expenses, that may arise from the performance of work by Owner, Design Professional or Others, but only to the extent caused by the negligent acts or omissions of the Owner, Design Professional or Others. The Owner shall be entitled to reimbursement of any defense costs paid above Owner's percentage of liability for the underlying claim to the extent provided for under subsection 10.1.1.

10.1.3 CONSTRUCTION MANAGER AND DESIGN PROFESSIONAL INDEMNITY The Owner shall cause the Construction Manager and the Design Professional to agree to indemnify and hold harmless the Owner from all claims for bodily injury and property damage, other than to the Work itself and other property insured under section 10.3, that may arise from the Construction Manager's or the Design Professional's services, but only to the extent that such claims result from the negligent acts or omissions of the Construction Manager or the Design Professional, respectively, or anyone for whose acts or omissions the Construction Manager or Design Professional, respectively, is liable. Such provisions shall be in a form no less protective of the Parties than the Construction Manager's Indemnity provided in ConsensusDocs 801 (2011) or the Design Professional's indemnity provided in ConsensusDocs 803 (2011) respectively, and shall be reasonably satisfactory to the Owner and the Trade Contractor.

10.1.4 ADJACENT PROPERTY INDEMNIFICATION To the extent of the limits of Trade Contractor's Commercial General Liability Insurance specified in subsection 10.2.1 or Zero Dollars and No Cents ($0.00) whichever is more, the Trade Contractor shall indemnify and hold harmless the Owner against any and all liability, claims, demands, damages, losses and expenses, including attorney's fees, in connection with or arising out of any damage or alleged damage to any of Owner's existing adjacent property that may arise from the performance of the Trade Contract Work, but only to the extent of the negligent acts or omissions of the Trade Contractor, Subcontractor or anyone employed directly or indirectly by any of them or by anyone for whose acts any of them may be liable.

10.1.5 NO LIMITATION ON LIABILITY In any and all claims against the Indemnitees by any employee of the Trade Contractor, anyone directly or indirectly employed by the Trade Contractor or anyone for whose acts the Trade Contractor may be liable, the indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Trade Contractor under Workers' Compensation acts, disability benefit acts or other employment benefit acts.

10.2 TRADE CONTRACTOR'S INSURANCE

10.2.1 Prior to the start of the Work, the Trade Contractor shall procure and maintain in force Workers Compensation/Employers' Liability Insurance, Business Automobile Liability Insurance, and Commercial General Liability Insurance (CGL). The CGL policy shall include coverage for liability arising from

premises, operations, independent contractors, products-completed operations, personal injury and advertising injury, contractual liability, and broad form property damage. The Trade Contractor's liability policies, as required in this Subparagraph 10.2.1, shall be written on an occurrence basis with at least the following limits of liability:

10.2.1.1 Workers' Compensation- amount required by the laws of Iowa

10.2.1.2 Employers' Liability Insurance - $500,000 or an amount required by Iowa law, whichever is greater.

10.2.1.3 Business Automobile Liability Insurance

a. $1,000,000 Each Accident

10.2.1.4 Commercial General Liability Insurance

a. $1,000,000 Each Occurrence b. $2,000,000 General Aggregate c. $1,000,000 Products/Completed Operations Aggregate d. $1,000,000 Personal and Advertising Injury Limit

10.2.2 The Trade Contractor Must also carry and maintain Excess or Umbrella Liability coverage for the policies in subsection 10.2.1 in the amounts as listed below:

Trade Contractor Contract Amount: <$1,000,000 - $2 Million Umbrella or more $1,000,000 - $5,000,000 - $5 Million Umbrella or more >$5,000,000 - $10 Million Umbrella or more

10.2.3 The Trade Contractor shall maintain in effect all insurance coverage required under subsection 10.2.1 with insurance companies lawfully authorized to do business in Iowa. Such insurance companies shall have a minimum A.M. Best Rating of A-VI (Consult instructions and insurance advisor).If the Trade Contractor fails to obtain or maintain any insurance coverage required under this Agreement, the Owner may purchase such coverage and charge the expense to the Trade Contractor, or terminate this Agreement.

10.2.4 To the extent commercially available, the policies of insurance required under Subparagraph 10.2.1 shall contain a provision that the insurance company or its designee must give the Owner written notice transmitted in paper or electronic format: (a) 30 days before coverage is nonrenewed by the insurance company and (b) with 10 business days after cancelation of coverage by the insurance company. The Trade Contractor shall maintain completed operations liability insurance for one year after acceptance of the Contract Documents, whichever is longer. Prior to commencement of services, the Trade Contract shall furnish the Owner with certificates evidencing the required coverages. In addition, if any insurance policy required under subsection 10.2.1 is not to be immediately replaced without a lapse in coverage when it expires, exhausts its limits, or is to be, cancelled, the Trade Contractor shall give Owner prompt written notice upon actual or constructive knowledge of such condition.

10.2.5 ADDITIONAL LIABILITY COVERAGE

10.2.5.1 The Owner ☒ shall / ☐ shall not (indicate one) require the Trade Contractor to purchase and maintain liability coverage, primary to the Owner's coverage under subsection 10.3.1.

10.2.5.2 If required by subsection 10.2.5.1, the additional liability coverage required of the Trade Contractor shall be:

1. Additional Insured Owner shall be named as an additional insured on Trade Contractor's

Commercial General Liability Insurance specified for operations and completed operations, but only with respect to liability for bodily injury, property damage or personal and advertising injury to the extent caused by the negligent acts or omissions of Trade Contractor, or those acting on Trade Contractor's behalf, in the performance of Trade Contractor's Work for.

2. OCP Trade Contractor shall provide an Owners' and Contractors' Protective Liability Insurance ("OCP") policy with limits equal to the limits on Commercial General Liability Insurance specified or limits as otherwise required by Owner.

Any documented additional cost in the form of a surcharge associated with procuring the additional liability coverage in accordance with this subsection shall be paid by the Owner directly or the costs may be reimbursed by the Owner to the Trade Contractor by increasing the Trade Contract Price to correspond to the actual cost required to purchase and maintain the additional liability coverage. Prior to commencement of the Work, the Trade Contractor shall obtain and furnish to the Owner a certificate evidencing that the additional liability coverages have been procured.

10.2.6 PROFESSIONAL LIABILITY INSURANCE To the extent the Trade Contractor is required to procure design services under this Agreement, in accordance with section 3.14, the Trade Contractor shall require the designers to obtain professional liability insurance for claims arising from the negligent performance of professional services under this Agreement, with a company reasonably satisfactory to the Owner, including coverage for all professional liability caused by any of the Designer's(s') consultants, written for not less than $1,000,000 per claim and in the aggregate with the deductible not to exceed $2,000,000. The deductible shall be paid by the Designer.

10.3 OWNER'S INSURANCE

10.3.1 Deleted.

10.3.2 Deleted.

10.4 PROPERTY INSURANCE

10.4.1 Before the start of Trade Contract Work, the Owner shall obtain and maintain Builder's Risk Policy insurance with minimum coverage limits equal to the full cost of replacement of the Project at the time of loss. This insurance shall also name the Trade Contractor, Subcontractors, Material Suppliers, Construction Manager and Design Professional as insureds. This insurance shall be written as a Builder's Risk Policy or equivalent form to cover all risks of physical loss except those specifically excluded by the policy, and shall insure at least against the perils of fire, lightning, explosion, windstorm, hail, smoke, aircraft and vehicles, riot and civil commotion, theft, vandalism, malicious mischief, debris removal, flood (subject to sublimits), earthquake (subject to sublimits), earth movement, water damage, wind damage, testing if applicable, collapse however caused, and shall include coverage for, material, or equipment stored offsite, onsite or in transit. This policy shall provide for a waiver of subrogation in favor of the Trade Contractor, Subcontractors, Material Suppliers, Construction Manager and Design Professional. This insurance shall remain in effect until the Substantial Completion of the Work, final payment has been made or until no person or entity other than the Owner has an insurable interest in the property to be covered by this insurance, whichever is sooner. Partial occupancy or use of the Work shall not commence until the Owner has secured the consent of the insurance company or companies providing the coverage required in this Subparagraph 10.4.1.

10.4.2 If the Owner does not intend to purchase the property insurance required by this Agreement, including all of the coverages and deductibles described herein, the Owner shall give written notice to

the Trade Contractor, the Design Professional and the Construction Manager before the Trade Contract Work is commenced. The Trade Contractor may then provide insurance to protect its interests and the interests of the Subcontractors, including the coverage of deductibles. The cost of this insurance shall be charged to the Owner in a Change Order. The Owner shall be responsible for all of Trade Contractor's costs reasonably attributed to the Owner's failure or neglect in purchasing or maintaining the coverage described above.

10.4.2.1 The Owner will not obtain insurance to cover the risk of physical loss resulting from Terrorism. The Construction Manager is not required to purchase this type of insurance but may purchase this type of insurance if it chooses. f purchased, the cost of this insurance shall be borne by the Construction manager.

10.4.3 POLICIES The Owner shall provide the Trade Contractor with a copy of all policies including all endorsements upon request.

10.5 PROPERTY INSURANCE LOSS ADJUSTMENT

10.5.1 LOSS ADJUSTMENT Any insured loss shall be adjusted with the Owner and the Trade Contractor and made payable to the Owner as trustee for the insureds, as their interests may appear.

10.5.2 DISTRIBUTION OF PROCEEDS Following the occurrence of an insured loss, monies received will be deposited in a separate account and the trustee shall make distribution in accordance with the agreement of the Parties in interest.

10.6 WAIVERS

10.6.1 PROPERTY DAMAGE The Owner and Trade Contractor waive all claims and other rights they may have against each other for loss of or damage to (a) the Project, (b) all materials, machinery, equipment and other items used in accomplishing the Trade Contract Work or services or to be incorporated into the Project, while the same are in transit, at the Project Site, during erection and otherwise, and (c) all property owned by or in the custody of Owner and its affiliates, however such loss or damage shall occur, to be extent such damage is covered by property insurance. The proceeds of such insurance shall be held by the Owner as trustee.

10.6.2 WAIVER OF SUBROGATION The Owner shall have its insurers waive all rights of subrogation they may have against the Construction Manager, Design Professional, Trade Contractors, and their Subcontractors and Material Suppliers on all policies carried by the Owner on the Project and adjacent properties, including, after final payment, those policies to be provided on the completed Project not intended to insure the Project during construction.

10.6.3 ENDORSEMENT If the policies of insurance referred to in this section require an endorsement to provide for continued coverage where there is a waiver of subrogation, the Owner will cause them to be so endorsed.

10.7 RISK OF LOSS Except to the extent a loss is covered by propertyinsurance,carried by the owner, risk of loss or damage to the Work shall be upon the Trade Contractor until the Date of Final Completion, unless otherwise agreed to by the Parties.

10.8 BONDS Performance and Payment Bonds

☒ are

☐ are not

required of the Trade Contractor that meet the requirements of Iowa Code Chapter 573. A deposit in lieu of a bond may be acceptable if it meets the requirements of Iowa Code Section 573.4. Such bonds shall be issued by a surety admitted in the State in which the Project is located and must be acceptable to the Owner. The Owner's acceptance shall not be withheld without reasonable cause. The penal sum of the Payment Bond and of the Performance Bond shall each be one hundred percent (100%) of the original Contract Price. Any increase in the Contract Price that exceeds ten percent (10%) in the aggregate shall require a rider to the Bonds increasing penal sums accordingly. Up to such ten percent (10%) amount, the penal sum of the Bond shall remain equal to one hundred percent (100%) of the Contract Price. The Trade Contractor shall endeavor to keep its surety advised of changes potentially impacting the Contract Time and Contract Price, though the Trade Contractor shall require that its surety waives any requirement to be notified of any alteration or extension of time. The Trade Contractor's Payment Bond for the Project, if any, shall be made available by the Owner for review and copying by the Subcontractor. Iowa Code Chapter 573 shall control and take precedence over any conflicting term or condition in this Agreement

ARTICLE 11 SUSPENSION, NOTICE TO CURE AND TERMINATION OF AGREEMENT

11.1 SUSPENSION BY OWNER FOR CONVENIENCE

11.1.1 OWNER SUSPENSION Should the Owner order the Trade Contractor in writing to suspend, delay, or interrupt the performance of the Trade Contract Work for such period of time as may be determined to be appropriate for the convenience of the Owner and not due to any act or omission of the Trade Contractor or any person or entity for whose acts or omissions the Trade Contractor may be liable, then the Trade Contractor shall immediately suspend, delay or interrupt that portion of the Trade Contract Work as ordered by the Owner. The Trade Contract Price and the Trade Contract Time shall be equitably adjusted by Trade Contract Change Order for the cost and delay resulting from any such suspension.

11.1.2 Any action taken by the Owner that is permitted by any other provision of the Trade Contract Documents and that results in a suspension of part or all of the Trade Contract Work does not constitute a suspension of Trade Contract Work under this section.

11.2 NOTICE TO CURE A DEFAULT If the Trade Contractor persistently refuses or fails to supply enough properly skilled workers, proper materials, or equipment to maintain the approved Construction Schedule in accordance with ARTICLE 6, or fails to make prompt payment to its workers, Subcontractors or Material Suppliers; disregards laws, ordinances, rules, regulations or orders of any public authority having jurisdiction; or is otherwise guilty of a material breach of a provision of this Agreement, the Trade Contractor may be deemed in default. If the Trade Contractor fails within seven (7) business Days after receipt of written notification to commence and continue satisfactory correction of such default with diligence and promptness, then the Owner shall give the Trade Contractor a second notice to correct the default within a three (3) Day period. If the Trade Contractor fails to promptly commence and continue satisfactory correction of the default following receipt of such second notice, the Owner without prejudice to any other rights or remedies may:

11.2.1 supply workers and materials, equipment and other facilities as the Owner or Construction Manager deems necessary for the satisfactory correction of the default, and charge the cost to the Trade Contractor, who shall be liable for the payment of same including reasonable Overhead, profit and attorneys' fees;

11.2.2 contract with Others to perform such part of the Trade Contract Work as the Owner or Construction Manager determines shall provide the most expeditious correction of the default, and charge the cost to the Trade Contractor;

11.2.3 withhold payment due the Trade Contractor in accordance with section 9.3; and

11.2.4 in the event of an emergency affecting the safety of persons or property, immediately commence and continue satisfactory correction of such default as provided in subsections 11.2.1 and 11.2.2 without first giving written notice to the Trade Contractor, but shall give prompt written notice of such action to the Trade Contractor following commencement of the action.

11.3 OWNER'S RIGHT TO TERMINATE FOR DEFAULT

11.3.1 TERMINATION BY OWNER FOR DEFAULT If, within seven (7) Days of receipt of a notice to cure pursuant to section 11.2, the Trade Contractor fails to commence and satisfactorily continue correction of the default set forth in the notice to cure, the Owner may notify the Trade Contractor that it intends to terminate this Agreement for default absent appropriate corrective action within fourteen additional Days. After the expiration of the additional fourteen (14) Day period, the Owner may terminate this Agreement by written notice absent appropriate corrective action. Termination for default is in addition to any other remedies available to Owner under section 11.2. If the Owner's cost arising out of the Trade Contractor's failure to cure, including the cost of completing the Trade Contract Work and reasonable attorneys' fees, exceeds the unpaid Trade Contract Price, the Trade Contractor shall be liable to the Owner for such excess costs. If the Owner's costs are less than the unpaid Trade Contract Price, the Owner shall pay the difference to the Trade Contractor. In the event the Owner exercises its rights under this section, upon the request of the Trade Contractor the Owner shall furnish to the Trade Contractor a detailed accounting of the cost incurred by the Owner.

11.3.2 USE OF TRADE CONTRACTOR'S MATERIALS, SUPPLIES AND EQUIPMENT If the Owner or Others perform work under this section, the Owner shall have the right to take and use any materials, supplies and equipment belonging to the Trade Contractor and located at the Worksite for the purpose of completing any remaining Trade Contract Work. Immediately upon completion of the Work, any remaining materials, supplies or equipment not consumed or incorporated in the Trade Contract Work shall be returned to the Trade Contractor in substantially the same condition as when they were taken, reasonable wear and tear excepted.

11.3.3 If the Trade Contractor files a petition under the Bankruptcy Code, this Agreement may be terminated for cause at the may be terminated for cause at the Owner.

11.3.3 If the Trade Contractor files a petition under the Bankruptcy Code, this Agreement may be terminated for cause at the may be terminated for cause at the Owner.

11.3.4 The Owner shall make reasonable efforts to mitigate damages arising from Trade Contractor default, and shall promptly invoice the Trade Contractor for all amounts due pursuant to sections 11.2 and 11.3.

11.4 TERMINATION BY OWNER FOR CONVENIENCE

11.4.1 Upon written notice to the Trade Contractor, the Owner may, without cause, terminate this Agreement. The Trade Contractor shall immediately stop the Work, follow the Owner's or Construction Manager's instructions regarding shutdown and termination procedures, and strive to minimize any further costs.

11.4.2 If the Owner terminates this Agreement pursuant to this section, the Trade Contractor shall be paid:

11.4.2.1 for the Work performed to date including Overhead and profit; and

11.4.2.2 for all demobilization costs and costs incurred as a result of the termination but not including Overhead or profit on work not performed;

11.4.2A Upon written notice to the Trade Contractor the Owner has the right to terminate this Agreement without penalty as a result of the following: 1) the legislature or governor fail to appropriate funds sufficient to allow the Owner to operate as required and fulfill its obligations under this Agreement, 2) funds are de-appropriated or not allocated, 3) the Owner's authorization to operate is withdrawn or there is a material alteration in the programs administered by the owner, or 4) the Owner's duties are substantially modified. If such a termination results then the Trade Contractor shall be paid in the manner set forth in subparagraph 11.4.2. If, however, an appropriation to cover the cost of this Agreement becomes available within sixty (60) days subsequent to termination under this paragraph then the Owner agrees to re-enter into a modified version of this Agreement that accounts for the termination and reinstatement.

11.4.3 If the Owner terminates this Agreement pursuant to sections 11.3 or 11.4, the Trade Contractor shall:

11.4.3 If the Owner terminates this Agreement pursuant to sections 11.3 or 11.4, the Trade Contractor shall:

11.4.3.1 execute and deliver to the Owner all papers and take all action required to assign, transfer and vest in the Owner the rights of the Trade Contractor to all materials, supplies and equipment for which payment has or will be made in accordance with the Trade Contract Documents and all subcontracts, orders and commitments which have been made in accordance with the Trade Contract Documents;

11.4.3.2 exert reasonable effort to reduce to a minimum the Owner's liability for subcontracts, orders and commitments that have not been fulfilled at the time of the termination;

11.4.3.3 cancel any subcontracts, orders and commitments as the Owner or Construction Manager directs; and

11.4.3.4 sell at prices approved by the Owner or Construction Manager any materials, supplies and equipment as the Owner or Construction Manager directs, with all proceeds paid or credited to the Owner.

11.5 TRADE CONTRACTOR'S RIGHT TO TERMINATE

11.5.1 Upon seven (7) Days' written notice to the Owner and Construction Manager, the Trade Contractor may terminate this Agreement if the Trade Contract Work has been stopped for a thirty (30) Day period through no fault of the Trade Contractor for any of the following reasons:

11.5.1.1 under court order or order of other governmental authorities having jurisdiction;

11.5.1.2 as a result of the declaration of a national emergency or other governmental act during which, through no act or fault of the Trade Contractor, materials are not available; or

11.5.1.3 suspension by the Owner for convenience pursuant to section 11.1

11.5.2 In addition, upon seven (7) Days' written notice to the Owner and Construction Manager, the Trade Contractor may terminate the Agreement if the Owner:

11.5.2.1 fails to furnish reasonable evidence pursuant to section 4.1.2 that sufficient funds are available and committed for Project financing, or

11.5.2.2 assigns this Agreement over the Trade Contractor's reasonable objection, or

11.5.2.3 fails to pay the Trade Contractor in accordance with this Agreement and the Trade Contractor has complied with the notice provisions of section 9.5, or

11.5.2.4 otherwise materially breaches this Agreement.

11.5.3 Upon termination by the Trade Contractor in accordance with this section, the Trade Contractor shall be entitled to recover from the Owner payment for all Trade Contract Work executed and for any proven loss, cost or expense in connection with the Trade Contract Work, including all demobilization costs plus reasonable Overhead and profit on work not performed.

11.6 OBLIGATIONS ARISING BEFORE TERMINATION Even after termination pursuant to ARTICLE 11, the provisions of this Agreement still apply to any Trade Contract Work performed, payments made, events occurring, costs charged or incurred or obligations arising before the termination date.

ARTICLE 12 DISPUTE MITIGATION AND RESOLUTION

12.1 WORK CONTINUANCE AND PAYMENT Unless otherwise agreed in writing, the Trade Contractor shall continue the Trade Contract Work and maintain the Construction Schedule during any dispute mitigation or resolution proceedings. If the Trade Contractor continues to perform, the Owner shall continue to make payments in accordance with this Agreement.

12.2 DIRECT DISCUSSIONS If the Parties cannot reach resolution on a matter relating to or arising out of the Agreement, the Parties shall endeavor to reach resolution through good faith direct discussions between the Parties' representatives, who shall possess the necessary authority to resolve such matter and who shall record the date of first discussions. The authorized representative for the Trade Contractor is identified in Paragraph 3.4 of the Agreement. The authorized representative for the Owner is identified in Paragraph 4.2 of the Agreement. The parties' authorized representative are, among other things, authorized to resolve matters of disagreement and disputes between the Parties. If the dispute remains unresolved after fifteen (15) Days from the date of first discussion, the Parties shall submit such matter to the dispute mitigation and dispute resolution procedures selected herein.

12.3 MITIGATION The Parties agree that dispute mitigation procedures provided in this Project. Disputes remaining unresolved after direct discussions shall be directed to the selected mitigation procedure immediately below. The dispute mitigation procedure shall result in nonbinding finding on the matter. This may be introduced as evidence at a subsequent binding adjudication of the matter, as designee on Paragraph 12.5. The Parties agree that the dispute mitigation procedure shall be

(Designate only one.)

☒ Project Neutral

☐ Dispute Review Board

12.3.1 MITIGATION PROCEDURES The Project Neutral/Dispute Review Board shall be mutually selected and appointed by the Parties and shall execute a retainer agreement with the Parties establishing the scope of the Project Neutral/Dispute Review Board's responsibilities. The costs and expenses of the Project Neutral/Dispute Review Board shall be shared equally by the Parties. The Project Neutral/Dispute Review Board shall be available to either Party, upon request, throughout the course of the Project, and shall make regular visits to the Project so as to maintain an up-to-date understanding of the Project progress and issues and to enable the Project Neutral/Dispute Review Board to address matters in dispute between the Parties promptly and knowledgeably. The Project Neutral/Dispute Review Board shall issue nonbinding findings within five (5) business Days of referral of the matter to the Project Neutral, unless good cause is shown.

12.3.2 If the matter remains unresolved following the issuance of the nonbinding finding by the mitigation procedure or if the Project Neutral/Dispute Review Board fails to issue nonbinding findings within five (5) Days of the referral, the Parties shall submit the matter to the binding dispute resolution procedure designated in section 12.5.

12.4 MEDIATION If direct discussions pursuant to section 12.2 do not result in resolution of the matter and no dispute mitigation procedure is selected under section 12.3, the Parties shall endeavor to resolve the matter by mediation through the current Construction Industry Mediation Rules of the American Arbitration Association, or the Parties may mutually agree to select another set of mediation rules. The administration of the mediation shall be as mutually agreed by the Parties. The mediation shall be convened within thirty (30) business Days of the matter first being discussed and shall conclude within forty-five (45) business Days of the matter first being discussed. Either Party may terminate the mediation at any time after the first session, but the decision to terminate shall be delivered in person by the terminating Party to the non-terminating Party and to the mediator. The costs of the mediation shall be shared equally by the Parties.

12.5 BINDING DISPUTE RESOLUTION If the matter is unresolved after submission of the matter to a mitigation procedure or to mediation, the Parties shall submit the matter to the binding dispute resolution procedure designated herein.

(Designate only one.)

☐ Arbitration using the current Construction Industry Arbitration Rules of the American Arbitration Association

☒ Litigation in either the state or federal court having jurisdiction of the matter in the location of the Project.

12.5.1 The costs of any binding dispute resolution procedures shall be borne by the non-prevailing Party, as determined by the adjudicator of the dispute. However, the costs of binding dispute resolution does not include attorney fees. The Parties are each responsible for paying for their own attorney fees.

12.5.2 VENUE The venue of any binding dispute resolution procedure shall be Des Moines, Iowa.

12.6 MULTIPARTY PROCEEDING All parties necessary to resolve a claim shall be parties to the same dispute resolution proceeding. Appropriate provisions shall be included in all other contracts relating to the Work to provide for the joinder or consolidation of such dispute resolution procedures.

12.7 LIEN RIGHTS The Trade Contractor acknowledges that it has no mechanic's lien rights on this Project because it is a public improvement project.

ARTICLE 13 MISCELLANEOUS PROVISIONS

13.1 ASSIGNMENT Neither the Owner nor the Trade Contractor shall assign their interest in this Agreement without the written consent of the other except as to the assignment of proceeds. The terms and conditions of this Agreement shall be binding upon both Parties, their partners, successors, assigns and legal representatives. Neither Party to this Agreement shall assign the Agreement as a whole without written consent of the other. If either Party attempts to make such an assignment, that Party shall nevertheless remain legally responsible for all obligations under this Agreement, unless otherwise agreed by the other Party.

13.2 GOVERNING LAW This Agreement and all disputes arising there from shall be governed by the Iowa law.

13.3 SEVERABILITY The partial or complete invalidity of any one or more provisions of this Agreement shall

not affect the validity or continuing force and effect of any other provision.

13.4 NO WAIVER OF PERFORMANCE The failure of either Party to insist, in any one or more instances, on the performance of any of the terms, covenants or conditions of this Agreement, or to exercise any of its rights, shall not be construed as a waiver or relinquishment of such term, covenant, condition or right with respect to further performance or any other term, covenant, condition or right.

13.5 TITLES AND GROUPINGS The titles given to the articles of this Agreement are for ease of reference only and shall not be relied upon or cited for any other purpose. The grouping of the articles in this Agreement and of the Owner's specifications under the various headings is solely for the purpose of convenient organization and in no event shall the grouping of provisions, the use of sections or the use of headings be construed to limit or alter the meaning of any provisions.

13.6 ASSISTANCE OF COUNSEL AND INTERPRETATION The Parties agree that they had the opportunity to obtain the assistance of counsel in reviewing the Agreement terms prior to execution. This Agreement shall be construed neither against nor in favor of either Party, but shall be construed in a neutral manner.

13.7 RIGHTS AND REMEDIES The Parties' rights, liabilities, responsibilities and remedies with respect to this Agreement, whether in contract, tort, negligence or otherwise, shall be exclusively those expressly set forth in this Agreement.

13.8 ADDITIONAL PROVISIONS (Insert here other provisions, if any, that pertain to this Agreement See Below.)

13.9 COMPLIANCE WITH LAW AND REGULATIONS The Trade Contractor shall comply with all applicable federal, state, and local laws, rules, ordinances, regulations and orders when performing services and/or performing work under this Agreement, including without limitation, all laws applicable to the prevention of discrimination in employment and the use of targeted small businesses as subcontractors or suppliers. The Trade Contractor declares that it has complied with all federal, state and local laws regarding business permits and licenses that may be required to provide the services and work required by this Agreement. The Trade Contractor further acknowledges that if this Project is a recipient of Federal financial assistance that it may be subject to requirements of Federal Acts and Executive Orders as mandated by Federal agencies having authority and jurisdiction to enforce and ensure compliance with such laws and regulations including, but not necessarily limited to, the Davis Bacon Act and other Federal Acts and Executive Orders.

13.10 EMPLOYMENT PRACTICES: It is the intent of the Iowa Department of Administrative Services to assure equal employment opportunity in all contract work as required by law. Vendors, are required to take affirmative action to ensure that applicants employed or seeking employment with them are treated equally as required by law. Vendors shall not illegally discriminate against any employee. During the course of the Project, the Vendor may be required to show compliance with the EEO and Affirmative Action requirements. Noncompliance with the provisions set forth at the time of contract award may result in termination or suspension of the Agreement in whole or in part. All vendors and service providers working under the terms of this Agreement are prohibited from engaging in discriminatory employment practices forbidden by Iowa law. Vendors shall complete and submit the Nondiscrimination Clause form for the Owner's approval.

13.11 RECIPROCAL BIDDER PREFERENCE In accordance with Iowa Code Section 73A.21, as amended in 2011 by HF 648, if the Trade Contractor is not a resident bidder of Iowa, as defined by law, then the Trade Contractor must specifically identify in writing with its bid any and all preferences or preferential treatment (including preferences related to labor) enforced by the state or foreign country in which the Trade Contractor is a resident. If the low bid Trade Contractor is not a resident bidder of Iowa and the Trade Contractor's foreign State of residence enforces such a preference then the Owner shall reciprocally enforce the preference in favor of a resident bidder of Iowa. Failure on the part of the Trade Contractor to completely and

accurately abide by this legal requirement may, among other things, result in civil penalties and void this Agreement. The Trade Contractor should contact its attorney regarding this legal requirement if the Trade Contractor has questions regarding its meaning or application.

13.12 LABOR RELATIONS The Trade Contractor shall comply with all Iowa and Federal labor laws. In accordance with Executive Order Number 69, issued by the Governor of Iowa on or about January 14, 2011, no project labor agreement (also known as a PLA), or similar, will be used on this Project. Iowa is a right to work state. No consultant, contractor, or employee shall be obligated to contract with or join any labor organization as a condition of performing work on this Project.

ARTICLE 14 TRADE CONTRACT DOCUMENTS

14.1 The Trade Contract Documents in existence at the time of execution of this Agreement are as follows:

RFB# and Bid Package #

14.2 INTERPRETATION OF TRADE CONTRACT DOCUMENTS

14.2.1 The drawings and specifications are complementary. If Trade Contract Work is shown only on one but not on the other, the Trade Contractor shall perform the Trade Contract Work as though fully described on both consistent with the Trade Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

14.2.2 In case of conflicts between the drawings and specifications, the specifications shall govern. In any case of omissions or errors in figures, drawings or specifications, the Trade Contractor shall immediately submit the matter to the Owner for clarification. The Owner's clarifications are final and binding on all Parties, subject to an equitable adjustment in Trade Contract Time or Price pursuant to ARTICLE 6 and ARTICLE 7 or dispute resolution in accordance with ARTICLE 12.

14.2.3 Where figures are given, they shall be preferred to scaled dimensions.

14.2.4 Any terms that have well-known technical or trade meanings, unless otherwise specifically defined in this Agreement, shall be interpreted in accordance with their well-known meanings. This Agreement entered into as of the date entered in ARTICLE 1.

14.2.5 PRECEDENCE In case of any inconsistency, conflict or ambiguity among the Trade Contract Documents, the documents shall govern in the following order: (a) Trade Contract Change Orders and written amendments to this Agreement; (b) this Agreement; (c) subject to subsection 14.2.2 the drawings, specifications and addenda issued prior to the execution of this Agreement; (d) approved submittals; (e) information furnished by the Owner pursuant to subsection 4.1.3; (f) other documents listed in this Agreement. Among all the Trade Contract Documents, the term or provision that is most specific or includes the latest date shall control. Information identified in one Trade Contract Document and not identified in another shall not be considered to be a conflict or inconsistency.

This Agreement entered into as of the date entered in ARTICLE 1.

OWNER State of Iowa, Department of Administrative Services

Trade Contractor: Test

By: _____

(Authorized Representative)

Name:

Title:

Date:

Owner: State of Iowa - DAS

By: _____

(Authorized Representative)

Name:

Title:

Date:

END OF DOCUMENT.

SECTION 00 6000

PERFORMANCE AND PAYMENT BOND

PART 1 - GENERAL

1.01 PERFORMANCE AND PAYMENT BOND

A. Performance and payment bonds to be used on this project, ConsensusDocs 260 and 261 are attached for reference following this page. ConsensusDocs performance and payment bonds are not required (other standard forms are acceptable to the State of Iowa).

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

CONSENSUSDOCS 260

PERFORMANCE BOND

This document was developed through a collaborative effort of organizations representing a wide cross-section of the design and construction industry. The organizations endorsing this document believe it represents a fair allocation of risk and responsibilities for all project participants.

Endorsing organizations recognize that this document must be reviewed and adapted to meet specific needs and applicable laws. This document has important legal and insurance consequences. You are encouraged to consult legal, insurance and surety advisors before completing or modifying this document. The software includes a notes section indicating where information is to be inserted to complete this document. Further information and endorsing organizations' perspectives are available at www.consensusdocs.org/guidebook.

For Use with ConsensusDOCS 200, Standard Form of Agreement and General Conditions Between Owner and Constructor (Where the Contract Price is a Lump Sum) and ConsensusDOCS 500, Standard Agreement and General Conditions Between Owner and Construction Manager.

The Owner, _____,(the "Owner") and the Constructor, _____,(the "Constructor") have entered into a Contract (the "Contract") dated _____ for _____(the "Project"). The Contract is incorporated by reference into this Performance Bond (the "Bond").

By virtue of this Bond, the Constructor as Principal and _____ as Surety ("Surety"), are bound to the Owner as Obligee in the maximum amount of _____ Dollars ($_____) (the "Bond Sum"). The Constructor and Surety hereby bind themselves, their heirs, executors,

administrators, successors and assigns, jointly and severally, as provided herein.

1. GENERAL CONDITIONS It is the condition of this Bond that if the Constructor performs its Contract obligations (the "Work"), the Surety's obligations under this Bond are null and void. Otherwise the Surety's obligations shall remain in full force and effect. The Surety waives any requirement to be notified of alterations or extensions of time made by the Owner in the Contract. The Owner may not invoke the provisions of this Bond unless the Owner has performed its obligations pursuant to the Contract. Upon making demand on this Bond, the Owner shall make the Contract Balance (the total amount payable by the Owner to the Constructor pursuant to the Contract less amounts properly paid by the Owner to the Constructor) available to the Surety for completion of the Work.

2. SURETY OBLIGATIONS If the Constructor is in default pursuant to the Contract and the Owner has declared the Constructor in default, the Surety promptly may remedy the default or shall:

a. Complete the Work, with the consent of the Owner, through the Constructor or otherwise;

b. Arrange for the completion of the Work by a Constructor acceptable to the Owner and secured by performance and payment bonds equivalent to those for the Contract issued by a qualified surety. The Surety shall make available as the Work progresses sufficient funds to pay the cost of completion of the Work less the Contract Balance up to the Bond Sum; or

c. Waive its right to complete the Work and reimburse the Owner the amount of its reasonable costs, not to exceed the Bond Sum, to complete the Work less the Contract Balance.

3. DISPUTE RESOLUTION All disputes pursuant to this Bond shall be instituted in any court of competent jurisdiction in the location in which the Project is located and shall be commenced within two years after default of the Constructor or Substantial Completion of the Work, whichever occurs first. If this provision is prohibited by law, the minimum period of limitation available to sureties in the jurisdiction shall be applicable.

This Bond is entered into as of _____.

SURETY _____(seal)

By: .....

Print Name: _____

Print Title: _____

(Attach Power of Attorney)

Witness: .....

CONSTRUCTOR _____(seal)

By: .....

Print Name: _____

Print Title: _____

Witness: .....

(Additional signatures, if any, appear on attached page)

CONSENSUSDOCS 261

PAYMENT BOND

This document was developed through a collaborative effort of organizations representing a wide cross-section of the design and construction industry. The organizations endorsing this document believe it represents a fair allocation of risk and responsibilities for all project participants.

Endorsing organizations recognize that this document must be reviewed and adapted to meet specific needs and applicable laws. This document has important legal and insurance consequences. You are encouraged to consult legal, insurance and surety advisors before completing or modifying this document. The software includes a notes section indicating where information is to be inserted to complete this document. Further information and endorsing organizations' perspectives are available at www.consensusdocs.org/guidebook.

For Use with ConsensusDOCS 200, Standard Form of Agreement and General Conditions Between Owner and Constructor (Where the Contract Price is a Lump Sum) and ConsensusDOCS 500, Standard Agreement and General Conditions Between Owner and Construction Manager.

The Owner, _____,(the "Owner ") and the Constructor, _____, (the "Constructor") have entered into a Contract (the "Contract") dated _____ for _____(the "Project"). The Contract is incorporated by reference into this Payment Bond (the "Bond").

By virtue of this Bond, the Constructor as Principal and _____as Surety ("Surety"), are bound to the Owner as Obligee in the maximum amount of _____Dollars ($_____) (the "Bond Sum"). The Constructor and Surety hereby bind themselves, their heirs, executors,

administrators, successors and assigns, jointly and severally, as provided herein.

1. GENERAL CONDITIONS It is the condition of this Bond that if the Constructor promptly makes payment of all sums for all labor, materials, and equipment furnished for use in the performance of the work required by the Contract, the Surety's obligations pursuant to this Bond are null and void. Otherwise the Surety's obligations shall remain in full force and effect. The Surety waives any requirement to be notified of alterations or extensions of time made by the Owner in the Contract.

2. SURETY OBLIGATION Every Claimant who has not been paid in full before the expiration of a period of ninety (90) Days after such Claimant provided or performed the last of the work or labor, or furnished the last of the materials for which said claim is made, may have a right of action on this Bond. The Surety's obligation to the Claimant(s) shall not exceed the Bond Sum.

3. LIMITATION OF ACTION No suit or action shall be commenced on this Bond by any Claimant:

a. Unless Claimant, other than one having a direct Contract with the Constructor, shall have given written notice to the Constructor, the Owner and the Surety within ninety (90) Days after the Claimant provided or performed the last of the work or labor, or furnished the last of the materials for which the claim is made, stating with substantial accuracy the amount claimed and the name of the Party to whom the materials were furnished, or for whom the work or labor was provided or performed. Such notice shall be served by any means which provides written third party verification of delivery to the Constructor at any place it maintains an office or conducts business, or served in any manner in which legal process may be served in the state in which the Project is located.

b. After the expiration of one (1) year from the date on which the Claimant last performed labor or furnished materials or equipment on the Project. If this provision is prohibited by law, the minimum period of limitation available to sureties in the jurisdiction shall be applicable.

c. Other than in any court of competent jurisdiction in the location in which the Project is located.

4. CLAIMANT A Claimant is defined as an individual or entity having a direct contract with the Constructor or having a contract with a subcontractor having a direct contract with the Constructor to furnish labor, materials or equipment for use in the performance of the Contract.

This Bond is entered into as of _____.

SURETY _____(seal)

By: .....

Print Name: _____

Print Title: _____

(Attach Power of Attorney)

Witness: .....

CONSTRUCTOR _____(seal)

By: .....

Print Name: _____

Print Title: _____

Witness: .....

(Additional signatures, if any, appear on attached page)

SECTION 01 1200

CONTRACT SUMMARY

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Project Information
B. Project Summary
C. Bid Scope Summary
D. Work Hour Restrictions
E. Access to Site
F. Coordination with Occupants
G. Rules for Construction Workers
H. Bid Package Instructions

1.02 PROJECT INFORMATION

A. Facility Name/Location: Newton Correctional Facility, 307 South 60th Avenue West, Newton, Iowa 50208.
B. DAS Project #: 8994.00
C. Owner: State of Iowa, Department of Administrative Services, Hoover State Office Building, Level 3, 1305 East Walnut Street, Des Moines, IA 50319
D. Owner's Representative: Brad Tonyan, Iowa Department of Administrative Services, 109 SE 13th Street, Des Moines, IA 50319
E. Construction Manager: Jerry Dehnke, The Samuels Group, 317 6th Ave., Suite 720, Des Moines, IA, 50309

1.03 PROJECT SUMMARY

The project includes the replacement of the following systems: communications infrastructure and network equipment, fire detection and alarm, detention controls, perimeter fence alarm, and video surveillance at Newton Correctional Facility at 307 South 60th Avenue West, Newton, Iowa 50208.

A. Target date to provide substantial completion is March 29, 2019 (Entire Project).
B. See 00 3113 for specific system substantial completion dates.

1.04 BID SCOPE SUMMARY

A. Scope Applicable to All Bid Packages:
    1. The Contractor's Work includes all labor, supervision, materials, equipment, services, supplies, tools, facilities, transportation, hoisting, storage, receiving, licenses, inspections, certifications, overhead, profit, or other items required or reasonably inferable to properly and timely perform and complete all work and services to be performed by the Contractor pursuant to this Agreement. Unless specifically stated otherwise, incidental work required to accomplish the work of this Bid Package shall be included the bid. This would include, but not be limited to, temporary facilities, protection of the work, security of equipment, materials, and work in progress, etc. Contractor's Work shall be performed in accordance with the Drawings, Specification Divisions 00 and 01, and Specification sections applicable to each Contractor's scope.
    2. Contractor is responsible for all labor and equipment to unload, account for all material delivered, stock, and delivery for this scope of work. Storage and

delivery of materials and equipment at the Site shall be permitted only to the extent approved in advance by the Construction Manager, and if anything so stored obstructs the progress of any portion of the work, it shall be promptly removed or relocated by the Contractor without reimbursement.

3. Provide any required electrical work to support the installation. Includes specification Division 26 in its entirety.
4. On site supervision by Prime Contractor at all times work by that contractor or their subcontractors/suppliers is taking place.
5. Provide all temporary facilities required for this scope of work including trailer, trailer power, telephone, secured storage, temporary power for work, temporary and task lighting for work, etc. as determined necessary by Contractor. Coordinate location of trailers, material storage and utility lines with Construction Manager. Limited space is available, and permission to bring any such facility or excess materials on to the site shall be approved by the Construction Manager.
6. Contractor shall provide all equipment and tools for Contractor's own cleanup. Clean up shall be done at end of every shift or more frequently if required for the Contractor to perform their work, for other Contractors to perform their work, as required by the Owner's operations, and at the discretion of the Construction Manager.
7. All turf, landscaping, and subgrade disturbances caused by equipment traffic or other activities related to the Contractor's scope shall be repaired or restored to proper conditions by the Contractor.
8. Protect adjacent existing building elements from damage from Scope of work. Repair existing building elements damaged during Contractor's Scope of work.
9. Facility Orientation Program for all contractor personnel. The facility orientation is four (4) hours long and is required for all contractors. Contractors shall coordinate training with the facility to minimize the number of training sessions required.

1.05 WORK HOUR RESTRICTIONS

A. Normal work hours are from 7:00 AM to 3:30 PM, Monday through Friday unless arrangements are made in advance.
B. See drawing notes for specific shut down time frames and cutover requirements.

1.06 CONTRACTOR USE OF SITE AND PREMISES

A. Construction Operations: Limited to areas noted on Drawings.
B. Provide access to and from site as required by law and Owner:
    1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
    2. Do not obstruct roadways, sidewalks, or other public ways without permission of Owner and permit if required.
C. Facility will be occupied at all times during duration of work. Contractor personnel shall conduct themselves in an agreeable manner at all times. Failure to do so may result in removal from the work site.

1.07 OWNER OCCUPANCY

A. Owner intends to occupy the Project during the construction project and upon Substantial Completion.
B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

C. See drawing notes for specific shut down durations.
D. Schedule the Work to accommodate Owner occupancy.

1.08 RULES FOR CONSTRUCTION WORKERS

A. The staff of the State of Iowa has a responsibility to protect the public by providing a secure environment. All work site rules must be followed to the letter, at all times.
B. All construction workers must have a background check completed prior to entering the campus to perform work.
C. Hot Work Permit Processes and Fire Watch, when necessary, will be adhered to for this project.
D. All State properties are tobacco free. No smoking or tobacco products will be permitted or tolerated on campus unless in designated areas.
E. You are permitted access only to the work site and no other area of the institution.
F. No drugs, alcohol, or firearms are allowed on the work site.
G. Do not leave money, drugs, alcohol, or firearms in your personal vehicle.
H. Company and personal vehicles are to be parked and locked in designated or authorized area of the work.
I. Secure all tools at the end of the day. Tool control process shall be coordinated with the facility.
J. Maintain control of all tools, supplies, and debris at all times during the work.
K. Never leave keys in any vehicle. If a security officer finds keys in a vehicle, they are under orders to turn them in to a security supervisor.
L. Do not give anything to residents or take anything from residents; if they offer, inform your supervisor.
M. Secure all tools at the end of each day. Never leave tools unattended. All tools shall be checked in at the beginning of the day and checked out at the end of the day. If security officers find loose tools, they are under orders to turn them in to their supervisor.
N. All delivery vehicles must go directly to the job site. Extra time should be anticipated for all deliveries. Provide 24-hour notice to the facility of deliveries.
O. During an emergency, follow the instructions of the security staff.
P. Contractor shall wear clothing of a different color, pattern, fashion, etc. as to distinguish themselves from inmates. Contractors shall wear high visibility green/yellow to differentiate themselves from inmates.

1.09 BID PACKAGE INSTRUCTIONS

A. **Bid Package #01** – Communications Infrastructure and Network Equipment: Trade Contractor shall include all of the following, but not limited to, as part of the contract:
    1. Provide new singlemode infrastructure between all campus buildings. Refer to the site plan and telecommunications riser diagram for additional information. Contractor shall provide thorough testing of each terminated strand to confirm signal strength and dB loss.
    2. Install new network switches at each site and establish backbone data connectivity between all buildings.
    3. Includes specification: Division 27 in its entirety

B. **Bid Package #02** – Fire Detection and Alarm System: Trade Contractor shall include all of the following, but not limited to, as part of the contract:
    1. Establish new head end/workstation requirements with Master Control and each command post.
    2. Upgrade/replace the existing fire detection and alarm system head end. Install new cabinet/tub as required. Place the system outside of the existing multimode lop while this is being done to minimize alarms at master control.
    3. If non-Simplex system, new field devices shall be required at each site.

4. Place new head end on the fiber optic infrastructure and ensure full communication and system status is being reported to Master Control in Building H.
5. Repeat Process for each building. Once all buildings have been upgraded/replaced, migrate all data communication to the new singlemode network.
6. Includes specification: 28 4600
7. Includes specification (as applies): 28 0000, 28 0505, 28 0533, 28 0544, and 28 0553.

C. **Bid Package #03** – Detention Controls: Trade Contractor shall include all of the following, but not limited to, as part of the contract:
1. Establish new head end/workstation requirements with Master Control and each Command Post.
2. Replace the existing detention controls system headend. Provide all necessary field work at each device in order to supervise all switches with appropriate resistor values.
3. Provide an integration with the intercom system, perimeter fence, and video surveillance solution. Include all necessary labor and programming time to ensure a single platform can receive and annunciate alarms from these various systems. Associate camera callup video with the nearest intercom station and controlled/monitored opening.
4. Each housing unit's command post shall have the ability to localize control in the event building "H" is unable to remotely lock/unlock doors.
5. Includes specification: 28 5200
6. Includes specification (as applies): 28 0000, 28 0505, 28 0533, 28 0544, and 28 0553.

D. **Bid Package #04** – Perimeter Fence Alarm System: Trade Contractor shall include all of the following, but not limited to, as part of the contract:
1. Establish new head end/workstation requirements with Master Control and each Command Post.
2. Replace the existing sensor post devices.
3. Replace the existing microwave on site with a new unit.
4. Integrate all alarms with the new detention controls system. Associate any alarm output with a symbol located on the detention control software. Coordinate this work closely with the detention controls contractor.
5. Includes specification: 28 5210 and 28 5220
6. Includes specification (as applies): 28 0000, 28 0505, 28 0533, 28 0544, and 28 0553.

E. **Bid Package #05** – Video Surveillance: Trade Contractor shall include all of the following, but not limited to, as part of the contract:
1. Establish new head end/workstation requirements with Master Control and each command post.
2. Includes specification: 28 2000
3. Includes specification (as applies): 28 0000, 28 0505, 28 0533, 28 0544, and 28 0553.

F. **Alternate #01** – Core Network Redundancy: Trade Contractor shall include all of the following, but not limited to, as part of the contract:

1. Provide one (1) additional core switch configured in an identical manner to the primary core illustrated on the drawings. In the event of primary core failure, the redundant core shall take over.
2. Provide two (2) additional SFP 1000Base-X modules at each building's switch to enable these additional pathways back to the redundant core switch.
3. Provide the appropriate quantity of matched SFP modules at the redundant core switch for a complete solution.
4. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
5. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
6. Execute accepted alternates under the same conditions as other work of the Contract.

G. **Alternate #02** – Fire Detection and Alarm System Alarm Interface: Trade Contractor shall include all of the following, but not limited to, as part of the contract:
1. REMOVE all Simplex Graphic Command Center's from the site. Modify the existing 62.5 multimode fiber optic configuration to accommodate this change.
2. Provide annunciator panels at each building's command station.
3. Provide a robust annunciator panel at Master Control inside Building H that allows specific identification of alarms (location and device) and the ability to silence. These shall take the place of the Graphic Command Center.
4. Provide the required connectivity from each building's fire detection and alarm control panel to support these new devices
5. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
6. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
7. Execute accepted alternates under the same conditions as other work of the Contract.

H. **Work Performed by Owner:** The Newton Correctional Facility will perform the following work items:
1. Relocate all moveable furniture, fixtures and equipment (FF&E), including window treatments; and personal materials from each sequenced work area prior to demolition and construction activities and after new construction is completed.
2. Verify all existing pathways between handholes and into existing buildings for fiber optic installation. See General Notes on drawing T0.03.
3. Remove and replace security screws for door latches prior to construction activities.

I. **Owner Furnished Products:** The Newton Correctional Facility will provide the following materials for installation by the facility:
1. Replacement security screws for door latches as needed.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

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SECTION 01 2500

SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Substitution Procedures
B. Request for Substitution form

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.01 SUBSTITUTION PROCEDURES

A. Where the Bidding Documents stipulate a specific product be provided by naming one or more manufacturer and model, and include a statement such as “or equal”, “equal to”, “equivalent to”, or “basis of design”, a substitute product will be considered when written request is received by the date and time identified in Section 00 2113 INSTRUCTIONS TO BIDDERS.
B. The written request shall be on the “Request for Substitution” form included in the Project Manual. If no such form is included, the request shall be provided on the letterhead of the company making the request.
C. Subsequently, substitutions will be viewed in the context of a Change Order to the Contract, and consideration will only be given in the event a product becomes unavailable or not practical due to no fault of the Contractor, or the substitution is substantially to the Owner’s advantage (equal product for less cost or higher quality product at no change in Contract Sum).
D. Document each substitution request with complete data substantiating compliance of the proposed substitution with the Bidding Documents. Each request shall identify the specified product for which the substitution is requested, and shall clearly describe the product for which approval is requested. The burden shall be on the requester to demonstrate the proposed substitute product’s suitability for use in the Work and its equivalency or superiority in function, appearance, quality, and performance with the product named in the Bidding Documents.
E. A description of any changes to the Bidding Documents that the proposed substitution will require shall be included with the request. The requester shall affirm that dimensions shown on the Drawings will not be affected by the substitute product, and that it will have no adverse effect on other trades, the construction schedule, or specified warranty requirements. The request for use of a substitute product shall be signed by an authorized representative of the firm submitting the request, who shall state that the firm will pay for any changes to the building design, including Design Professional’s design, detailing, and construction cost caused by the requested substitution if the substitution is approved for use in the Work.
F. All such substitute products approved for use in the Work during the established period of time before receipt of Bids will be identified in a subsequent Addendum to the Bidding Documents.

3.02 REQUEST FOR SUBSTITUTION FORM

A. A Request for Substitution Form is attached following this page.

END OF SECTION

SUBSTITUTION REQUEST FORM

Project: _____ Substitution Request Number: _____

_____ From: _____

To: _____ Date: _____

_____ A/E Project Number: _____

Re: _____

Specification Title: _____ Description: _____

Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____

Manufacturer: _____ Address: _____ Phone: _____

Trade Name: _____ Model No.: _____

_____ _____ _____

History: ☐ New product ☐ 2-5 years old ☐ 5-10 yrs old ☐ More than 10 years old

Differences between proposed substitution and specified product: _____

_____

_____

☐ Point-by-point comparative data prepared by contractor and attached - REQUIRED BY A/E

Reason for not providing specified item: _____

_____

Similar Installation:

Project: _____ Architect: _____

Address: _____ Owner: _____

_____ Date Installed: _____

Proposed substitution affects other parts of Work: ☐ No ☐ Yes; explain _____

_____

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

SUBSTITUTION REQUEST FORM

(Continued)

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

_____

Telephone: _____

Attachments: _____

_____

_____

_____

A/E's REVIEW AND ACTION

☐ Substitution approved - Make submittals in accordance with Specification Section 01 3300.
☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01 3300.
☐ Substitution rejected - Use specified materials.
☐ Substitution Request received too late - Use specified materials.

Signed by: Date:

Additional Comments: ☐ Contractor ☐ Subcontractor ☐ Supplier ☐ Manufacturer ☐ A/E ☐ _____

_____

_____

_____

_____

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SECTION 01 2600

CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Change procedures

1.02 CHANGE PROCEDURES

A. The Design Professional will advise of minor changes in the work not involving an adjustment to Contract Sum/Price or contract time as authorized.
B. The Construction Manager may issue a Proposal Request that includes a detailed description of a proposed change with supplementary or revised drawings and specifications and a change in contract time for executing the change as provided by the Design Professional. The Trade Contractor will prepare and submit an estimate within 7 calendar days. Estimates shall be provided for the project at no cost, regardless of acceptance or rejection of proposal.
C. The Trade Contractor may propose changes by submitting a Request for Information to the Construction Manager, describing the proposed change and its full effect on the work. Include a statement describing the reason for the change, and the effect on the Contract Sum/Price and contract time with full documentation and a statement describing the effect on work by separate or other contractors. Document any requested substitutions in accordance with the specifications. Construction Manager will forward the Request for Information on to the Design Professional for their official response.
D. Stipulated Sum/Price Change Order: Based on executed Change Order and contractor's fixed price quotation.
E. Unit Price Change Order: The change order will be executed on a fixed unit price basis for pre-determined unit prices and quantities. Changes in contract price or contract time will be computed as specified for time and material change orders.
F. Time and Material Change Order: The change order will be executed on a not to exceed basis. Design professional and Construction Manager will determine the not to exceed estimated cost based on contractor’s proposal for hourly rates and material costs. Maintain detailed records of work done on time and material basis. Time and Material tickets must be submitted daily to the Construction Manager for verification. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the work. Submit itemized account and supporting data after completion of change. A final deductive change order will be issued to reconcile final cost to the initial change order.
G. Change Order Forms: CONSENSUSDOC Forms provided by Owner.
H. Execution of Change Orders: The Construction Manager will issue change orders for signature of parties as provided in the Conditions of the Contract.
I. With respect to pricing change orders, the percentage mark-up for overhead and profit is subject to the following limits:
    1. Fifteen (15) percent maximum for work directly performed by employees of the Constructor, Subcontractor or Sub-subcontractor.
    2. Five (5) percent maximum for work performed or passed through by a Subcontractor and passed through to the Owner by the Constructor.
    3. Five (5) percent maximum Subcontractor’s mark-up for Work performed by a Sub-Subcontractor and passed through to the Owner by the Subcontractor and Constructor.
    4. The maximum allowable mark-up shall be twenty-five (25) percent passed through to the Owner by the Constructor under any circumstances. Overhead and profit shall be shown separately for the Constructor and each Subcontractor of any tier performing the Change Order Work.

J. Contractor and subcontractor agree to provide and require all suppliers to provide, a detailed breakdown of labor, labor burden, materials, installation, rental, and fuel costs.

K. **Please refer to Article 8 of CONSENSUDOCS 802- STANDARD FORM OR AGREEMENT BETWEEN OWNER AND TRADE CONTRACTOR for additional Change Procedures.**

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

SECTION 01 2900

PAYMENT PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Schedule of values
B. Application for payment

1.02 SCHEDULE OF VALUES

A. Coordination: Trade Contactor will coordinate preparation of the Schedule of Values with preparation of the Construction Manager's Construction Schedule.
   1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including Application for Payment forms with Continuation Sheets, Submittals Schedule, and Construction Manager's Construction Schedule.
   2. Submit original Schedule of Values in EADOC within 14 days after date of Owner-Trade Contractor Agreement. Schedule of Values must be approved by Owner prior to submission for first application for payment.
B. Format: Utilize the Table of Contents of this project manual. Identify each line item with number and title of the major specification section. Each major specification section should be further itemized by materials cost and labor cost. Identify site mobilization, bonds and insurance.
   1. Identification: Include the following Project identification on the Schedule of Values:
      a. Project name and location.
      b. Name and address of Owner, Trade Contractor, Construction Manager and Design Team.
      c. DAS Project Number.
      d. Date of Submittal.
   2. Revise the Schedule of Values to list approved Change Orders with each Application for Payment.

1.03 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications for payments as certified by the Design Professional and paid for by Owner.
   1. Application for Payment at time of Substantial Completion and final Application for Payment involve additional requirements.
B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement. Progress payments shall be submitted to the Construction Manager. Any request for payment for work completed prior to June 30th of any year needs to be submitted by July 15th of the same calendar year.
C. Payment Application Forms: Use AIA form G702 and G703 as the form for the Application for Payment or an equivalent approved by the owner.
D. Include lien waiver forms required by the owner when applicable.
E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of the Trade Contractor. Construction Manager will return incomplete applications without action.
   1. Include amounts of Change Orders issued before last day of construction period covered by application.
F. Waivers of Mechanic's Lien: If requested by Owner with each Application for Payment, submit waivers of mechanic's lien from every entity who is lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment when applicable.

1. Owner reserves the right to designate which entities involved in the Work must submit waivers.
2. Submit waivers of lien on forms, executed in a manner acceptable to Owner.

G. Initial Application for Payment: Administrative actions and submittals that must precede submittal of first Application for Payment include the following:
1. Schedule of Values
2. Certificates of insurance and insurance policies.
3. Lists of vendors and any subcontractors.

H. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for the portion of the Work claimed as substantially complete.
1. Include documentation supporting the claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

I. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706, “Contractor's Affidavit of Payment of Debts and Claims.”
5. AIA Document G706A, “Contractor's Affidavit of Release of Liens.”
6. AIA Document G707, “Consent of Surety to Final Payment.”
7. Letter of Notification to all sub-contractors and suppliers of application for release of retainage.
8. Evidence that claims have been settled.

J. Payments will be made to the extent of the value of the work performed in the previous month less a retainage amount of 5% of the value of the work performed. Upon substantial completion for the entire work, a sum sufficient to decrease the total retained to 5% of the contract sum, plus such other retainage as the engineer shall determine for all incomplete work and unsettled claims will be authorized.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

SECTION 01 3100

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Coordination
B. Pre-construction meeting
C. Progress meetings
D. Coordination Meetings
E. Requests for Interpretation (RFIs)
F. Background Checks

1.02 COORDINATION

A. Coordinate scheduling, submittals, and work of the various sections of the project manual to ensure efficient and orderly sequence of installation of interdependent construction elements.
   1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
   2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
   3. Make adequate provisions to accommodate items scheduled for later installation.

B. Administrative procedures: The Trade Contractor will coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
   1. Preparation of Trade Contractor's Construction Schedule.
   2. Provide updated information for Construction Manager's Construction Schedule.
   3. Preparation of Schedule of Values.
   4. Delivery and processing of submittals.
   5. Progress meetings.
   6. Pre-installation conferences.
   7. Project closeout activities

C. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

D. Coordinate space requirements, supports, and installation of mechanical and electrical work, which are indicated diagrammatically on drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

E. In finished areas except as otherwise indicated conceal pipes and wiring within the construction. Coordinate locations of piping with finish elements.

F. Coordinate completion and cleanup of work of separate sections in preparation for Substantial Completion.

G. After owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of owner's activities.

H. During construction coordinate use of site and facilities through Construction Manager.

I. Comply with Construction Manager and Owner’s procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.

J. Make the following types of submittal to Architect through the Construction Manager via EADOCs:
   1. Request for Information/Interpretation.
   2. Request for substitution.
   3. Shop drawings, product data, and samples.
   4. Test and inspection reports.
   5. Design data.
   6. Manufacturer's instructions and field reports.
   7. Applications for payment and change order requests.
   8. Progress schedules.
   9. Coordination drawings.
   10. Correction punch list and final correction punch list for substantial completion
   11. Closeout submittals

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.01 PRE-CONSTRUCTION MEETING

A. The Construction Manager and Owner will schedule a meeting after Notice of Award.
B. Required: Design Professional, Owner, Construction Manager, Trade Contractor and any Sub Contractors.
C. Agenda:
   1. Execution of Owner-Contractor Agreement.
   2. Submission of executed bonds and insurance certificates.
   3. Distribution of Contract Documents.
   4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
   5. Designation of personnel representing the parties in Contract.
   6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, change orders, RFIs and contract closeout procedures
   7. Tentative construction schedule.
   8. Critical work sequencing and long-lead items.
   9. Procedures for testing and inspecting.
   10. Preparation of Record Documents.
   11. Safety Procedures.
   12. Owner's requirements.
   13. Security and housekeeping procedures.
   14. Background Checks.
   15. Responsibility for temporary facilities and controls.
   16. Construction waste management.
   17. Logistics (use of premise, parking, work restrictions, maintain egress, etc.)
D. The Construction Manager is to record minutes and distribute copies within two days after meeting to participants, with one copy to owner, participants, and those affected by decisions made.

3.02 PROGRESS MEETINGS

A. The Construction Manager shall schedule and administer meetings throughout progress of the work at bi-weekly intervals.
B. The Construction Manager is to make arrangements for meetings, prepare agenda with copies for participants, and preside at meetings, record minutes and distribute copies within two days to those affected by decisions made.

C. Attendees may include: Project superintendent, major subcontractors and suppliers, Owner, Construction Manager, Architect/Engineer, as appropriate to agenda topics for each meeting. All participants at the conference call shall be familiar with the Project and authorized to conclude matters relating to the Work.

D. Agenda:
   1. Review minutes of previous meetings.
   2. Review the Construction Manager's Construction Schedule.
   3. Field observations, problems, and decisions.
   4. Identification of problems that impede planned progress.
   5. Review of submittals schedule and status of submittals.
   6. Review of RFI's.
   7. Review of off-site fabrication and delivery schedules.
   8. Corrective measures to regain projected schedules.
   9. Planned progress during succeeding work period.
   10. Coordination of projected progress.
   11. Maintenance of quality and work standards.
   12. Effect of proposed changes on progress schedule and coordination.
   13. Other business relating to work.
   14. Access, temporary facilities and controls, housekeeping and progress cleaning.
   15. Safety.
   16. Status of proposal requests, pending changes, official Change Orders.

E. Minutes:
   1. Following the meeting, the meeting minutes will be published in EADOC by the Construction Manager for all parties.

3.03 COORDINATION MEETINGS

A. Coordination meetings will be held at the discretion of the construction manager.

3.04 REQUESTS FOR INTERPRETATION (RFIs)

A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, prepare and submit an RFI in EADOC.
   1. RFIs shall originate with Trade Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
   2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in the Work.

B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:
   1. Specification Section number and title and related paragraphs, as appropriate.
   2. Drawing number and detail references, as appropriate.
   3. Field dimensions and conditions, as appropriate.
   4. Trade Contractor's suggested solution(s). If Trade Contractor's solution(s) impact the Contract Time or the Contract Sum, Trade Contractor shall state impact in the RFI.
   5. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.

C. Design Professional's Action: Design Professional will review each RFI, determine action required, and return it. Allow seven (7) working days for Design Professional's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day. The following RFIs will be returned without action:
   1. Requests for approval of submittals.
   2. Requests for approval of substitutions.
   3. Requests for coordination information already indicated in the Contract Documents.
   4. Requests for adjustments in the Contract Time or the Contract Sum.
   5. Requests for interpretation of Design Professional's actions on submittals.

6. Incomplete RFIs or RFIs with numerous errors.
7. Design Professional's action may include a request for additional information, in which case Design Professional's time for response will start again.

D. Design Professional's action on RFIs that may result in a change to the Contract Time or the Contract Sum/Price.
1. If Trade Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Construction Manager in writing within ten (10) days of receipt of the RFI response.

E. On receipt of Design Professional's response in EADOC, review the response and notify Design Professional within seven (7) days if Trade Contractor disagrees with response.

3.05 BACKGROUND CHECKS

A. Background checks must be performed on all on site employees, including sub-contractors.
B. The Contractor hereby explicitly authorized the Iowa DAS to conduct criminal history and/or other background investigation(s) of the Contractor, its officers, supervisory personnel, employees, and other staff retained by the Contractor or their sub-contractors for the performance of the contract.
C. A state of Iowa record check request form will be provided at the pre-construction meeting. Information required may include:
1. Last Name
2. First Name
3. Middle Name
4. Date of Birth
5. State Driver’s License or State ID #
6. Social Security #

END OF SECTION

SECTION 01 3000.01

WEB BASED CONSTRUCTION MANAGEMENT

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Owner and Contractor shall utilize **Bentley Systems, Inc. EADOC** system for electronic submittal of all data and documents (unless specified otherwise by the owner's representative) throughout the duration of the Contract. **EADOC** is a web-based electronic media site that is hosted by **Bentley Systems, Inc.**, utilizing their **EADOC** web solution. **EADOC** will be made available to all contractors' project personnel, subcontractor personnel, suppliers, consultants and the Designer of Record. The joint use of this system is to facilitate; electronic exchange of information, automation of key processes, and overall management of the contract. **EADOC** shall be the primary means of project information submission and management. When required by the Owners representative, paper documents will also be provided. In the event of discrepancy between the electronic version and paper documents, the paper documents will govern. **EADOC** is a registered trademark of **Bentley Systems, Inc**.

1.02 USER ACCESS LIMITATIONS

A. The Owner's Representative/Construction Manager will control the Contractor's access to **EADOC** by allowing access and assigning user profiles to accepted Contractor personnel. User profiles will define levels of access into the system, determine assigned function-based authorizations (determines what can be seen) and user privileges (determines what they can do). Sub-contractors and suppliers will be given access to **EADOC** through the Contractor. Entry of information exchanged and transferred between the Contractor and its sub-contractors and suppliers on **EADOC** shall be the responsibility of the Contractor.
   1. Joint Ownership of Data: Data entered in a collaborative mode (entered with the intent to share as determined by permissions and workflows within the **EADOC** system) by the Owner's Representative and the Contractor will be jointly owned.

1.03 AUTOMATED SYSTEM NOTIFICATION AND AUDIT LOG TRACKING

A. Review comments made (or lack thereof) by the Owner on Contractor submitted documentation shall not relieve the Contractor from compliance with requirements of the Contract Documents. The Contractor is responsible for managing, tracking, and documenting the Work to comply with the requirements of the Contract Documents. Owner's acceptance via automated system notifications or audit logs extends only to the face value of the submitted documentation and does not constitute validation of the Contractor's submitted information.

1.04 SUBMITTALS

A. See Section 01 3300 SUBMITTAL PROCEDURES:
B. Preconstruction Submittals
   1. List of Contractor's key **EADOC** personnel. Include descriptions of key personnel's roles and responsibilities for this project. Contractor should also identify their organization's administrator on the list.

1.05 COMPUTER REQUIREMENTS

A. The Contractor shall use computer hardware and software that meets the requirements of the **EADOC** system as recommended by **Bentley Systems, Inc**. to access and utilize **EADOC** . As

recommendations are modified by **EADOC**, the Contractor will upgrade their system(s) to meet the recommendations or better. Upgrading of the Contractor's computer systems will not be justification for a cost or time modification to the Contract. The contractor will ensure that connectivity to the **EADOC** system (whether at the home office or job site) is accomplished through DSL, cable, T-1 or wireless communications systems. The minimum bandwidth requirement for using the system is 128kb/s. It is recommended a faster connection be used when uploading pictures and files into the system. **EADOC** supports the current and prior two major versions of Chrome, Firefox, Internet Explorer, and Safari.

B. The Contractor shall be responsible for the validity of their information placed in EADOC and for the abilities of their personnel. Accepted users shall be knowledgeable in the use of computers, including Internet Browsers, email programs, cad drawing applications, and Adobe Portable Document Format (PDF) document distribution program. The Contractor shall utilize the existing forms in **EADOC** to the maximum extent possible. If a form does not exist in **EADOC** the Contractor must include a form of their own or provided by the Owner representative as an attachment to a submittal. Adobe PDF documents will be created through electronic conversion rather than optically scanned whenever possible. The Contractor is responsible for the training of their personnel in the use of **EADOC** (outside what is provided by the owner) and the other programs indicated above as needed.

C. User Access Administration: Provide a list of Contractor's key **EADOC** personnel for the Owner's Representative acceptance. Contractor is responsible for adding and removing users from the system. The Owners Representative reserves the right to perform a security check on all potential users. The Contractor will be allowed to add additional personnel and sub-contractors to **EADOC.**

1.06 CONNECTIVITY PROBLEMS

A. **EADOC** is a web-based environment and therefore subject to the inherent speed and connectivity problems of the Internet. The Contractor is responsible for its own connectivity to the Internet. **EADOC** response time is dependent on the Contractor's equipment, including processor speed, Internet access speed, etc. and current traffic on the Internet. The Owner will not be liable for any delays associated from the usage of **EADOC** including, but not limited to: slow response time, down time periods, connectivity problems, or loss of information. The contractor will ensure that connectivity to the **EADOC** system (whether at the home office or job site) is accomplished through DSL, cable, T-1 or wireless communications systems. The minimum bandwidth requirement for using the system is 128kb/s. It is recommended a faster connection be used when uploading pictures and files into the system. Under no circumstances shall the usage of the **EADOC** be grounds for a time extension or cost adjustment to the contract.

1.07 TRAINING

A. The Construction Manager shall provide the necessary training to the Prime Contractor.

PART 2 - PRODUCTS

2.01 DESCRIPTION

A. EADOC project management application (no equal) Provided by Bentley Systems, Inc. www.EADOCsoftware.com

PART 3 - EXECUTION

3.01 EADOC UTILIZATION

A. **EADOC** shall be utilized in connection with submittal preparation and information management required by Sections:
   1. PROJECT MANAGEMENT AND COORDINATION
   2. CONSTRUCTION PROGRESS DOCUMENTATION
   3. SUBMITTAL PROCEDURES
   4. QUALITY REQUIREMENTS
   5. Other Division One sections.
   6. Requirements of this section are in addition to requirements of all other sections of the specifications.

B. Design Document Submittals
   1. All design drawings and specifications shall be submitted as cad .dwg files or PDF attachments to the **EADOC** submittal work flow process and form.

C. Shop Drawings
   1. Shop drawing and design data documents shall be submitted as cad .dwg files or PDF attachments to the **EADOC** submittal work flow process and form. Examples of shop drawings include, but are not limited to:
   2. Standard manufacturer installation drawings.
   3. Drawings prepared to illustrate portions of the work designed or developed by the Contractor.
   4. Steel fabrication, piece, and erection drawings.

D. Product Data
   1. Product catalog data and manufacturer’s instructions shall be submitted as
   2. PDF attachments to the EADOC submittal work flow process and form. Examples of product data include, but are not limited to:
   3. Manufacturer's printed literature.
   4. Preprinted product specification data and installation instructions.

E. Samples
   1. Sample submittals shall be physically submitted as specified in Section 01 3300 SUBMITTAL PROCEDURES. Contractor shall enter submittal data information into EADOC with a copy of the submittal form(s) attached to the sample. Examples of samples include, but are not limited to:
   2. Product finishes and color selection samples.
   3. Product finishes and color verification samples.
   4. Finish/color boards.
   5. Physical samples of materials.

F. Administrative Submittals
   1. All correspondence and pre-construction submittals shall be submitted using EADOC. Examples of administrative submittals include, but are not limited to:
   2. Digging permits and notices for excavation.
   3. List of product substitutions
   4. List of contact personnel.
   5. Notices for roadway interruption, work outside regular hours, and utility cut overs.
   6. Requests for Information (RFI).
   7. Construction progress Schedules and associated reports and updates.
      a. Each schedule submittal specified in CONSTRUCTION PROGRESS

DOCUMENTATION shall be submitted as a native backed-up file (.PRX or .STX) of the scheduling program being used. The schedule will also be posted as a PDF file in the format.

8. Plans for safety, demolition, environmental protection, and similar activities.
9. Quality Control Plan(s), Testing Plan and Log, Quality Control Reports, Production Reports, Quality Control Specialist Reports, Preparatory Phase Checklist, Initial Phase Checklist, Field Test reports, Summary reports, Rework Items List, etc.
10. Meeting minutes for quality control meetings, progress meetings, pre-installation meetings, etc.
11. Any general correspondence submitted.

G. Compliance Submittals
   1. Test reports, certificates, and manufacture field report submittals shall be submitted on **EADOC** as PDF attachments. Examples of compliance submittals include, but are not limited to:
      a. Field test reports.
      b. Quality Control certifications.
      c. Manufacturer's documentation and certifications for quality of products and materials provided.

H. Record and Closeout Submittals
   1. Operation and maintenance data and closeout submittals shall be submitted on EADOC as PDF documents during the approval and review stage as specified, with actual set of documents submitted for final. Examples of record submittals include, but are not limited to:
      a. Operation and Maintenance Manuals: Final documents shall be submitted as specified.
      b. As-built Drawings: Final documents shall be submitted as specified.
      c. Extra Materials, Spare Stock, etc.: Submittal forms shall indicate when actual materials are submitted.

I. Financial Submittals
   1. Schedule of Value, Pay Applications and Change Request Proposals shall be submitted on **EADOC.** Supporting material for Pay Applications and Change Requests shall be submitted on **EADOC** as PDF attachments. Examples of compliance submittals include, but are not limited to:
      a. Contractors Schedule of Values
      b. Contractors Monthly Progress Payment Requests
      c. Contract Change proposals requested by the project owner

END OF SECTION

SECTION 01 3200

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Construction Progress Schedule
B. Construction Manager's Construction Schedule
C. Submittal Schedule
D. Daily Construction Reports
E. Progress Photographs

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.01 CONSTRUCTION MANAGER'S MASTER CONSTRUCTION SCHEDULE

A. Upon award of package, Contractor agrees to accept and meet or improve upon the schedule proposed in section **03 3113 PRELIMINARY SCHEDULE** with intermediate handoffs. Each package contractor will be required to participate in schedule coordination meetings with the Construction Manager.
B. If the bid package contractor does not meet the handoff milestones in the master construction schedule, the bid package contractor shall take measures to increase work forces, increase work hours, initiate revisions to means and methods of construction, and/or other similar measures as required to make up lost time and complete the work in accordance with the construction schedule and remain consistent with project progress and overall construction schedule. Such measures shall be at no additional cost to the Owner. The Construction Manager shall have sole discretion on decisions to accelerate work.
C. Updating the master construction schedule – Contractors are required to attend and participate in schedule coordination update meetings with the Construction Manager. This will be an opportunity for contractors to further define their scheduled scope of work in conjunction with other trades on site.
D. Acceptance of revised master construction schedule – After an updated master construction schedule has been issued via EADOC, Contractors will have 48 hours to dispute the new schedule. All contractors will be held to the last fully accepted master construction schedule.

3.02 CONSTRUCTION PROGRESS SCHEDULE

A. Submit preliminary outline to the Construction Manager no later than 48 hours prior to the pre-construction meeting for coordination with Owner's requirements.
B. Submit revised progress schedule with each application for payment.
C. Schedules will be electronically submitted through "EADOCS".
D. Distribute copies of reviewed schedules to project site file, subcontractors, suppliers, and other concerned parties.
E. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.
F. Submit computer generated horizontal bar chart with separate line for each major portion of work or operation, identifying the first day of each week.
G. Show complete sequence of construction activity, identifying work of separate stages and other logically grouped activities. Indicate early and late start, early and late finish, float dates, and duration.
H. Indicate estimated percentage of completion for each item of work at each submission.

I. Participate in joint review and evaluation of schedule with Construction Manager.
J. Revisions to schedules:
   1. Indicate progress of each activity to date of submittal and projected completion date of each activity.
   2. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.
   3. Prepare narrative report to define problem areas, anticipate delays, and impact on schedule. Report corrective action taken, or proposed, and its effect including effect of changes on schedules of separate contractors.

3.03 SUBMITTAL SCHEDULE

A. Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, re-submittal, ordering, manufacturing, fabrications, and delivery when establishing dates.
   1. Coordinate submittal schedule with list of subcontractors, the schedule of values, and construction schedule.
   2. Submit concurrently with first complete submittal of contractor's construction schedule.

3.04 DAILY CONSTRUCTION REPORTS

A. Daily Construction Reports: Submitted at weekly intervals.
   1. Daily Construction Reports will be submitted to Construction Manager.
B. Prepare a daily construction report recording the following information concerning events at project site:
   1. Count of personnel at Project site
   2. Equipment at Project site
   3. Material Deliveries
   4. High and low temperatures and general weather conditions, including presence of rain or snow
   5. Accidents
   6. Meetings and significant decisions
   7. Unusual events
   8. Stoppages, delays, shortages, and losses
   9. Meter readings and similar recordings
   10. Emergency procedures
   11. Orders and requests of authorities having jurisdiction
   12. Change orders received and implemented
   13. Services connected and disconnected
   14. Equipment or system tests and startups
   15. Partial completions and occupancies
   16. Substantial completions authorized

3.05 PROGRESS PHOTOGRAPHS

A. Progress photographs will be electronically submitted through "EADOCS".
B. Preconstruction Photographs: Before starting construction, take photographs of project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Construction manager.
   1. Take additional photographs as required to record existing damage to site, structure, equipment, or finishes.
C. Periodic Construction Photographs: Take photographs at regular intervals. Select vantage points to show status of construction and progress since last photographs were taken.
D. Field Completion Construction Photographs: Take photographs after date of Substantial Completion for submission as project record documents. Construction manager will inform of

desired vantage points.

END OF SECTION

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SECTION 01 3300

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Submittals for Review
B. Submittals for Information
C. Submittal Procedures
D. Samples

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.01 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
   1. Product Data
   2. Shop Drawings
   3. Samples for Selection
   4. Samples for Verification
B. Submit to Construction Manager to forward to Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
C. Samples will be reviewed only for aesthetic, color, or finish selection.
D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record document purposes.

3.02 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
   1. Design data.
   2. Certificates.
   3. Test reports.
   4. Inspection reports.
   5. Manufacturer’s instructions.
   6. Manufacturer’s field reports.
   7. Other types indicated.
B. Submit for Construction Manager, Architect, and Owner’s knowledge. No action will be taken.

3.03 SUBMITTAL PROCEDURES

A. Submittals will be electronically submitted through “EADOCS”. Contractor will be invited to join web based program after issue of Notice of Intent to award.
B. Shop Drawing Procedures:
   1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting the Contract Documents and coordinating related Work.
   2. Do not reproduce the Contract Documents to create shop drawings.
   3. Generic, non-project specific information submitted as shop drawings do not meet the requirements for shop drawings.
C. Transmit each submittal with a copy of approved submittal form.
D. Sequentially number the submittal form. Revise submittals with original number and a sequential

numeric suffix.

E. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.
F. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
G. Schedule submittals to expedite the project and coordinate submission of related items.
H. For each submittal review, allow 15 days excluding delivery time to and from the contractor.
I. Identify variations from the Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
J. When revised for resubmission, identify all changes made since previous submission.
K. Distribute reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.
L. Submittals not requested will not be recognized or processed.

3.04 SAMPLES

A. Submit to Construction Manager to forward to Architect/Engineer for review for limited purpose for checking conformance with information given and design concept expressed in the Contract Documents.
B. Samples for selection as specified in product sections:
   1. Submit to Construction Manager to forward to Architect/Engineer for aesthetic, color, or finish selections.
   2. Submit samples of finishes from full range of manufacturer's standard colors, textures, and patterns to Construction Manager to forward to Architect/Engineer for selection.
C. Submit samples to illustrate functional and aesthetic characteristics of products, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
D. Include identification on each sample, with full project information.
E. Submit number of samples specified in individual specification sections.
F. Photograph of submitted samples, along with transmittal sheet, shall be uploaded as a submittal in EADOC.

END OF SECTION

SECTION 01 4000

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. References
B. Quality assurance and control of installation
C. Tolerances
D. Defect Assessment
E. Inspection and testing laboratory services
F. Manufacturer's field services and reports

1.02 REFERENCES

A. Conform to reference standard in effect at date of contract.
B. When required by contract documents, obtain copies of standards.
C. Should specified reference standards conflict with contract documents request clarification from engineer before proceeding.
D. The contractual relationship of the parties to the contract shall not be altered from the contract documents by mention or inference otherwise in any reference document.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.01 QUALITY ASSURANCE/CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship to produce work of specified quality.
B. Comply fully with manufacturer's instructions, including each step in sequence.
C. Should manufacturer's instructions conflict with contract documents, request clarification from the engineer prior to proceeding.
D. Comply with specified standards as a minimum quality for the work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
E. Perform work by persons qualified to produce workmanship of specified quality
F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
G. Secure products in place with positive anchorage devices designed and sized to withstand stress, vibration, physical distortion, or disfiguration.

3.02 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable work. Do not permit tolerances to accumulate.
B. Comply with manufacturers’ tolerances. Should manufacturers’ tolerances conflict with contract documents, request clarification from Architect before proceeding.
C. Adjust products to appropriate dimensions; position before securing products in place.

3.03 DEFECT ASSESSMENT

A. Replace work or portions of work not conforming to specified requirements.

B. If, in the option of the Owner, it is not practical to remove and replace the work, Architect will direct an appropriate remedy or recommend adjusted payment.

3.04 INSPECTION AND TESTING

A. Trade Contractor shall include and pay for all required inspections, testing, and balancing if applicable. Copies of all testing and inspection reports shall be submitted to the Construction Manager and Design Professional by the testing and inspection agency.

B. Testing Agency Duties:
   1. Provide qualified personnel at site. Cooperate with Architect, Construction Manager, and contractor in performance of services.
   2. Perform specified sampling and testing of products in accordance with specified standards.
   3. Ascertain compliance of materials and mixes with requirements of contract documents.
   4. Immediately notify the Construction Manager and contractor of observed irregularities or non-conformance of work or products.
   5. Perform additional testing and inspections required by the Owner

C. Limits on Testing Agency/Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirement of contract documents.
   2. Agency may not approve or accept any portion of the work.
   3. Agency may not assume any duties of the contractor.
   4. Agency has no authority to stop the work.

D. Contractor responsibilities:
   1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
   2. Cooperate with laboratory personnel, and provide access to the work and to manufacturer’s facilities.
   3. Provide incidental labor and facilities:
      a. To provide access to work to be tested/inspected.
      b. To obtain and handle samples at the site or at source of products to be tested/inspected.
      c. To facilitate test/inspections.
      d. To provide storage and curing of test samples.
   4. Notify Construction Manager and laboratory 24 hours prior to expected time for operations requiring testing/inspection.

E. Re-testing required because of non-conformance to specified requirements shall be performed by the same testing agency on instruction by Architect/Construction Manager.

F. Re-testing required because of non-conformance to specified requirements shall be paid for by the Contractor.

3.05 MANUFACTURER'S FIELD SERVICES AND REPORTS

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start up of equipment, test, adjust and balance of equipment as applicable and to initiate instructions when necessary.

B. Individuals are to report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to the manufacturers' written instructions.

C. Submit report in duplicate within 30 days of observation to Construction Manager for review.

END OF SECTION

SECTION 01 5000

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Temporary utilities
B. Temporary sanitary facilities
C. Telephone Service
D. Removal of Utilities, Facilities, and Controls
E. Temporary Facilities
F. Equipment
G. Vehicular Access and Parking
H. Traffic Regulation
I. Barriers
J. Enclosures and Fencing
K. Waste Removal

1.02 TEMPORARY UTILITIES

A. Owner will provide the following:
   1. Electrical Power, consisting of connection to existing facilities.
   2. Water Supply, consisting of connection to existing facilities.
B. The Contractor shall pay for installation, maintenance, and removal of temporary utilities. Temporary utilities shall not disrupt the Facility's need for continuous service.

1.03 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.
B. Maintain daily in clean and sanitary condition.

1.04 TELEPHONE SERVICE

A. Provide, maintain, and pay for telephone service to field or use a cellular telephone.

1.05 REMOVAL OF UTILITIES, FACILITIES AND CONTROLS

A. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

PART 2 - PRODUCTS

2.01 TEMPORARY FACILITIES

A. Field Offices: Coordinate with Construction Manager and Owner if applicable.

2.02 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated, with class and extinguishing agent as required by locations and classes of fire exposures.

PART 3 - EXECUTION

3.01 VEHICULAR ACCESS AND PARKING

A. Use designated existing on-site roads for construction traffic.
B. Parking is as directed by Owner.
C. When site space is not adequate, provide additional off-site parking.
D. Use of designated existing on-site streets and driveways used for construction traffic is permitted. Track vehicles not allowed on paved areas.
E. Use of designated areas of existing parking facilities used by construction personnel as permitted.
F. Do not allow heavy vehicles or construction equipment in parking areas.
G. Provide and maintain access to fire hydrants, free of obstructions.
H. Provide means of removing mud from vehicle wheels before entering streets.

3.02 TRAFFIC REGULATION

A. Flag Persons: Provide trained and equipped flag persons to regulate traffic when construction operations or traffic encroach on public traffic lanes.
B. Flares and lights: Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.
C. Haul Routes:
    1. Consult with authority having jurisdiction, establish public thoroughfares to be used for haul routes and site access.
D. Removal:
    1. Remove equipment and devices when no longer required.
    2. Repair damage caused by demolition.

3.03 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for Owner's use of site and to protect existing facilities and adjacent properties from damage during construction operations.
B. Provide barricades and covered walkways required by governing authorities for public rights-of-way.
C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

3.04 ENCLOSURES AND FENCING

A. Provide temporary enclosure and fences as necessary to protect the public and secure the site.
B. Provide security and facilities to protect work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

3.05 WASTE REMOVAL

A. Except for items or materials to be salvaged, recycled or otherwise reused, remove waste materials from project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
    1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
    2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
B. Burning: Do not burn waste materials.
C. Waste Disposal Facilities: Provide waste collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction.

END OF SECTION

SECTION 01 6000

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. General product requirements
B. Product options
C. Maintenance materials
D. Transportation and handling
E. Storage and protections

PART 2 - PRODUCTS

2.01 GENERAL PRODUCT REQUIREMENTS

A. Provide new products unless specifically required or permitted by the contract documents.
B. Do not use products having any of the following characteristics:
   1. Made using or containing CFC's or HCFC's
   2. Made of wood from newly cut old growth timber.
C. Where all other criteria are met, contractor shall give preference to products that:
   1. If used on interior, have lower emissions
   2. If wet-applied, have lower VOC content
   3. Are extracted, harvested, and/or manufactured closer to the location of the project
   4. Have longer documented life span under normal used
   5. Result in less construction waste
   6. Are made of vegetable materials that are rapidly renewable

2.02 PRODUCT OPTIONS

1. Products specified by reference standards or by description only: Use of any product meeting those standards or description.
2. Products specified by naming one or more manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
3. Products specified by naming one or more manufacturers with a provision for substitutions: Submit a request for substitution for any manufacturer not named by the date specified in this project manual.

2.03 MAINTENANCE MATERIALS

1. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
2. Deliver to project site; obtain receipt prior to final payment.

PART 3 - EXECUTION

3.01 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.
B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
D. Transport and handle products in accordance with manufacturer's instructions.
E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.02 STORAGE AND PROTECTIONS

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
B. Store and protect products in accordance with manufacturers' instructions.
C. Store with seals and labels intact and legible.
D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to the product.
E. For exterior storage of fabricated products, place on slopped supports above ground.
F. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
G. Comply with manufacturers' warranty conditions, if any.
H. Cover product subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
I. Prevent contact with material that may cause corrosion, discoloration, or staining.
J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01 7300

EXECUTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures
B. Alteration project procedures
C. Cutting and patching
D. Cleaning and protection
E. Adjusting

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.01 EXAMINATION, PREPARATION, AND GENERAL INSTALLATION PROCEDURES

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
C. Examine and verify specific conditions described in individual specification sections.
D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or mis-production.
E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
F. Prior to cutting: Examine existing conditions prior to commencing work; include elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.
G. Clean substrate surfaces prior to applying next material or substance.
H. Seal cracks or openings of substrate prior to applying next material or substance.
I. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.
J. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
K. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
L. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
M. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
N. Make neat transitions between different surfaces, maintaining texture and appearance.

3.02 ALTERATION PROJECT PROCEDURES

A. Materials: As specified in product sections match existing products and work for patching and extending work.
B. Employ skilled and experienced installer to perform alteration work.
C. Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity.
D. Remove unsuitable material not marked for salvage, including rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished work.

E. Remove, cut and patch work in a manner to minimize damage and to provide a means of restoring products and finished to original condition.
F. Remove debris and abandoned items from area and from concealed spaces.
G. Refinish visible existing surfaces to remain in renovated rooms and spaces to specified condition for each material with a neat transition to adjacent finishes.
H. Where new work abuts or aligns with existing, perform a smooth and even transition. Patched work to match existing adjacent work in texture and appearance.
I. When finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line of division and make recommendation to the Construction Manager. Prior to cutting get the Owner's approval.
J. Where change of plane of ¼ inch or more occurs, submit recommendation for providing smooth transition to the Construction Manager for review.

3.03 CUTTING AND PATCHING

A. Employ skilled and experienced installer to perform cutting and patching.
B. Submit written request in advance of cutting or altering elements which affect:
   1. Structural integrity of element.
   2. Integrity of weather-exposed or moisture-resistant elements.
   3. Efficiency, maintenance, or safety of element.
   4. Visual qualities of sight exposed elements.
   5. Work of owner or separate contractor.
C. Execute cutting, fitting, and patching to complete work, and to:
   1. Fit the several parts together, to integrate with other work.
   2. Uncover work to install or correct ill-timed work.
   3. Remove and replace defective and non-conforming work.
   4. Remove samples of installed work for testing.
   5. Provide openings in elements of work for penetrations of mechanical and electrical work.
D. Execute work by methods to avoid damage to other work and which will provide proper surfaces to receive patching and finishing.
E. Cut rigid materials using masonry saw or core drill.
F. Cut masonry and concrete materials using masonry saw or core drill.
G. Restore work with new products in accordance with requirements of Contract Documents.
H. Fit work tight to pipes, sleeves, ducts, conduit and other penetrations through surfaces.
I. Maintain integrity of wall, ceiling or floor construction; completely seal voids.
J. Refinish surfaces to match adjacent finishes. Refinish to nearest intersection for continuous surfaces. Refinish entire unit for continuous surfaces for an assembly.
K. Identify hazardous substances or conditions exposed during the work to the engineer for decision or remedy.

3.04 CLEANING AND PROTECTION

A. Progress cleaning
   1. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
   2. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.
B. Protection of installed work
   1. Protect installed work from damage by construction operations.
   2. Provide special protection where specified in individual specification sections.
   3. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
   4. Remove protective coverings when no longer needed; reuse or recycle plastic coverings if possible.

5. Prohibit traffic from landscaped areas.

3.05 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

END OF SECTION

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SECTION 01 7700

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Inspections
B. Substantial Completion
C. Project Record Documents
D. Warranties
E. Operations and Maintenance Manuals
F. Operations and Maintenance Data for Materials and Finishes
G. Operations and Maintenance Data for Equipment and Systems
H. Training
I. Final Completion
J. Maintenance

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.01 INSPECTIONS

A. Ensure all state inspections have been completed by the authority having jurisdiction.
B. Upload documentation of all test/inspections to EADOC.
C. Submit a written request for inspection of Substantial Completion. On receipt of request, The Design Professional will either proceed with inspection or notify contractor of unfulfilled requirements. The Design Professional will prepare the Certificate of Substantial Completion after inspection or will notify contractor of items, either on contractor's list or additional items identified by architect that must be completed or corrected before certificate will be issued.
    1. Re-inspection: Request re inspection when the work identified in previous inspections as incomplete is completed or corrected.
    2. Results of completed inspection will form the basis of requirements for Final Completion.

3.02 SUBSTANTIAL COMPLETION

A. A substantial completion checklist is attached for reference following this specification section.
B. Make submittals that are required by governing or other authorities.
    1. Provide copies to the Construction Manager through upload to EADOC.
C. Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
    1. Submit written certification that contract documents have been reviewed, work has be inspected, and that work is completed in accordance with contract documents and ready for review
    2. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the work has not been completed.
    3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
    4. Make final changeover of permanent locks and deliver key to the owner. Advise owner's personnel of changeover in security provisions.
    5. Complete startup testing of systems.
    6. Submit test/adjust, balance records.

7. Terminate and remove temporary facilities from project site, along with mockups, construction tools, and similar elements.
8. Advise owner of changeover in heat and other utilities.
9. Submit changeover information related to owner's occupancy, use, operation, and maintenance.
10. Complete final cleaning requirements, including touch up painting.
11. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

3.03 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the work:
   1. Drawings
   2. Specifications
   3. Addenda
   4. Change orders and other modifications to the contract
   5. Reviewed shop drawings, product data, and samples
B. Ensure entries are complete and accurate, enabling future reference by Owner.
C. Store record documents separate from documents used for construction.
D. Record information concurrent with construction progress, not less than weekly.
E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Manufacturer’s name and product model and number.
   2. Product substitutions or alterations utilized.
   3. Changes made by Addenda and modifications.
F. Record Drawings:
   1. Measured depths of foundations in relation to finish first floor datum.
   2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the work.
   4. Field changes of dimension and detail.
   5. Details not on original contract drawings.
G. Record Drawings shall be uploaded to EADOC in pdf format.

3.04 WARRANTIES

A. Submit written warranties for designated portions of the work where commencement of warranties other than date of Substantial Completion is indicated.
B. Submit properly executed warranties in EADOC prior to Final Completion.
C. Verify that documents are in proper form, contain full information, and are notarized.
D. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
E. Include warranties in operation and maintenance manuals.
F. Items of work delayed beyond date of Substantial Completion, provide updated submittal after acceptance by Owner, listing date of acceptance as start of warranty period

3.05 OPERATIONS AND MAINTENANCE MANUALS

A. Format: Submit operations and maintenance manuals in the following format:
   1. Portable Document Format (PDF) electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Owner and upload to EADOC.

a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.

2. Assemble with data arranged in the same sequence as, and identified by the specification sections. Where systems involve more than one specification section, provide separate index for each system.
3. Include project directory listing title and address of project, names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.
4. Include Table of Contents listing every item separated by index and specification section.

B. Source Data: For each product or system, list names, addresses, and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
C. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
D. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use project record documents as maintenance drawings.
E. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.06 OPERATIONS AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. For each product, applied material, and finish:
1. Product data, with catalog number, size, composition, and color and texture designations.
2. Information for re-ordering custom manufactured products.

B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
C. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.
D. Additional information as specified in individual product specification sections.
E. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specified products.

3.07 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. For each item of equipment and each system:
1. Description of unit or system, and component parts
2. Identify function, normal operating characteristics, and limiting conditions
3. Include performance curves, with engineering data and tests
4. Complete nomenclature and model number of replacement parts.

B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specified products.
C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.
D. Include color coded wiring diagrams as installed.
E. Operating procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

F. Maintenance requirements: Include routine procedure and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
G. Provide servicing and lubrication schedule and list of lubricants required.
H. Include manufacturer's printed operation and maintenance instructions.
I. Include sequence of operation by controls manufacturer.
J. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
K. Provide control diagrams by controls manufacturer as installed.
L. Provide contractor's coordination drawings, with color coded piping diagrams as installed.
M. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
N. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
O. Include test and balancing reports.
P. Additional requirements: As specified in individual specification sections.

3.08 TRAINING

A. Demonstrate operations of systems, subsystems, and equipment.
B. Train in operation and maintenance of systems, subsystems, and equipment
C. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.
D. Submit written agenda to Construction Manager for approval prior to scheduling training.
E. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

3.09 FINAL COMPLETION

A. A final completion checklist is attached for reference following this specification section.
B. Before requesting final inspection for determining date of Final Completion, complete the following:
    1. Complete punch list items.
    2. Prepare and submit project record documents, operation and maintenance manuals, damage or settlement surveys, and similar final record information.
    3. Deliver tools, spare parts, extra materials, and similar items to location designated by owner. Label with manufacturer's name and model number where applicable.
    4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
    5. All trailers, construction signs, unused, broken or demolition materials have been removed from the site and the premises returned to the original condition in the opinion of the Owner and Design Professional.
    6. Submit a final Application for Payment (retainage).
C. Upon receipt of final payment complete final completion certificate in EADOC.

END OF SECTION

Substantial Completion Project Checklist

Date: _____

DAS Project Number: _____
Project Title: _____
Location: _____
Contractor: _____

In order to process the final (100% pay app/not retainage) payment on a Capital Project, the Department of Administrative Services and State Accounting Enterprise needs the following information. Please complete this form and obtain the necessary documents.

Have all state inspections been completed and documentation uploaded to EADOC?
(Including but not limited to the following inspections)

Boiler Inspection	❑ **Yes**	❑ **No**	❑ **N/A**
Water Heater Inspection	❑ **Yes**	❑ **No**	❑ **N/A**
Energy Code Inspection	❑ **Yes**	❑ **No**	❑ **N/A**
Building Code Inspection	❑ **Yes**	❑ **No**	❑ **N/A**
Electrical Inspection	❑ **Yes**	❑ **No**	❑ **N/A**
Elevator Inspection	❑ **Yes**	❑ **No**	❑ **N/A**
Test & Balance Reports	❑ **Yes**	❑ **No**	❑ **N/A**
Other: _____	❑ **Yes**	❑ **No**	❑ **N/A**

❑ **Occupancy Permit if applicable**

❑ **Certificate of Substantial Completion completed in EADOC (Consensus Docs 814)**

Are there any disputes with the above mentioned vendor which need resolution?
❑ **Yes (provide description below)** ❑ **No**

_____

_____

Can final (100% pay app/not retainage) payment be released? ❑ **Yes** ❑ **No**

Final Completion Project Checklist

Date: _____

DAS Project Number: _____
Project Title: _____
Location: _____
Contractor: _____

In order to process the Retainage payment on a Capital Project, the Department of Administrative Services and State Accounting Enterprise needs the following information. Please complete this form and obtain the necessary documents.

Notification Letter to all Subs and Suppliers of Application for Retainage uploaded into EADOC? ❑ Yes ❑ No

Have all Warranties been received? ❑ Yes ❑ No

Have you received the Operations and Maintenance Manuals? ❑ Yes ❑ No

Who is in possession of the O & M Manuals? _____

Has all training been completed? ❑ Yes ❑ No

Have all as-built drawings been scanned and uploaded into EADOC? ❑ Yes ❑ No

Have electronic drawing/specification files been transferred to DAS? ❑ Yes ❑ No

❑ AIA Form G706 – Contractor's Affidavit of Payment of Debts and Claims

❑ AIA Form G706A – Contractor's Affidavit of Release of Liens

❑ AIA Form G707 – Consent of Surety Company to Final Payment

❑ Certificate of Final Completion completed in EADOC (Consensus Docs 815)

Are there any disputes with the above mentioned vendor which need resolution?
❑ Yes (provide description below) ❑ No

_____

_____

Can retainage payment be released? ❑ Yes ❑ No

SECTION 26 0519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:
   1. Copper building wire rated 600 V or less.
   2. Connectors, splices, and terminations rated 600 V and less.

B. Related Requirements:
   1. Section 271513 "Communications Copper Horizontal Cabling" for twisted pair cabling used for data circuits.

1.03 DEFINITIONS

A. RoHS: Restriction of Hazardous Substances.

B. VFC: Variable-frequency controller.

PART 2 PRODUCTS

2.01 COPPER BUILDING WIRE

A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

B. Standards:
   1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
   2. RoHS compliant.
   3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

C. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with, ASTM B8, and with ASTMB496 for stranded conductors.

D. Conductor Insulation:
   1. Type THHN and Type THWN-2: Comply with UL 83.
   2. Type THW and Type THW-2: Comply with NEMA WC-70/ICEA S-95-658 and UL 83.

2.02 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

PART 3 EXECUTION

3.01 CONDUCTOR MATERIAL APPLICATIONS

A. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.02 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Exposed Branch Circuits, Including in Crawlspaces: Type THHN/THWN-2, single conductors in raceway.

B. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway.

C. Branch Circuits Installed below Raised Flooring: Type THHN/THWN-2, single conductors in raceway.

D. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

3.03 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

G. Complete cable tray systems installation according to Section 260536 "Cable Trays for Electrical Systems" prior to installing conductors and cables.

3.04 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
   1. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.

C. For #8 AWG and larger, utilize compression type connectors.
   1. For motor connections #8 AWG and larger, insulate connection with heat shrink tubing.

D. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches (150-mm) of slack.
   1. Wire ground with pigtail in each device to ensure uninterruptable circuit wiring.

E. Do NOT use split-bolt type connectors.

F. Do NOT use scotch lock type wire connectors.

3.05 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.06 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.07 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly .

END OF SECTION

SECTION 26 0526
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section includes grounding and bonding systems and equipment.

1.03 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with ul 467 for grounding and bonding materials and equipment.

PART 2 PRODUCTS

2.01 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

2.02 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:
   1. Solid Conductors: ASTM B 3.
   2. Stranded Conductors: ASTM B 8.
   3. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
   4. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inchs (41 mm) wide and 1/16 inchs (1.6 mm) thick.

2.03 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

PART 3 EXECUTION

3.01 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

3.02 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

3.03 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
   1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.

2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

C. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact are galvanically compatible.
1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
2. Make connections with clean, bare metal at points of contact.
3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
4. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

END OF SECTION

SECTION 26 0533

RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:
   1. Metal conduits, tubing, and fittings.
   2. Metal wireways and auxiliary gutters.
   3. Boxes, enclosures, and cabinets.

1.03 DEFINITIONS

A. GRC: Galvanized rigid steel conduit.

B. IMC: Intermediate metal conduit.

PART 2 PRODUCTS

2.01 METAL CONDUITS, TUBING, AND FITTINGS

A. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. GRC: Comply with ANSI C80.1 and UL 6.

C. IMC: Comply with ANSI C80.6 and UL 1242.

D. EMT: Comply with ANSI C80.3 and UL 797.

E. FMC: Comply with UL 1; zinc-coated steel.

F. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

G. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
   1. Fittings for EMT:
      a. Material: Steel or die cast.
      b. Type: Setscrew or compression.

H. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.02 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

A. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ENT: Comply with NEMA TC 13 and UL 1653.

C. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

D. LFNC: Comply with UL 1660.

E. Rigid HDPE: Comply with UL 651A.

F. Continuous HDPE: Comply with UL 651B.

G. Coilable HDPE: Preassembled with conductors or cables, and complying with ASTM D 3485.

H. RTRC: Comply with UL 1684A and NEMA TC 14.

I. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.

J. Fittings for LFNC: Comply with UL 514B.

K. Solvents and Adhesives: As recommended by conduit manufacturer.

2.03 METAL WIREWAYS AND AUXILIARY GUTTERS

A. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 unless otherwise indicated, and sized according to NFPA 70.
   1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

C. Wireway Covers: Screw-cover type unless otherwise indicated.

D. Finish: Manufacturer's standard enamel finish.

2.04 BOXES, ENCLOSURES, AND CABINETS

A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

D. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

E. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.

F. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

G. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.

H. Gangable boxes are allowed.

I. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.
   1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
   2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

J. Cabinets:
   1. NEMA 250, Type 1 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
   2. Hinged door in front cover with flush latch and concealed hinge.
   3. Key latch to match panelboards.
   4. Metal barriers to separate wiring of different systems and voltage.
   5. Accessory feet where required for freestanding equipment.

PART 3 EXECUTION

3.01 RACEWAY APPLICATION

A. Indoors: Apply raceway products as specified below unless otherwise indicated:
   1. Exposed, Not Subject to Physical Damage: EMT.
   2. Exposed, Not Subject to Severe Physical Damage: EMT.
   3. Concealed in Ceilings and Interior Walls and Partitions: EMT.
   4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
   5. Damp or Wet Locations: GRC, IMC.
   6. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.

B. Minimum Raceway Size: 3/4-inch trade size.

C. Raceway Fittings: Compatible with raceways and suitable for use and location.
   1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
   2. EMT: Use setscrew or compression, steel fittings. Comply with NEMA FB 2.10.
   3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

D. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

3.02 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Complete raceway installation before starting conductor installation.

D. Comply with requirements in Section 26 05 29 "Hangers and Supports for Electrical Systems" for hangers and supports.

E. Arrange stub-ups so curved portions of bends are not visible above finished slab.

F. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.

G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

H. Support conduit within 12 inchesof enclosures to which attached.

I. Stub-ups to Above Recessed Ceilings:
   1. Use EMT, IMC, or RMC for raceways.
   2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

J. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

K. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

L. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

M. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

N. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

O. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

P. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

Q. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.

R. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
   1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
   2. Where an underground service raceway enters a building or structure.
   3. Where otherwise required by NFPA 70.

S. Comply with manufacturer's written instructions for solvent welding RNC and fittings.

T. Expansion-Joint Fittings:
   1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet. Install in each run of aboveground RMC and EMT conduit that is located where environmental temperature change may exceed 100 deg F and that has straight-run length that exceeds 100 feet.
   2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
      a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
      b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
      c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
   3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
   4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
   5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

U. Flexible Conduit Connections:
   1. Use flexible conduit (AC cable) only for fixture whips and final equipment connections.
   2. Use a maximum of 72 inches of flexible conduit for recessed and semirecessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
   3. Use LFMC in damp or wet locations subject to severe physical damage.
   4. Comply with NEMA RV 3.

V. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

W. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

X. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

Y. Locate boxes so that cover or plate will not span different building finishes.

Z. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

AA. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

AB. Set metal floor boxes level and flush with finished floor surface.

3.03 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies.

END OF SECTION

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SECTION 26 0544

SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:
   1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
   2. Sleeve-seal systems.
   3. Sleeve-seal fittings.
   4. Grout.
   5. Silicone sealants.

B. Related Requirements:
   1. Section 078413 "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

PART 2 PRODUCTS

2.01 SLEEVES

A. Wall Sleeves:
   1. Steel Pipe Sleeves: ASTM A53/A53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
   2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

C. PVC-Pipe Sleeves: ASTM D1785, Schedule 40.

D. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.

E. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

F. Sleeves for Rectangular Openings:
   1. Material: Galvanized sheet steel.
   2. Minimum Metal Thickness:
      a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and with no side larger than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
      b. For sleeve cross-section rectangle perimeter 50 inches (1270 mm) or more and one or more sides larger than 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

2.02 SLEEVE-SEAL SYSTEMS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
   1. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
   2. Pressure Plates: Carbon steel.
   3. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, of length required to secure pressure plates to sealing elements.

2.03 SLEEVE-SEAL FITTINGS

A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.

2.04 GROUT

A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.

B. Standard: ASTM C1107/C1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

2.05 SILICONE SEALANTS

A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.
   1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.

B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 EXECUTION

3.01 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

A. Comply with NECA 1.

B. Comply with NEMA VE 2 for cable tray and cable penetrations.

C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:
   1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
      a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 079200 "Joint Sealants."
      b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.
   2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
   3. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed.
   4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
   5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches above finished floor level. Install sleeves during erection of floors.

D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:
   1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
   2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.

E. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

G. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

3.02 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.

B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.03 SLEEVE-SEAL-FITTING INSTALLATION

A. Install sleeve-seal fittings in new walls and slabs as they are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms.

D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION

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SECTION 26 0553

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:
   1. Identification for raceways.
   2. Identification of power and control cables.
   3. Identification for conductors.
   4. Warning labels and signs.
   5. Instruction signs.
   6. Equipment identification labels, including arc-flash warning labels.
   7. Miscellaneous identification products.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Comply with ASME A13.1.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Comply with ANSI Z535.4 for safety signs and labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

2.02 COLOR AND LEGEND REQUIREMENTS

A. Raceways and Cables Carrying Circuits at 600 V or Less:
   1. Black letters on an orange field.
   2. Legend: Indicate voltage.

B. Color-Coding for Phase- and Voltage-Level Identification, 600 V or Less: Use colors listed below for ungrounded feeder and branch-circuit conductors.
   1. Color shall be factory applied or field applied for sizes larger than No. 8 AWG if authorities having jurisdiction permit.
   2. Colors for 208/120-V Circuits:
      a. Phase A: Black.
      b. Phase B: Red.
      c. Phase C: Blue.
   3. Colors for 480/277-V Circuits:
      a. Phase A: Brown.
      b. Phase B: Orange.
      c. Phase C: Yellow.
   4. Color for Neutral: White or gray.
   5. Color for Equipment Grounds: Green.

2.03 LABELS

A. Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.

B. Snap-Around Labels for Raceways and Cables Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameters of raceways they identify, and that stay in place by gripping action.

C. Self-Adhesive Labels:
   1. Preprinted, 3-mil-thick, polyester flexible label with acrylic pressure-sensitive adhesive.
   2. Polyester, thermal, transfer-printed, 3-mil-thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.
      a. Nominal Size: 3.5-by-5-inch.
   3. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
   4. Marker for Tags: Machine-printed, permanent, waterproof, black ink recommended by printer manufacturer.

2.04 TAPES AND STENCILS:

A. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

B. Underground-Line Warning Tape
   1. Tape:
      a. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
      b. Printing on tape shall be permanent and shall not be damaged by burial operations.
      c. Tape material and ink shall be chemically inert and not subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.
   2. Color and Printing:
      a. Comply with ANSI Z535.1, ANSI Z535.2, ANSI Z535.3, ANSI Z535.4, and ANSI Z535.5.
      b. Inscriptions for Red-Colored Tapes: "ELECTRIC LINE, HIGH VOLTAGE".
      c. Inscriptions for Orange-Colored Tapes: "TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE".

2.05 SIGNS

A. Baked-Enamel Signs:
   1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
   2. 1/4-inch grommets in corners for mounting.
   3. Nominal Size: 7 by 10 inches.

B. Laminated Acrylic or Melamine Plastic Signs:
   1. Engraved legend.
   2. Thickness:
      a. For signs up to 20 sq. inches, minimum 1/16-inch-.
      b. For signs larger than 20 sq. inches, 1/8 inch thick.
      c. Engraved legend with black letters on white face.

2.06 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 EXECUTION

3.01 PREPARATION

A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.02 INSTALLATION

A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.

B. Install identifying devices before installing acoustical ceilings and similar concealment.

C. Verify identity of each item before installing identification products.

D. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.

E. Apply identification devices to surfaces that require finish after completing finish work.

F. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

G. Attach plastic raceway and cable labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to the location and substrate.

H. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.

I. During backfilling of trenches, install continuous underground-line warning tape directly above cable or raceway at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.

3.03 IDENTIFICATION SCHEDULE

A. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.

B. Install instructional sign, including the color code for grounded and ungrounded conductors using adhesive-film-type labels.

C. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use write-on tags with the conductor or cable designation, origin, and destination.

D. Conductors To Be Extended in the Future: Attach write-on tags to conductors and list source.

E. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical-fiber cable.
   1. Limit use of underground-line warning tape to direct-buried cables.
   2. Install underground-line warning tape for direct-buried cables and cables in raceways.

F. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall comply with NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

G. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.
   1. Comply with 29 CFR 1910.145.
   2. Identify system voltage with black letters on an orange background.
   3. Apply to exterior of door, cover, or other access.

4. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:
    a. Power-transfer switches.
    b. Controls with external control power connections.

H. Arc Flash Warning Labeling: Self-adhesive thermal transfer vinyl labels.
1. Comply with NFPA 70E and ANSI Z535.4.
2. Comply with Section 26 05 74 "Overcurrent Protective Device Arc-Flash Study" requirements for arc-flash warning labels.

I. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

J. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm unless equipment is provided with its own identification.
1. Labeling Instructions:
    a. Indoor Equipment: Self-adhesive label. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high label; where two lines of text are required, use labels 2 inches high.
    b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
    c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
    d. Unless labels are provided with self-adhesive means of attachment, fasten them with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.
2. Equipment To Be Labeled:
    a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be in the form of a self-adhesive, engraved, laminated acrylic or melamine label.
    b. Enclosures and electrical cabinets.
    c. Access doors and panels for concealed electrical items.
    d. Switchboards.
    e. Transformers: Label that includes tag designation shown on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
    f. Substations.
    g. Emergency system boxes and enclosures.
    h. Motor-control centers.
    i. Enclosed switches.
    j. Enclosed circuit breakers.
    k. Enclosed controllers.
    l. Variable-speed controllers.
    m. Push-button stations.
    n. Power-transfer equipment.
    o. Contactors.
    p. Remote-controlled switches, dimmer modules, and control devices.

END OF SECTION

SECTION 27 0000

GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Division 27 Specifications are provided to define the standards and criteria to be used to bid, plan, furnish, install, test, and document communication systems for Newton Correctional Facility. These specifications shall form the basis for implementation of the procurement, installation, inspection, and close-out process.

B. Division 27 has been designed and developed based on NFPA 70 (NEC), National Electrical Safety Code (NESC), Institute of Electronic and Electrical Engineers (IEEE), and a combination of ANSI/TIA Telecommunication Standards, and BICSI methodologies. The requirements within those documents are not superseded herein unless specifically stated. NEC and NESC code requirements are unable to be superseded by this document at any time. ANSI/TIA standards and BICSI methodologies are guidelines and recommendations for best practices and may be superseded, as specified, or may be made more stringent by this document.

C. Any use of the word “shall” marks a mandatory requirement. Use of the word “may” or “should” suggests optional elements. All conflicts within this document shall be resolved by the Construction Manager in consultation with the Design Team. The standards of Owner's shall take precedence in the resolution of any dispute.

D. Unauthorized changes and/or deviations from these specifications, regardless of scale, may result in re-design, reconstruction, or re-installation of communications elements at the contractor’s expense. Contractors shall obtain formal written approval prior to bidding and prior to installation in order to deviate from these specifications or from ANSI/TIA standards and BICSI methodologies. Contractors shall not deviate from NEC and NESC requirements.

E. Division 27 Specifications address information transport pathways, multiple different types of communication systems, spaces, media, grounding, identification, testing, and documentation requirements in support of multiple information transport infrastructures.

F. Specific responsibilities of Division 27 include, but are not limited to:
   1. Installation of the intra-building pathways, cabling, and coordinating space requirements necessary to house the communication systems and associated electronic information transport equipment. Pathways and spaces shall be provided to support the known systems and cabling requirements, as well as provisions for those that may be required in the future for growth purposes.
   2. The procurement and installation of each communications system and the associated components and cabling to create a fully functional system.
   3. Thorough testing shall be conducted of each individual communications system to illustrate compliance with specific performance requirements.
   4. Definition and establishment of administration and labeling schemes, conforming to Owner’s requirements.
   5. Securing all necessary permits and licenses, payment of all fees, and provision of all construction work notifications.
   6. Compliance with all applicable laws, ordinances, rules, and regulations.
   7. Mandatory project manager attendance at a weekly project status meeting with the Construction Manager.
   8. It is the intent of the project drawings and specifications to provide complete and fully functional Division 27 communication systems, ready for use. Any item, not specifically shown in the project drawings or called for in the project specifications but normally required for a complete system, is to be considered a part of this contract.

G. System Continuity:

1. Reconnect all existing items that remain in use. Provide all materials and labor required to retain continuity of existing circuits or systems that are disrupted by these alterations even though not indicated on the drawings.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 & 01 Specification Sections, apply to this Section.

B. The following documents shall also be considered as a part of and shall relate directly to this section:
   1. Section 27 0505 - SELECTIVE DEMOLITION OF COMMUNICATIONS SYSTEMS
   2. Section 27 0526 - GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS
   3. Section 27 0533 - CONDUIT AND BACKBOXES FOR COMMUNICATIONS SYSTEMS
   4. Section 27 0544 - SLEEVES AND SLEEVE SEALS FOR COMMUNICATIONS PATHWAYS AND CABLING
   5. Section 27 0553 - IDENTIFICATION FOR COMMUNICATIONS SYSTEMS
   6. Section 27 1116 - COMMUNICATIONS RACKS, FRAMES, AND ENCLOSURES
   7. Section 27 1323 - COMMUNICATIONS OPTICAL FIBER BACKBONE CABLING
   8. Section 27 1513 - COMMUNICATIONS COPPER HORIZONTAL CABLING
   9. Section 27 2100 - DATA COMMUNICATIONS GENERAL REQUIREMENTS
   10. Section 27 2130 - DATA COMMUNICATIONS SWITCHES AND HUBS

1.03 ABBREVIATIONS AND ACRONYMS

A. The following definitions are applicable to the work as indicated and as shown herein:
   1. ACR: Attenuation-to-Crosstalk Ration
   2. ADA: Americans with Disabilities Act
   3. AFF: Above Finished Floor
   4. ANSI: American National Standards Institute
   5. APC: Angle Physical Connector
   6. ARC: Aluminum Rigid Conduit
   7. ASTM: American Society for Testing & Materials (ASTM International)
   8. AWG: American Wire Gauge
   9. BCT: Bonding Conductor for Telecommunications
   10. BICSI: Building Industry Consulting Service International, Inc.
   11. BTU: British Thermal Unit
   12. dB: Decibel
   13. dBmV: Decibel MilliVolt
   14. EF: Entrance Facility
   15. EIA: Electronic Industries Association
   16. ELFEXT: Equal Level Far-End Crosstalk
   17. EMC: Electromagnetic Compatibility
   18. EMI: Electromagnetic Interference
   19. EMT: Electrical Metallic Tubing
   20. ER: Equipment Room
   21. FCC: Federal Communications Commission
   22. FD: Floor Distributor
   23. FEXT: Far-End Crosstalk
   24. F/FTP: Overall foil screened cable with foil screened twisted pair.
   25. F/UTP: Overall foil screened cable with unshielded twisted pair.
   26. FTP: Shielded twisted pair.
   27. FOTP: Fiber Optic Test Procedure
   28. Freq: Frequency
   29. GE: Grounding Equalizer (replacing TBBIBC)
   30. GRC: Galvanized Rigid Conduit

31. HC: Horizontal Cross-Connect
32. HVAC: Heating, Ventilation, and Air Conditioning
33. Hz: Hertz
34. IC: Intermediate Cross-Connect
35. IDC: Insulation Displacement Connector
36. IDF: Intermediate Distribution Frame
37. IMC: Intermediate Metal Conduit
38. IEEE: Institute of Electrical and Electronics Engineers
39. ISO: International Organization for Standardization
40. LAN: Local Area Network
41. LC: Lucent Connector
42. LCD: Liquid Crystal Display
43. Mbps: Megabits per second
44. MC: Main Cross-Connect
45. MDF: Main Distribution Frame
46. MHz: Megahertz
47. MM: Multimode
48. NEC: National Electrical Code, NFPA 70
49. NESC: National Electric Safety Code
50. NFPA: National Fire Protection Association
51. NRTL: Nationally Recognized Testing Laboratory
52. OSHA: Occupational Safety and Health Administration
53. OSP: Outside cable Plant
54. OTDR: Optical Time Domain Reflectometer
55. OLTS: Optical Loss Test Set
56. PR: Pair
57. RCDD: Registered Communications Distribution Designer
58. xRFI: Radio Frequency Interference
59. RH: Relative Humidity
60. S/FTP: Overall braid screened cable with foil screened twisted pair
61. S/UTP: Overall braid screened cable with unshielded twisted pair
62. SC: Subscriber Connector
63. SE: Service Entrance
64. SFP: Small Form-Factor Pluggable Transceiver
65. SM: Single Mode
66. TBB: Telecommunication Bonding Backbone
67. TBBIBC: Telecommunications Bonding Backbone Interconnecting Bonding Conductor
68. TGB: Telecommunications Grounding Bus Bar
69. TIA: Telecommunications Industry Association
70. TMGB: Telecommunications Main Grounding Bus Bar
71. TO: Telecommunications Outlet
72. TR: Telecommunications Room
73. TV: Television
74. UL: Underwriters Laboratory
75. UPS: Uninterruptible Power Supply
76. WAO: Work Area Outlet
77. WAP: Wireless Access Point
78. UTP: Unshielded Twisted Pair

1.04 DEFINITIONS

A. The following definitions are applicable to the work as indicated and as shown herein:
   1. APC: Angle Physical Connector - An optical fiber connector that is polished at an angle of 8 to 10 degrees to reduce the back reflection of the signal.

2. Attenuation: The decrease in power of a signal, light beam, or lightwave, either absolutely or as a fraction of a reference value. Attenuation is the opposite of gain and is measured in decibels (dB).
3. Backbone System: The cabling and connecting hardware that provides interconnection between Telecommunications Rooms, Equipment Room, and Entrance Facilities.
4. BCT: Bonding Conductor for Telecommunications - A conductor that interconnects the building's service equipment (power ground) to the telecommunications grounding system.
5. Conduit Chase Pipe: Short section of bushed EMT conduit with sufficient size and capacity to support horizontal cabling bundles from ceiling space, through ceiling tile, onto the ladder tray system connecting wall to rack or cabinet.
6. Cross Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.
7. Design Team: A group of individuals comprised of Architect(s) and Engineer(s) involved in assembling the contract documents known as the drawings and specifications.
8. Duct Bank: Two or more ducts in parallel, with or without additional casing materials.
9. EF: Entrance facility - A location within a building for both public and private network service cables. A facility that provides all necessary mechanical and electrical services for the entry of telecommunications cables into a building and that complies with all relevant regulations. Also referred to as SE: Service Entrance.
10. ER: Equipment Room - A centralized space designed for telecommunications equipment that serves the occupants of a building. Equipment therein is considered distinct from a IDF (Telecommunications Room) because of its nature or complexity. Also frequently referred to as MCR or MDF.
11. Fusion Splicing: An optical fiber splicing method that consists of two clean (stripped of coating) cleaved fibers then joining them and fusing the ends together with an electric arc.
12. GE: Grounding Equalizer - A conductor that interconnects elements of the telecommunications grounding infrastructure (formerly Telecommunications Bonding Backbone Interconnecting Bonding Conductor).
13. Horizontal System: The cabling between, and including, the TO (Telecommunications Outlet) connector and the HC (Horizontal Cross-connect) in the Telecommunications Room.
14. HC: Horizontal Cross-Connect - A group of connectors, such as patch panel or punchdown block, that allows equipment and backbone cabling to be cross-connected with patch cords or jumpers. Floor Distributor (FD) is the international term for HC. Also frequently referred to as IDF.
15. Jack: Also commonly called an "outlet", it is the fixed, female connector.
16. J-Hook: A supporting device for horizontal cables that is shaped like a "J". It is attached to some building structures. Horizontal cables are laid in the opening formed by the "J" to provide support for cables.
17. LC: Lucent Connector - A small form factor (SFF) single fiber, optical fiber connector used for the termination of both multimode and single mode optical fiber cables. The housing mechanism of the LC connector (simplex and duplex) is a push-pull type connection.
18. Minor Pathway Support Hardware: Anchors, support brackets, clamps, clips, cable ties, D-rings, rack screws, velcro straps and etc. used to dress and secure cabling, conduits and surface raceways.
19. Multimode Optical Fiber: Optical fiber with a core diameter of 50 or 62.5 micron (micrometer) and a cladding diameter of 125 micron; lightwave propagation allows many modes within multimode fiber. Also abbreviated as MM or FOMM.
20. OTDR: Optical Time Domain Reflectometer - An instrument that measures transmission characteristics by sending a series of short light pulses down an optical fiber element/strand and provides a graphic representation of the backscattered light.
21. OLTS: Optical Loss Test Set - A tool, consisting of a stabilized light source and optical power meter, that directly measures loss by computing the difference between the optical power entering a fiber element/strand and the optical power exiting it.

22. Plug: Also commonly called a “connector”, it is the removable, male telecommunications connector.
23. RF: Radio Frequency - The area (or band) of the electromagnetic spectrum where most radio communication takes place, typically from 100 KHz to 100 GHz. A frequency at which coherent electromagnetic radiation of energy is useful for communication purposes. Analog electrical signals sent on cable or over the air. Conventional (broadcast) television and radio, as well as cable TV, deliver RF signals to your television/radio.
24. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
25. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner.
26. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.
27. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.
28. SC: Subscriber Connector - An “full-size” optical fiber connector used for the termination of both multimode and single mode optical fiber cables (both simplex and duplex), having a square front profile with push-pull latching mechanism.
29. Screen: A metallic layer, either a foil or braid, placed around a pair or group of conductors.
30. SE: Service Entrance - An entrance to a building for both public and private network service cables. A facility that provides all necessary mechanical and electrical services for the entry of telecommunications cables into a building and that complies with all relevant regulations. Also referred to as EF: Entrance Facility.
31. Shield: A metallic layer, either a foil or braid, placed around a group of conductors.
32. Single Mode Optical Fiber: Optical fiber with a relatively small core diameter of 8-9 micron (micrometer) and a cladding diameter of 125 micron; lightwave propagation is restricted to a single path, or mode, in single mode optical fiber. Also abbreviated as SM or FOSM.
33. Splice: A joining of conductors meant to be permanent. A device that joins conducting or transmitting media. Also referred to as straight splice.
34. Splice Case: A metal or plastic housing with a semi-cylindrical cavity used to clamp around a cable splice, providing a closure.
35. TBB: Telecommunications Bonding Backbone - A copper conductor used to connect the Telecommunications Main Grounding Busbar (TMGB) to the Telecommunications Grounding Busbar (TGB).
36. TE: Telecommunications Enclosure - A case or housing for telecommunications cable terminations and cross-connect cabling.
37. TGB: Telecommunications Grounding Bus Bar - A common point of connection for telecommunications system and equipment bonding to ground, and located in the telecommunications room or equipment room.
38. TMGB: Telecommunications Main Grounding Bus Bar - A bus bar placed in a convenient and accessible location and bonded, by means of the bonding conductor for telecommunications, to the building service equipment (power) ground.
39. TO: Telecommunications Outlet - A device placed at the user workstation for termination of horizontal media and for connectivity of network equipment. Also referred to as WAO (Work Area Outlet).
40. Transition Splice: A planned splice point, at the building entrance, used to transition from non-rated outdoor to indoor-rated cable designs.
41. Trafficways: Locations where vehicular or pedestrian traffic is a normal course of events.
42. WAO: Work Area Outlet - A device placed at the user workstation for termination of horizontal media and for connectivity of network equipment. Also referred to as TO (Telecommunications Outlet).

1.05 CODE REFERENCES AND STANDARDS

A. All work shall be in compliance with the following codes and agencies. Nothing contained within these specifications shall be misconstrued to permit work not in conformance with the most stringent of applicable codes and standards. It is assumed that bidders have access to, and specific knowledge of, the listed reference materials in order to ensure conformity with them.
   1. National Electrical Code (NEC)
   2. National Electrical Safety Code (NESC)
   3. National Fire Protection Association (NFPA)
   4. International Building Code (IBC)
   5. Iowa Administrative Code
   6. Federal, State, and Local Codes.
   7. National Electronic Manufacturer's Association (NEMA)
   8. Institute of Electronic and Electrical Engineers (IEEE)
   9. American National Standards Institute/ Industries Association Telecommunication/ Electronic Industries Association (ANSI/TIA/EIA)
   10. Occupational Safety & Health Administration (OSHA)
   11. Federal Communications Commission (FCC)

B. All new materials, equipment, and installation practices shall meet the requirements of the following standards, unless specifically instructed otherwise by the Design Team.
   1. TIA-455-C Requirements for Standard Test Procedures for Optical Fibers (August 2014)
   2. TIA-526-7 - Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant (July 2015)
   3. TIA-526-14-C - Optical Power Loss Measurement of Installed Multimode Fiber Cable Plant (April 2015)
   4. TIA-568.0-D - Generic Telecommunications Cabling for Customer Premises (September 2015)
   5. TIA-568.1-D - Commercial Building Telecommunications Infrastructure Standard (September 2015)
   6. TIA-568.3-D - Optical Fiber Cabling and Components Standard (October 2016)
   7. TIA-568-C.2 - Balanced Twisted-Pair Telecommunications Cabling and Components Standards (August 2009)
   8. TIA-569-D - Telecommunications Pathways and Spaces (April 2015)
   9. TIA-598-A, Optical Fiber Cable Color Coding
   10. TIA-606-B - Administration Standard for Telecommunications Infrastructure (December 2015)
   11. TIA-607-C - Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises (November 2015)
   12. TIA-758-B - Customer-Owned Outside Plant Telecommunications Infrastructure Standard (March 2012)
   13. TIA-942-A - Telecommunications Infrastructure Standard for Data Centers (March 2014)
   14. NFPA 70 - National Electric Code (NEC)
   15. BICSI - Telecommunications Distribution Methods Manual 13th, or most recent, edition.
   16. BICSI - Information Transport Systems Installation Manual 7th, or most recent, edition
   17. Federal, State, and local codes, rules, regulations, and ordinances.
      a. Perform all work in accordance with local jurisdiction requirements that is governing the work and as fully part of the specifications attached.

1.06 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate the installation of the telephone and internet service provider pathway and entrance with the Electrical Contractor and the Owner's selected carrier.

B. Sequencing: Ensure that any wide area network connectivity cutover necessary is achieved in a coordinated and orderly manner.

C. All Division 27 Contractor Project Managers shall schedule and conduct a coordination meeting with Owner's Information Technology Department to confirm and coordinate scope of work requirements prior to commencement of work. Project meetings shall be scheduled through the Construction Manager.

1.07 SUBMITTALS

A. Refer to Division 1 for exact submittal procedures.

B. The Division 27 Contractor shall provide for review, without exception prior to material acquisition and installation, the following items. Failure to submit required items shall disqualify the bidder.
   1. Product Data Sheets (Catalog Cuts)
   2. Backbone Diagram
   3. Riser Diagram
   4. Cabling Diagram
   5. System Schematics
   6. Signal Flow Diagram
   7. Dimensioned plans, sections and elevations and fabrication details.
   8. Specification Sheets for Test Equipment
   9. Bill of Materials
   10. Contracting Firm Qualifications and Certifications
   11. Installation Team Qualifications by Individual
   12. Current Manufacturer Certifications

C. Provide throughout installation:
   1. Material samples, if requested by the design team.
   2. Periodic field quality control reports.
   3. Periodic system test reports.
   4. Periodic cable test reports.

D. Provide prior to completion:
   1. Actual samples of labeling to be applied to cabling components, to be approved by the Design Team and Construction Manager.
   2. Cable data base listing patch panel station cable assignments. Database shall be provided on compact disc or other electronic media format when requested by the Construction Manager, Owner's or the Design Team. Database shall be submitted to the requesting party within seven (7) calendar days.
   3. Cable administration drawings, as requested to assist in the planning process. Drawings will be requested prior to final documentation.

1.08 CLOSEOUT SUBMITTALS

A. Provide at completion of each construction phase area:
   1. Cable test and certification reports; summary hard copy or full test results on compact disc when requested by the owner or design team. Reports shall be submitted to the requesting party within seven (7) calendar days.
   2. One (1) set of record drawings of the actual installation of the Division 27 systems. Drawings shall be given as full size originals and on disk in AutoCAD format

B. Provide at final completion Closeout Submittals. This shall consist of three (3) bound sets of O&M (Operating and Maintenance) Manuals formatted as defined by Division 1 and one (1) electronic copy provided on a CD/DVD disc. Each copy of the O&M Manual shall include, at minimum, items listed as follows:
   1. Cable test and certification reports; summary hard copy and full test results on disc. Test results shall be delivered at the completion of each project phase and at any time when called for by the Owner.
   2. Provide one (1) full-size hard copy set of record drawings (as-builts) to be submitted to the Design Team for approval, immediately upon completion of the installation.

3. Instruction manuals including equipment and schedules, operating instructions, and manufacturer's instructions.
4. Manufacturer Warranty Certificate.
    a. Warranty contacts including but not limited to: names, telephone numbers (office and mobile).

1.09 QUALITY ASSURANCE

A. Contracting firm shall constitute a company with a minimum of five (5) years successful installation experience with projects utilizing infrastructure and systems work similar to that required for this project.

B. Service Qualifications: Installing and servicing contractor shall have a permanent office within a 120 mile radius of the project site.

C. Cabling Contractor shall have at least one (1) Registered Communications Distribution Designer and installers with Installer-level BICSI Certifications on staff responsible for this project. Provide copies of these certificates in the submittal process.

D. Work crew, not involved in installing cable elements (e.g. laborers delivering/moving materials, installing grounding by an electrician, or workers installing pathway elements) do not require BICSI or manufacturer certification or registration.

E. Contractor shall provide a Manufacturer Certification for the system solution bid, issued directly in the bidder’s company name, valid for the time frame in which the installation will be completed. Contractor shall be manufacturer certified in order to participate in the bid event.

F. The contractor shall be knowledgeable in local, state, regional, and national codes and regulations. All work shall comply with the latest revision of codes or regulations. When conflict exists between local or national codes or regulations, the most stringent codes or regulations shall apply.

G. Only installers trained and certified by the proposed manufacturer shall be allowed to install products. Installers must possess the highest level of certification available by the manufacturer for the specific solution being installed.

H. Only installers trained and certified by the proposed manufacturer shall be allowed to install firestop products.

I. Only installers trained and certified by the proposed manufacturer shall be allowed to terminate and test optical fiber. Others specified above may pull/ place optical fiber cable under the supervision of an installer trained and certified by the manufacturer.

J. Before bidding, the contractor shall study and compare all contract documents and promptly notify the Design Team of any discrepancies or deficiencies discovered by or made known to the contractor.

K. Discrepancies: Whenever a discrepancy or inconsistency exists between related information indicated on the contract drawings and/or specifications, this contractor shall obtain additional clarification and direction from the Design Team before proceeding. For bidding purposes, this contractor shall include the labor and materials necessary to comply with the solution that results in the greatest cost to the contract.
    1. If there is a conflict between applicable documents, then the more stringent requirement shall apply.
    2. The failure to question any controversial item will constitute acceptance by the bidder who shall execute it to the satisfaction of the owner after being awarded the contract.

L. Deficiencies: The contractor and associated subcontractors shall resolve all known deficiencies and omissions, including non-compliance with applicable codes, with the Design Team prior to ordering materials or proceeding with the work. Any work performed prior to receipt of instructions from the Design Team will be done so at the contractor’s risk.
    1. If mention has been omitted pertaining to details, items or related accessories required for the completion of any system, it is understood such item and accessories are included in

the contract. After the contract is awarded, claims based on insufficient data or incorrectly assumed conditions, or claims based on misunderstanding the nature of the work, will not be recognized.

2. All devices, symbols and work illustrated shall be new work provided under this contract except work labeled existing to remain and equipment labeled to be furnished (or supplied) by others, but installed by this contractor.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Equipment, materials, and supplies shall be shipped, handled and stored in ways that shall prevent damage to the items.

B. All items shall be handled and stored as recommended by the manufacturer.

C. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under manufacturer's specified conditions, and free from damage or deterioration.

D. Equipment, materials, and supplies to be incorporated in the area of work shall be new unless otherwise specified.

E. Equipment, materials, and supplies shall be produced in a good workmanlike manner.

F. When the quality of a material, process, or article is not specifically set forth in the Drawings or Specifications, the best available quality of the material, process, or article shall be provided.

1.11 FIELD CONDITIONS

A. Conditions and Measurements: Visit the jobsite to verify installation conditions and confirm measurements for all required systems and associated cabling connectivity.

1.12 WARRANTY

A. The Contractor shall submit, in the bid documents, any additional contractor-specific warranties or guarantees to be offered on the project.

B. The Contractor shall supply any and all necessary documentation needed to process and record the warranty(s) and to verify the installation solution.

C. Data Cabling System Warranty

1. All cabling systems shall include a minimum ten (10) year application assurance warranty as a manufacturer registered system installation. During the warranty period, and for non-conformities of which contractor has notice, contractor shall take all necessary and appropriate action; free of charge, to correct any non-conformity with the warranties contained in the manufacturer agreement. During the warranty period, contractor shall provide to the Owner, free of costs and charges, all support necessary to ensure that the cabling system meets the requirements specified in this document and performance guarantees provided by the contractors. During the warranty period, contractors shall furnish, or cause to be furnished, all maintenance, service, parts and replacements necessary to maintain the cabling system in good working condition, at no cost to the Owner.
2. The contractor shall supply a full manufacturer’s application assurance warranty for all new installations, to include approved termination hardware and cabling media from the proposed manufacturer’s list of approved materials. Services to be provided by this contractor to the Owner during the warranty period shall include, without limitation, the following:
    a. Remedial Maintenance
        1) Contractor shall provide service on the Owner's site as necessary including, but not limited to, fault isolation, diagnosis, and repair.
    b. Maintenance Records
        1) Contractor shall maintain, at the jobsite, a current record of the cabling system configuration.
    c. Replacement Parts

1) Contractor shall provide and install replacement parts, including new components.

D. All Other Communications Systems Warranty
1. Unless listed elsewhere within these specifications, a warranty shall be provided for a minimum of one (1) year for all other communications systems listed. One year shall begin from the date of Substantial Completion. This warranty shall cover both product and service to address remedial maintenance and replacement parts as is appropriate to keep each system complete and fully functional.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. If a Bidder proposes to Substitute an article, device, material, equipment, form of construction, fixture, or item other than the approved manufacturers and part numbers, listed and named in the Specifications, the Bidder shall certify that the proposed item is equal in quality and all aspects of performance and appearance, to the items specified. The Bidder shall submit a request for Substitution to the Design Team by following the instruction in Specification Section 01 2500, which must include:
1. The name and complete description of the proposed Substitution including Drawings, performance and test data, and other information necessary for a complete evaluation; and
2. A statement setting forth any changes that the Proposed Substitution will require in the Contract Documents or the project.

B. If the Design Team approves the Proposed Substitution, the Design Team shall issue an Addendum. If the Design Team does not approve the substitution, the Design Team shall inform the Bidder of its decision, which is final. The Design Team may reject a proposed Substitution because the Bidder failed to provide sufficient information to enable the Design Team to completely evaluate the Proposed Substitution without causing a delay in the scheduled bid opening.
1. Proposed Substitutions received by the Design Team after the allotted time allowed by Section 01 2500 shall not be considered.

C. Bidder shall confirm all reference part numbers, listed within Division 27, as current and suitable for the items described and specified and shall file a formal RFI for all perceived discrepancies prior to bidding.
1. All materials associated with reference parts shall be included so as to constitute a complete and functional system, whether or not specifically identified and itemized.

2.02 ASSEMBLIES

A. Sleeves and Pathways for Cabling:
1. Where additional conduits are needed beyond those shown on the drawings to accommodate the installation of systems cabling, this contractor (Division 27) shall include such provisions in this contract. Provide conduit suitable for its application and sized in accordance with industry standards. Include nylon bushings at conduit ends and firestopping as required around conduits wherever building barriers are penetrated. If necessary, this contractor shall hire a qualified contractor to perform this work.

PART 3 - EXECUTION

3.01 CLEANING

A. Division 27 Contractor shall thoroughly clean all assemblies within the telecommunications room’s space before they are turned over to the Owner's IT Services for operation. Cleaning shall include, but not be limited to, all ladder tray, racks and wire managers (both inside and out), copper and optical fiber panels (both inside and out). Should any telecommunications room or closet be completed prior to the balance of the floor space construction that it serves, racks, cabinets, and wall frames shall be covered with plastic sheeting to repel dust and other contaminants to which they will be subjected.

3.02 PROJECT CONDITIONS

A. The Owner shall not be responsible for delays in work because of shutdowns due to unsafe working practices by Contractors.

B. The active information transport system and cabling associated with specific work beyond the construction area shall not be disrupted at any time.

C. Contractor shall clean work areas each day and remove debris properly and legally from the project site. Materials and supplies stored for use in the project shall be neatly stacked outside the circulation areas. All exits and paths shall be cleaned so as to prevent dirt from being tracked into the site.

D. It shall be the responsibility of the Contractor to secure any parking permits prior to the first day of work on-site.

E. Work outside of normal operating hours and days shall be coordinated with Owner's.

3.03 SAFETY REQUIREMENTS

A. All contract work shall be performed in accordance with the policies, procedures, and standards established by the Owner.

B. In construction areas, all Contractor personnel shall wear personnel protection devices, as deemed appropriate by the Construction Manager and as required by OSHA for the work location and work operation being performed. Devices shall include, but not be limited to hardhats, work boots, safety eye protection, reflective vests, etc.

C. All exposed holes, pits, pipes, etc., either inside or outside the project site, shall be barricaded or plated and adequately secured when Contractor personnel are not present. All ladders, hanging wires, pipes, and other items protruding at a pedestrian level travel way most be removed or secured following the final shift of the day.

D. During breaks or when only a portion of work has been completed, tools shall not be left exposed where others may risk injury or attempt to use them. Windows and doors shall not be left unsecured or propped open during breaks. At the completion of the final shift each day, doors, windows, or other openings shall be adequately secured.

E. When driving on the Owner's property, Contractor personnel shall observe all traffic safety regulations and pay particular attention to pedestrians. All loose material and debris on vehicles shall be adequately secured and tied down.

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SECTION 27 0505

SELECTIVE DEMOLITION OF COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Demolition and removal of selected portions of building or structure.

B. Demolition, temporary removal, relocation, or reconfiguration of selected site elements and/or Information Technology (IT), Security or other Special Systems or infrastructure.

C. Salvage of existing items to be reused or recycled.

D. Contractor shall include in the Bid all labor, materials, tools, transportation, storage costs, equipment, insurance, temporary protection, permits, inspections, taxes and all necessary and related items required to provide complete demolition and cutover of existing telecommunication systems shown and described in the drawings and specifications herein.

E. The Contractor is responsible for providing and coordinating phased activities and construction methods that minimize disruption to operations and provide complete and operational systems. Equipment and devices shall not be removed or reconfigured until removal or reconfiguration has been coordinated with owner and approval is given in writing.

F. The Contractor shall coordinate interfaces to existing systems that are being demolished in order to minimize disruption to the existing systems operations. Any systems outages shall be approved in advance and scheduled with Owner's .

1.02 RELATED REQUIREMENTS

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

B. The following documents shall also be considered as a part of and shall relate directly to this section:
   1. Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.03 ABBREVIATIONS AND ACRONYMS

A. Reference Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.04 DEFINITIONS

A. Reference Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.05 CODE REFERENCES AND STANDARDS

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.06 ADMINISTRATIVE REQUIREMENTS

A. Pre-Demolition Meeting
   1. Conduct a pre-demolition meeting at Project Site with Owner's and all affected stakeholders.
      a. Inspect and discuss condition of construction to be selectively demolished.
      b. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
      c. Existing telecommunications rooms that have demolition work may involve electrical, mechanical and architectural demolition. Review and coordinate requirements of work performed by other trades.
      d. Review areas where existing construction is to remain and requires protection.

e. Review procedures to be followed when critical systems are inadvertently interrupted. The Contractor shall be responsible for the coordination required with Owner's prior to device removal to ensure systems that must remain operational are not compromised during the demolition process.

1.07 QUALITY ASSURANCE

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.08 PROJECT CONDITIONS

A. The owner WILL occupy portions of building during selective demolition.

B. Conduct selective demolition so Owner's operations will not be disrupted.

C. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

D. Field verify the existing conditions, device equipment locations to determine the extent of the demolition required. Notify the Design Team of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

E. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
   1. Hazardous materials will be removed by Owner before start of the Work.
   2. If suspected hazardous materials are encountered, do not disturb; immediately notify the Design Team. Hazardous materials will be removed by Owner under a separate contract.

F. Storage or sale of removed items or materials on-site is not permitted.

G. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 EXAMINATION

A. Demolition and construction methods shall conform to Owner's requirements and all applicable building codes.

B. Verify that utilities have been disconnected and capped per approved procedures before starting selective demolition operations.

C. Survey existing condition of all communications systems related conduits and cables from origin to destination and correlate with requirements indicated to determine extent of selective demolition required.

D. Label all conduits and cables with origin, destination and what system they serve.

E. Consult with the Owner to determine whether systems can be disabled or whether a new parallel system needs to be installed.

F. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to the Design Team.

3.02 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

B. Comply with requirements for access and protection.

C. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

D. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.

E. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.

F. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.

G. Cover and protect furniture, furnishings, and equipment that have not been removed.

H. Comply with requirements for temporary enclosures, dust control, heating, and cooling.

3.03 SELECTIVE DEMOLITION

A. Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
   1. Proceed with selective demolition systematically. Complete selective demolition operations above each floor or tier, before disturbing supporting members on the next lower level, if applicable. Remove all abandoned cable from origin to destination.
   2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
   3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
   4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and/or portable fire-suppression devices during flame-cutting operations.
   5. Maintain adequate ventilation when using cutting torches.
   6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
   7. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
   8. Dispose of demolished items and materials promptly.

B. Removed and Salvaged Items:
   1. Clean salvaged items.
   2. Pack or crate items after cleaning. Identify contents of containers.
   3. Store items in a secure area until delivery to Owner.
   4. Transport items to Owner's designated storage area. Coordinate delivery of equipment with the Owner seven (7) days prior to delivery.
   5. Protect items from damage during transport and storage.

C. Removed and Reinstalled Items:
   1. Clean and repair items to functional condition adequate for intended reuse.
   2. Pack or crate items after cleaning and repairing. Identify contents of containers.
   3. Protect items from damage during transport and storage.
   4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
   5. Perform testing on reinstalled active systems and get sign-off by the Owner or Owner’s representative inspector that systems are re-connected and working properly.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Engineer, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.04 UTILITY SERVICES AND COMMUNICATION SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
   1. Comply with requirements for existing services/systems interruptions.
   2. For existing equipment with active components in them, provide dust protection and circulate cooling air with a portable air conditioning unit or other means to ensure equipment does not overheat.

B. Existing Services/Systems to Be Removed, or Relocated: Locate, identify, disconnect, and seal or cap off indicated utility services and communications systems serving areas to be selectively demolished.
   1. Owner will arrange to shut off indicated services/systems when requested by Contractor. Coordinate the disconnection of all electrical circuits with the Electrical Contractor prior to disconnection.
   2. Arrange to shut off indicated utilities with utility companies.
   3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.

3.05 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
   1. Do not allow demolished materials to accumulate onsite.
   2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
   3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.06 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

B. The contractor shall be required, on a daily basis, to dispose of any demolished material not required to be returned to the Owner. All materials shall be transported off of the Owner’s property at the expense of the Contractor.

C. At the end of each work day or shift, the Contractor shall be required to clean-up the work area and remove all construction debris such that the site is clean and usable without hazard to workers.

END OF SECTION

SECTION 27 0526

GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Provide a communications bonding and grounding system as described herein and in compliance with the referenced codes and standards.

B. The grounding and bonding for communications systems shall consist of the following components:
   1. Grounding Conductors.
   2. Grounding Connectors.
   3. Grounding Busbars.
   4. Grounding Labeling.

C. These components, upon completion of installation and testing, shall provide the means of a low impedance pathway to earth for unintentional and/or stray voltages or spurious signals present on telecommunications media and equipment.

1.02 RELATED REQUIREMENTS

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

B. The following documents shall also be considered as a part of and shall relate directly to this section:
   1. Section 26 0526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
   2. Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS
   3. Section 27 0533 - CONDUIT AND BACKBOXES FOR COMMUNICATIONS SYSTEMS
   4. Section 27 0544 - SLEEVES AND SLEEVE SEALS FOR COMMUNICATIONS PATHWAYS AND CABLING
   5. Section 27 1116 - COMMUNICATIONS RACKS, FRAMES, AND ENCLOSURES

1.03 ABBREVIATIONS AND ACRONYMS

A. Reference Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.04 DEFINITIONS

A. Reference Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.05 CODE REFERENCES AND STANDARDS

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.06 SUBMITTALS

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.07 QUALITY ASSURANCE

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.08 DELIVERY, STORAGE, AND HANDLING

A. Reference Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.09 WARRANTY

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Panduit Corp.

B. Burndy, LLC

C. Chatsworth Products, Inc.

D. Substitution: See Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

2.02 GROUNDING CONDUCTORS

A. Insulated Conductors: Stranded copper wire, green or green with yellow stripe insulation, insulated for 600 V, and complying with UL 83.
   1. Telecommunications Bonding Backbone (TBB):
      a. Size this conductor as a minimum 6 AWG minimum, then as 2,000 cmil per linear foot up to 3/0 AWG.
   2. Bonding Conductor for Telecommunications (BCT):
      a. Conductor sizing shall be equal in size to the largest telecommunications bonding backbone (TBB) conductor.
   3. Grounding Equalizer (GE):
      a. Size this conductor as a minimum 6 AWG minimum, then as 2,000 cmil per linear foot up to 3/0 AWG.
   4. Telecommunications Bonding Conductor (TBC):
      a. Size this conductor as a minimum 6 AWG minimum, then as 2,000 cmil per linear foot up to 3/0 AWG.

2.03 GROUNDING CONNECTORS

A. Irreversible connectors listed for the purpose. Listed by an NRTL as complying with NFPA 70 for specific types, sizes, and combinations of conductors and other items connected. Comply with UL 486A-486B.

B. Compression Wire Connectors: Crimp-and-compress connectors that bond to the conductor when the connector is compressed around the conductor. Comply with UL 467.
   1. Electroplated tinned copper, C and H shaped.
   2. Busbar Connectors: Cast silicon bronze, solderless exothermic-type, mechanical connector; with a long barrel and two holes spaced on 5/8- or 1-inch (15.8- or 25.4- mm) centers for a two-bolt connection to the busbar.
   3. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.04 GROUNDING BUSBARS

A. Telecommunications Ground Busbar (TGB): Predrilled rectangular bars of hard-drawn solid copper, 1/4 by 2 inches (6.3 by 50 mm) in cross section, length as indicated on Drawings. The busbar shall be for wall mounting, shall be NRTL listed as complying with UL 467, and shall comply with TIA-607-C.
   1. Predrilling shall be with holes for use with lugs specified in this Section.
   2. Mounting Hardware: Stand-off brackets that provide at least a 2-inch (50-mm) clearance to access the rear of the busbar. Brackets and bolts shall be stainless steel.
   3. Stand-off insulators for mounting shall be Lexan or PVC. Comply with UL 891 for use in 600-V switchboards, impulse tested at 5000 V.

B. Rack and Cabinet Grounding Busbars: Rectangular bars of hard-drawn solid copper, accepting conductors ranging from No. 14 to No. 2/0 AWG, NRTL listed as complying with UL 467, and complying with TIA-607-C. Predrilling shall be with holes for use with lugs specified in this Section.
   1. Cabinet-Mounted Busbar: Terminal block, with stainless-steel or copper-plated hardware for attachment to the cabinet.

2.05 GROUNDING LABELING

A. Comply with requirements for identification products in Section 27 0553 - IDENTIFICATION FOR COMMUNICATIONS SYSTEMS

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine the ac grounding electrode system and equipment grounding for compliance with requirements for maximum ground-resistance level and other conditions affecting performance of grounding and bonding of the electrical system.

3.02 PREPARATION

A. Inspect the test results of the AC grounding system measured at the point of BCT connection.

B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

C. Proceed with connection of the BCT only after any unsatisfactory conditions have been corrected.

3.03 INSTALLATION

A. Bonding shall include the ac utility power service entrance, the communications cable entrance, and the grounding electrode system. The bonding of these elements shall form a loop so that each element is connected to at least two others.

B. Comply with NECA 1.

C. Comply with TIA-607-C.

D. Conductors: Install solid conductor for No. 8 AWG and smaller and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
   1. The bonding conductors between the TGB and structural steel of steel-frame buildings shall not be smaller than No. 6 AWG.
   2. The bonding conductors between the TMGB and structural steel of steel-frame buildings shall not be smaller than No. 6 AWG.

E. Conductor Terminations and Connections:
   1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
   2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
   3. Connections to Ground Rods at Test Wells: Bolted connectors.
   4. Connections to Structural Steel: Welded connectors.

F. Conductor Support:
   1. Secure grounding and bonding conductors at intervals of not less than 36 inches (900 mm).

G. Grounding and Bonding Conductors:
   1. Install in the straightest and shortest route between the origination and termination point, and no longer than required. The bend radius shall not be smaller than eight times the diameter of the conductor. No one bend may exceed 90 degrees.
   2. Install without splices.
   3. Support at not more than 36-inch (900-mm) intervals.

H. Telecommunications Grounding Busbar:

1. Locate the TGB inside each floor serving telecommunications space and provide the following connections:
   a. Telecommunications Bonding Backbone (TBB).
   b. Building steel, via telecommunications bonding conductors (TBC).
   c. Each entrance conduit into the space, via telecommunications bonding conductors (TBC).
   d. Overhead cable support within the space via telecommunications bonding conductors (TBC).
   e. Dedicated power panels within the space serving communication equipment, via telecommunications bonding conductors (TBC).
   f. Metallic pathways (conduits, surface raceway, etc.) within the space, via telecommunications bonding conductors (TBC).

3.04 GROUNDING ELECTRODE SYSTEM

A. The bonding conductor for telecommunications (BCT) between the telecommunications main grounding busbar (TMGB) and the main building AC service equipment ground shall not be smaller than the largest telecommunications bonding backbone (TBB) conductor.

3.05 CONNECTIONS

A. Bond metallic equipment in a telecommunications equipment room to the grounding busbar in that room, using equipment grounding conductors not smaller than No. 6 AWG.

B. Stacking of conductors under a single bolt is not permitted when connecting to busbars.

C. Assemble the wire connector to the conductor, complying with manufacturer's written instructions and as follows:
   1. Use crimping tool and the die specific to the connector.
   2. Pretwist the conductor.
   3. Apply an antioxidant compound to all bolted and compression connections.

D. Telecommunications Enclosures and Equipment Racks: Bond metallic components of enclosures to the telecommunications bonding and grounding system. Install top-mounted rack grounding busbar unless the enclosure and rack are manufactured with the busbar. Bond the equipment grounding busbar to the TGB No. 2 AWG bonding conductors.

E. Structural Steel: Where the structural steel of a steel frame building is readily accessible within the room or space, bond each TGB and TMGB to the vertical steel of the building frame.

F. Shielded Cable: Bond the shield of shielded cable to the TGB in communications rooms and spaces. Comply with TIA-568-C.1 and TIA-568-C.2 when grounding shielded balanced twisted-pair cables.

G. Rack- and Cabinet-Mounted Equipment: Bond powered equipment chassis to the cabinet or rack grounding bar. Power connection shall comply with NFPA 70; the equipment grounding conductor in the power cord of cord- and plug-connected equipment shall be considered as a supplement to bonding requirements in this Section.

3.06 IDENTIFICATION

A. Labels shall be preprinted or computer-printed type.
   1. Label TGB(s) with "fs-TGB," where "fs" is the telecommunications space identifier for the space containing the TGB.
   2. Label the BCT and each telecommunications backbone conductor at its attachment point: "WARNING! TELECOMMUNICATIONS BONDING CONDUCTOR. DO NOT REMOVE OR DISCONNECT!"

3.07 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
2. Test the bonding connections of the system using an ac earth ground-resistance tester, taking two-point bonding measurements in each telecommunications equipment room containing a TMGB and a TGB and using the process recommended by BICSI TDMM. Conduct tests with the facility in operation.
    a. Measure the resistance between the busbar and the nearest available grounding electrode. The maximum acceptable value of this bonding resistance is 100 milliohms.
        1) Test for ground loop currents using a digital clamp-on ammeter, with a full-scale of not more than 10 A, displaying current in increments of 0.01 A at an accuracy of plus/minus 2.0 percent.
        2) With the grounding infrastructure completed and the communications system electronics operating, measure the current in every conductor connected to the TMGB. Maximum acceptable ac current level is 1 A.
3. Excessive Ground Resistance: If resistance to ground at the BCT exceeds 5 ohms, notify Design Team promptly and include recommendations to reduce ground resistance.
4. Grounding system will be considered defective if it does not pass tests and inspections.
5. Prepare test and inspection reports.

END OF SECTION

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SECTION 27 0533

CONDUIT AND BACKBOXES FOR COMMUNICATIONS SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Conduit and Fittings.
   2. Junction Boxes.
   3. Device Boxes.

1.02 RELATED REQUIREMENTS

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

B. The following documents shall also be considered as a part of and shall relate directly to this section:
   1. Section 26 0526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
   2. Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS
   3. Section 27 0526 - GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS
   4. Section 27 1513 - COMMUNICATIONS COPPER HORIZONTAL CABLING

1.03 ABBREVIATIONS AND ACRONYMS

A. Reference Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS.

1.04 DEFINITIONS

A. Reference Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS.

1.05 CODE REFERENCES AND STANDARDS

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS.

1.06 SUBMITTALS

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS.

1.07 QUALITY ASSURANCE

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Reference Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS.

1.09 WARRANTY

A. Reference Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS.

PART 2 PRODUCTS

2.01 GENERAL

A. Refer to all of the technology and communication Drawings and details in the Construction Documents for additional requirements including, but not limited to: outlet box size, mud ring gang size, conduit size and quantity and conduit routing. The specific outlet box configuration illustrated in the details sheets shall supersede the general outlet box size, mud ring gang size, conduit size and quantity and conduit routing requirements listed in this specification.

2.02 CONDUIT AND FITTINGS

A. Approved Manufacturers:
   1. Allied Tube & Conduit
   2. Western Tube & Conduit Corp.
   3. Wheatland Tube Company
   4. Substitutions: See Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS.

B. Conduit types:
   1. EMT shall be steel, hot-dipped galvanized or electro-galvanized, with an inner coating to protect cables and aid pulling, UL listed, and meeting the requirements of UL 797 and ANSI C80.3.
   2. RMC shall be steel, hot-dipped galvanized inside and outside with factory threaded ends full cut and galvanized after threading, UL listed, and meeting the requirements of UL 6 and ANSI C80.1.
   3. RNC shall be PVC Schedule 40 rigid plastic unless otherwise noted on the Drawings, shall be rated for use with 90 degree C wire, and shall conform to UL 651, WC-1094C and NEMA TC 2.
   4. Flexible (flex) conduit: Flex conduit is not approved and not acceptable. Where, in rare instances, flex conduit is the only remaining viable raceway option, the Contractor shall notify the Engineer and await the Engineer's direction prior to procurement and installation.
   5. Conduit bodies (LB's): Conduit bodies (LB's) are not approved and are not acceptable.

C. Fittings:
   1. Provide fittings as follows:
      a. EMT fittings shall be steel compression type with a nylon insulated throat for rain-tight and concrete-tight applications, steel set screw type or steel compression type for all other connections. Conduit ends shall be fitted with bushings - bushings shall be threaded type for RMC and IMC, set screw type for EMT, and have a nylon insulated throat.
      b. RMC fittings shall be threaded galvanized steel. Conduit ends shall be fitted with bushings - bushings shall be threaded and have a nylon insulated throat.
      c. RNC fittings shall be of same material and manufacturer as the conduit and shall be UL listed and conform to UL 514.
   2. Expansion fittings shall be provided across structural joints, shall be of a design to compensate for expansion and contraction, and shall be sealed to prevent entrance of water and moisture, and shall safely deflect and expand up to twice the distance of the structural movement. Expansion fittings shall be approved for grounding duty.
   3. Minimum Trade Size:
      a. Communication systems conduit: 1 inch

2.03 JUNCTION BOXES

A. Approved Manufacturers:
   1. Hubbell/Raco
   2. Garvin Industries
   3. Substitutions: See Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS.

B. Junction boxes shall be provided to serve as a transition point between pathways/raceways. Junction boxes shall be galvanized stamped steel, deep drawn one piece (without welds or tab connections), with knockouts for conduit entrances, meeting NEMA OS 1.

C. Junction boxes shall not be placed in non-accessible ceiling locations unless specifically shown on the Communications Construction Drawings or approved in writing by the Engineer prior to rough-in and installation.

D. Junction boxes in locations other than walls shall be sized according to the NEC.

E. Junction boxes in walls:
   1. Unless otherwise shown on the Drawings, junction boxes shall be 4-11/16 inch by 4-11/16 inch by 2-1/8 inch deep with blank cover, and knockouts pre-manufactured to support the conduit size serving the junction box.
   2. Size according to the NEC and provide the larger of the minimum size mentioned above or the NEC requirements.

2.04 DEVICE BOXES

A. Approved Manufacturers:
   1. Hubbell/Raco
   2. Garvin Industries
   3. Substitutions: See Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS.

B. General: Unless otherwise shown on the Drawings or specified herein, device boxes shall:
   1. Be galvanized stamped steel, deep drawn one piece (without welds or tab connections), with knockouts for conduit entrances, meeting NEMA OS 1, and equipped with extension rings to suit construction and application.
   2. Have knockouts pre-manufactured to support the conduit size serving the outlet box.

C. Device Box Types:
   1. Device Box: Typically installed as an empty box with blank faceplate, conduit and pull string for future use, unless specifically noted otherwise on the Communications Construction Drawings.
      a. Shall be a minimum 4-11/16 inch by 4-11/16 inch by 2-1/8 inch deep capable of accepting a minimum of (2) 1 inch conduits.
      b. Shall be equipped with a minimum single-gang mud ring unless otherwise noted on the Drawings.
         1) Mud ring depth shall be sized according to the depth of the wall surface per the Architectural Construction Documents.
      c. Provide a blank faceplate to match the material, style and color being used on the Electrical Wiring Devices.
   2. Outlet Box: Outlet boxes shall be provided to house Communications System outlets and connectors. Unless otherwise noted in the Communications Construction Drawings the typical Outlet Box(es) shall be as follows:
      a. Communications Cabling System:
         1) Shall be a minimum 4-11/16 inch by 4-11/16 inch by 2-1/8 inch deep capable of accepting a minimum of two (2) 1 inch conduits
         2) Shall be equipped with a single-gang mud ring unless otherwise noted on the Drawings or specified as follows:
            (a) Mud ring depth shall be sized according to the depth of the wall surface per the Architectural Construction Documents.
            (b) Wireless Access Point: Provide a cover plate in lieu of single-gang mud ring.

PART 3 EXECUTION

3.01 CONDUIT

A. General:
   1. Run conduit in the most efficient and direct route possible. Runs shall be parallel and perpendicular to building lines.
   2. Route conduits as close to the deck/structure as possible.
   3. Do not route conduit through areas in which flammable material may be stored, or over boilers, incinerators, hot water lines, or steam lines.
   4. Conceal all conduits unless indicated otherwise, within finished walls, ceilings, and floors.

5. Keep conduits at least 6-inches away from parallel runs of flues and steam or hot water pipes.
6. Install conduits level and square and at proper elevations.
7. For conduit runs exceeding more than 100 feet in length, provide pull boxes so that no conduit segment between end points and/or pull boxes exceeds 100 feet.
8. For conduit runs which require more than two 90 degree bends, install pull boxes so that no conduit segment between end points and/or pull boxes contains more than two 90 degree bends or a total of 180 degrees of bends including offsets and kicks.
9. Ream all conduits to eliminate sharp edges. Conduits shall be reamed after threads are cut.
10. Joints shall be cut square and shall butt solidly into couplings.
11. Terminate all metal conduits with metallic threaded insulated throat bushings, PVC conduit with PVC bushings.
12. Metallic conduits entering communication rooms shall be equipped with grounding lugs.
13. Prevent foreign matter from entering conduits by using temporary closure protection. After cable installation, cap each unused conduit with a mechanical-type seal (tape is not acceptable).
14. Install expansion fittings where conduit crosses an expansion join in structure or is in an environment where temperature changes combined with conduit run length may produce expansion or contraction stress. Provide a flexible bonding jumper at least three times the nominal width of the joint.
15. Terminate conduits that protrude through a floor 2 to 3 inches above the surface of the floor.
16. Conduits shall be cleaned and dried prior to the installation of cables.
17. Route conduit through roof openings for piping and ductwork wherever possible. Where not possible, provide and route through roof jack with pitch pocket for waterproofing. Empty conduits passing through roof penetrations shall be capped and sealed weather tight.
18. Conduits passing through exterior walls and floors below grade shall be made watertight with duct plugs. Pipe sleeves and wall collars shall extend all around the conduit or entrance seals and be specifically manufactured for that purpose.
19. When using RNC, transition to RMC for all bends, stub-ups, and penetrations through foundation walls.
20. The inside radius of a bend in a conduit shall be at least 10 times the internal diameter of the conduit, regardless of size. All bends in conduits shall be done in a sweeping manner.
21. Building codes require a bushing to be placed at each end of any conduit that is used for placing communications wiring. The purpose of these bushings is to protect the cabling as it is being placed. The Contractor will be required to ensure these bushings are in place prior to pulling wiring and not place them after the fact
22. Double-gang wall boxes that will be used in conjunction with single-gang faceplates shall include a single gang reducer plate.

B. Conduit Schedule:
   1. Buried or below grade level slab: RNC
   2. Embedded in concrete slab: RNC
   3. Through foundation walls: RMC
   4. Corrosive/Hazardous Areas: RMC
   5. Exposed or subject to mechanical injury: RMC
   6. All other areas (unless otherwise noted): EMT

C. Minimum Conduit Sizing, where not shown on the Drawings,:
   1. Junction Boxes in walls: 1 inch.
   2. Device Boxes: 1 inch.

3. Floor boxes: Coordinate with the other Trades who will make use of the floor box and provide per their requirements. Conduits shall be provided per the manufacturer's requirements and recommendations for the specified floor box.
4. Poke-thru: The size of the conduit feeding the poke-through shall be the same size as the conduit stub of the poke-through.

D. Conduit bends:
1. A conduit bend shall not exceed 90 degrees and shall not be constructed in such a way as to reduce the effective diameter of the conduit.
2. Conduit bends shall be sweeping, shall conform to TIA 569 bend radius requirements, and shall be a minimum of no less than 6 times the internal diameter of the conduit for conduits 2-inches or less and a minimum of no less than 10 times the internal diameter of the conduit for conduits greater than 2-inches.
3. For conduits larger than 1-1/4 inch, bends shall be factory-manufactured. Bending conduit larger than this in the field using manual or mechanical methods is not acceptable. 1 inch and 1-1/4 inch bends shall be made in an approved bending machine or shall be factory-manufactured.
4. The Contractor shall test each conduit with a mandrel to prove compliance with TIA and cable manufacturer bend radius requirements throughout the conduit run and shall provide evidence of such testing immediately upon request of the Engineer.
5. The sum total of conduit bends for a conduit segment between end points/pull boxes shall not exceed 180 degrees, except one additional bend of up to 90 degrees is acceptable if the bend is located within 12 inches of the cable feed end.
6. 90 degree conduit bodies (LB's) are not acceptable.

E. Conduit Stubs:
1. From boxes in partition walls: Conduit stubs shall extend a minimum of 6-inches above top of partition wall and shall be angled 30 degrees toward the nearest raceway/pathway for horizontal cabling.
2. To cable tray: Terminate conduits 2 to 4 vertical inches above the tray and within 2 horizontal inches of the edge of the tray. Conduits shall not extend over the edge of the cable tray.
3. Through floor slabs: Arrange so curved portion of bend (if any) is not visible above finished slab.

F. Pull String for horizontal and systems cable:
1. Equip all conduits over 3 feet long with plastic or nylon pull strings with printed footage indicators and a minimum test rating of 200 pounds. Extend pull string a minimum of 3 feet from each end. Pull strings shall be secured to avoid losing the pull string within the conduit by either securing tying the end of each string in place, or by tying the end of each string to a washer with a diameter larger than the conduit diameter.
2. Label each pull string in a clear manner by designating, at each end of the pull string, the location of the far end of the pull string (i.e. room name, communications closet name, pull box identifier, cable tray, station identifier, etc.). Indicate pull string length on the label.

G. Bushings: The Contractor is solely responsible for ensuring that bushings (insulated throat for metallic conduit, PVC for PVC conduit) are installed at conduit end(s) prior to cable installation. Where cable is installed prior to the installation of bushings, the Contractor shall remove the cable, install the bushing, and re-install the cable at no additional cost to the Owner.

H. Labels: Label each conduit end in a clear manner by designating, at each end of the conduit, the location of the far end of the conduit (i.e. room name, communications closet name, pull box identifier, cable tray, station identifier, etc.). Indicate conduit length on the label.

3.02 JUNCTION AND DEVICE BOXES

A. General:

1. Unless otherwise indicated, boxes shall be recessed. Set boxes plumb, level, square and flush with wall. Do not exceed more than 1/16 inch tolerance for each condition. Recess outside edge and trim plates from finished surface in accordance with NEC.
2. Boxes shall be supported independently of the conduit system. Supports shall be noncombustible and corrosion resistant. Suspended boxes shall be supported with threaded rod hangers and galvanized steel clamps, or trapeze hangers such as Unistrut.
3. Install additional straps or cross-bracing to ensure a rigid installation in a steel stud system.
4. Boxes on opposite sides of fire rated walls and partitions shall be separated by a horizontal distance of at least 24 inches.
5. Unused knockouts in boxes shall be left sealed.
6. For acoustical purposes, boxes on opposite sides of a wall shall not be located back-to-back.
7. For boxes to be installed in brick, masonry or concrete, offsets shall be provided to provide for proper adjustment to finished surfaces. Exposed mortar is not acceptable around device plates.
8. In the event of discrepancies between box locations shown on the communications drawings and any other drawings in the Construction Documents, the Contractor shall notify the Engineer and await the Engineer's direction prior to installation.

B. Device Box Types
   1. Device Box:
      a. Unless specifically noted otherwise on the Drawings, device boxes shall be dedicated to communications systems and shall not be shared with power.
      b. Provide with blank faceplate and pull string.
   2. Outlet Box:
      a. General:
         1) Unless specifically noted otherwise on the Drawings, Outlet Boxes shall be dedicated to Communications Systems, and shall not be shared with power.
         2) The Contractor shall install the box and mudring such that the face of the mudring is flush with the face of the wall. Refer to the Architectural Construction Documents (Drawings and Specifications) for Wall Types, Materials and Installation Details.
         3) The use of dividers to divide a single box into "separate" sections for Communications Systems and power (or another function) is not acceptable.
      b. Communications Cabling System:
         1) Outlet boxes shall be located within 3 feet of an electrical power receptacle. Where conditions are such that this is not possible, promptly notify the Engineer and await the Engineer's direction prior to rough-in of the box.
      c. Security System(s):
         1) Refer to Drawings and Manufacturers requirements.
         2) Coordinate with Security Contractor prior to rough-in.

END OF SECTION

SECTION 27 0544

SLEEVES AND SLEEVE SEALS FOR COMMUNICATIONS PATHWAYS AND CABLING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sleeves.

B. Firestop Sealants.

C. Firestop Putty.

1.02 RELATED REQUIREMENTS

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

B. The following documents shall also be considered as a part of and shall relate directly to this section:
   1. Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS
   2. Section 27 0533 - CONDUIT AND BACKBOXES FOR COMMUNICATIONS SYSTEMS
   3. Section 27 1323 - COMMUNICATIONS OPTICAL FIBER BACKBONE CABLING
   4. Section 27 1513 - COMMUNICATIONS COPPER HORIZONTAL CABLING

1.03 ABBREVIATIONS AND ACRONYMS

A. Reference Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS.

1.04 DEFINITIONS

A. Reference Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS.

1.05 CODE REFERENCES AND STANDARDS

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS.

1.06 SUBMITTALS

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS.

1.07 QUALITY ASSURANCE

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Reference Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS.

1.09 WARRANTY

A. Reference Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS.

PART 2 PRODUCTS

2.01 GENERAL

A. Use only fire-stopping products that have bene tested for specific fire resistance rated construction conditions confirming to construction assembly type, penetrating item type, annular space requirements, and fire rating involved for each separate instance.

2.02 SLEEVES

A. Approved Manufacturers:

1. Specified Technologies, Inc. - EZ-Path
2. Hilti - Speed Sleeve
3. Substitutions: See Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

B. Wall and Floor Sleeves:
   1. Fire-rated pathway devices shall be the preferred product and shall be installed in all locations where frequent cable moves, add-ons and changes will occur, such devices shall:
      a. Meet the hourly rating of the floor or wall penetrated.
      b. Permit the allowable cable load to range from 0% to 100% visual fill thereby eliminating the need to calculate allowable fill ratios.
      c. Not require any additional action on the part of the installer to open or close the pathway device or activate the internal smoke and fire seal, such as, but not limited to:
         1) Opening or closing of doors.
         2) Twisting an inner liner.
         3) Removal or replacement of any material such as, but not limited to, sealant, caulk, putty, pillows, bags, foam plugs, foam blocks, or any other material.
      d. Permit multiple devices to be ganged together to increase overall cable capacity.
      e. Allow for retrofit to install around existing cables.
      f. Include an optional means to lengthen the device to facilitate installation in thicker barriers without degrading fire or smoke sealing properties or inhibiting ability of device to permit cable moves, add-ons, or changes.
   2. Where single cables penetrate gypsum board/stud wall assemblies, a fire-rated cable grommet may be substituted. Acceptable products shall be molded from plenum-grade polymer and conform to the outer diameter of the cable forming a tight seal for fire and smoke. Additionally, acceptable products shall lock into the barrier to secure cable penetration.
   3. Where non-mechanical products are utilized, provide products that upon curing do not re-emulsify, dissolve, leach, breakdown or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture characteristic during or after construction.
   4. Where it is not practical to use a mechanical device, openings within floors and walls designed to accommodate telecommunications and data cabling shall be provided with re-enterable products that do not cure or dry.
   5. Cable trays shall terminate at each barrier and resume on the opposite side such that cables pass independently through fire-rated pathway devices. Cable tray shall be rigidly supported independent from fire-rated pathway devices on each side of barrier.
   6. Treat all wall penetrations that are required as a minimum of one a 1-hour rated wall. It shall also be assumed that any existing penetration used by a contractor for cabling is “owned” by that contractor. They shall be responsible for providing the appropriate fire-stopping materials to fire-stop the penetration regardless of whether fire-stopping existed at the beginning. Any fire-stopping material removed during cable installation shall be replaced with like material.

2.03 FIRESTOP SEALANTS

A. Approved Manufacturers:
   1. Specified Technologies, Inc. - SpecSeal Series SSS Sealant
   2. Specified Technologies, Inc. - SpecSeal Series LCI Sealant
   3. Substitutions: See Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

B. Firestop Sealants: This shall be a single component latex formula that upon curing shall not re-emulsify during exposure to moisture. Firestop sealants shall be used to fill annular space around and between the wall substrate and sleeve.

2.04 FIRESTOP PILLOWS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Specified Technologies, Inc. - SpecSeal SSB Pillows
   2. Substitutions: See Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

B. Firestop Pillow: This shall be a re-enterable, non-curing, mineral fiber core encapsulated on six sides with intumescent coating contained in a flame retardant poly bag.

C. Firestop pillows shall be used to seal large through penetrations such as those created to allow cable trays to pass through fire-rated walls.

2.05 FIRESTOP PUTTY

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Specified Technologies, Inc. - SpecSeal SSP Putty
   2. Substitutions: See Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

B. Firestop Putty: This shall be intumescent, non-hardening, water resistant putty containing no solvents, inorganic fibers or silicone compounds.

C. Firestop Putty shall be used to seal through-penetrations such as traditional conduit sleeves.

PART 3 EXECUTION

3.01 SLEEVE INSTALLATION FOR COMMNICATION SYSTEMS PENETRATIONS

A. Comply with NECA 1.

B. Sleeves for Penetrating Above-Grade Concrete and Masonry-Unit Floors and Walls:
   1. Interior Penetrations of Walls and Floors:
      a. Seal annular space between sleeve and pathway, using fire-stop sealant appropriate for size, depth, and location of joint.
   2. Use the fire-rated prefabricated sleeve assembly as specified unless penetration arrangement requires rectangular sleeved opening. Rectangular openings shall require firestop pillows to block the annular space of a fire-rated wall.
   3. Install sleeves for wall penetrations. Perform core drilling as required to install/set the prefabricated assembly into its designated location.
   4. Install sleeves during erection of walls.
   5. Install sleeves for floor penetrations. Extend sleeves installed in floors a minimum of 2 inches (50 mm) above finished floor level. Install sleeves during erection of floors.

C. Sleeves for Conduits Penetrating Fire-Rated Gypsum Board Assemblies:
   1. Use the fire-rated prefabricated sleeve assembly as specified unless penetration arrangement requires rectangular sleeved opening.
   2. If conduit was utilized, seal space outside of sleeves with approved firestop compound/sealant for gypsum board assemblies.

D. Roof-Penetration Sleeves: Seal penetration of individual pathways and cables with flexible boot-type flashing units applied in coordination with roofing work.

E. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

F. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between pathway or cable and sleeve for installing sleeve-seal system.

3.02 SLEEVE SYSTEM INSTALLATION

A. Install through-penetration fire-stop systems and fire-resistive joint systems in accordance with the manufacturer's instructions.
   1. Seal all openings or voids made by penetrations to ensure an air and water resistant seal.
   2. Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of through-penetration firestop systems that might hamper the performance of fire dampers as it pertains to duct work.
   3. Protect materials from damage on surfaces subjected to traffic.
   4. Apply a suitable bond-breaker to prevent three-sided adhesion in applications where this condition might occur such as the intersection of a gypsum wallboard/steel stud wall to floor or roof assembly where the joint is backed by a steel ceiling runner or track.

B. Perimeter Containment: Comply with manufacturer's instructions for installation of perimeter fire containment system products.
   1. Seal all slab-edge openings to ensure an air and water resistant seal.
   2. Curtain wall insulation that is an integral component of the perimeter fire containment system shall be in accordance with the conditions of testing and classification as specified in the design and shall comply with thermal insulation requirements as specified in Section 07 210 Building Insulation.

C. Install type and number of sealing elements recommended by manufacturer for pathway or cable material and size. Position pathway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pathway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.03 IDENTIFICATION

A. Comply with Section 27 0553 - IDENTIFICATION FOR COMMUNICATIONS SYSTEMS.

B. A firestop identification label shall be applied to the wall substrate adjacent to the through penetration or joint firestop system.

C. At a minimum, the label shall contain the following information:
   1. Firestop identification per Section 27 0553 - IDENTIFICATION FOR COMMUNICATIONS SYSTEMS.
   2. Fire stop product/system used
   3. Installation Company
   4. Penetration Hour Rating
   5. Installation Date

3.04 FIELD QUALITY CONTROL

A. Keep areas of work accessible until inspection by authorities having jurisdiction.

B. Where deficiencies are found, repair or firestopping products so they comply with requirements.

3.05 ADJUSTING AND CLEANING

A. Remove equipment, materials and debris, leaving area in undamaged, clean condition.

B. Clean all surfaces adjacent to sealed openings to be free of excess firestopping materials and soiling as work progresses.

END OF SECTION

SECTION 27 0553
IDENTIFICATION FOR COMMUNICATIONS SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Color and legend requirements for labels and signs.

B. Labels.

C. Signs.

D. Cable ties.

1.02 RELATED REQUIREMENTS

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

B. The following documents shall also be considered as a part of and shall relate directly to this section:
   1. Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS
   2. Section 27 0533 - CONDUIT AND BACKBOXES FOR COMMUNICATIONS SYSTEMS
   3. Section 27 0544 - SLEEVES AND SLEEVE SEALS FOR COMMUNICATIONS PATHWAYS AND CABLING
   4. Section 27 1116 - COMMUNICATIONS RACKS, FRAMES, AND ENCLOSURES
   5. Section 27 1323 - COMMUNICATIONS OPTICAL FIBER BACKBONE CABLING
   6. Section 27 1513 - COMMUNICATIONS COPPER HORIZONTAL CABLING

1.03 ABBREVIATIONS AND ACRONYMS

A. Reference Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS.

1.04 DEFINITIONS

A. Reference Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS.

1.05 CODE REFERENCES AND STANDARDS

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS.

1.06 SUBMITTALS

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS.

1.07 QUALITY ASSURANCE

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Reference Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Comply with NFPA 70 and TIA 606-B.

B. Comply with ANSI Z535.4 for safety signs and labels.

C. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

2.02 COLOR AND LEGEND REQUIREMENTS

A. Identification Labels:
   1. Black letters on a white field.

2.03 LABELS

A. Vinyl Wraparound Labels: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.

B. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameters of raceway or cable they identify, that stay in place by gripping action.

C. Self-Adhesive Wraparound Labels: Preprinted, 3-mil- (0.08-mm-) thick, polyester flexible labels with acrylic pressure-sensitive adhesive.
   1. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating protective shields over the legend. Labels sized such that the clear shield overlaps the entire printed legend.

D. Self-Adhesive Labels: Polyester, thermal, transfer-printed, 3-mil- (0.08-mm-) thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.
   1. Minimum Nominal Size:
      a. 1-1/2 by 6 inches (37 by 150 mm) for raceway and conductors.
      b. 3-1/2 by 5 inches (76 by 127 mm) for equipment.
      c. As required by authorities having jurisdiction.

2.04 BANDS AND TUBES

A. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inches (50 mm) long, with diameters sized to suit diameters of raceway or cable they identify, that stay in place by gripping action.

2.05 SIGNS

A. Baked-Enamel Signs:
   1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
   2. 1/4-inch (6.4-mm) grommets in corners for mounting.
   3. Nominal Size: 7 by 10 inches (180 by 250 mm).

B. Laminated-Acrylic or Melamine-Plastic Signs:
   1. Engraved legend.
   2. Thickness:
      a. For signs up to 20 sq. in. (129 sq. cm), minimum 1/16 inch (1.6 mm) thick.
      b. For signs larger than 20 sq. in. (129 sq. cm), 1/8 inch (3.2 mm) thick.
      c. Engraved legend with black letters on white face.
      d. Punched or drilled for mechanical fasteners with 1/4-inch (6.4-mm) grommets in corners for mounting.
      e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.06 CABLE TIES

A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.
   1. Minimum Width: 3/16 inch (5 mm).
   2. Tensile Strength at 73 deg F (23 deg C) according to ASTM D 638: 12,000 psi (82.7 MPa).
   3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
   4. Color: Black, except where used for color-coding.

PART 3 EXECUTION

3.01 PREPARATION

A. Self-Adhesive Identification Products: Before applying communications identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.02 INSTALLATION

A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.

B. Install identifying devices before installing acoustical ceilings and similar concealment.

C. Verify identity of each item before installing identification products.

D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

E. Apply identification devices to surfaces that require finish after completing finish work.

F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of communications systems and connected items.

G. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.

H. Polyester Wraparound Labels:
   1. Secure tight to surface of raceway or cable at a location with high visibility and accessibility.
   2. Attach labels that are not self-adhesive type with clear tape, with adhesive appropriate to the location and substrate.
   3. Provide label 6 inches (150 mm) from cable end.

I. Self-Adhesive Wraparound Labels:
   1. Secure tight to surface at a location with high visibility and accessibility.
   2. Provide label 6 inches (150 mm) from cable end.

J. Self-Adhesive Labels:
   1. On each item, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
   2. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high.

K. Cable Ties: General purpose, except as listed below:
   1. Outdoors: UV-stabilized nylon.
   2. In Spaces Handling Environmental Air: Plenum rated.

3.03 IDENTIFICATION SCHEDULE

A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.

B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations with high visibility. Identify by system and circuit designation.

C. Accessible Fittings for Raceways and Cables within Buildings: Identify covers of each junction and pull box with self-adhesive labels containing wiring system legend.
   1. System legends shall be as follows:
      a. Telecommunications.

D. Faceplates: Label individual faceplates with self-adhesive labels. Place label at top of faceplate. Each faceplate shall be labeled with its individual, sequential designation, composed of the following, in the order listed:
   1. Wiring closet designation.
   2. Dash.
   3. Work area outlet number.

E. Equipment Room Labeling:
   1. Racks, Frames, and Enclosures: Identify front and rear of each with self-adhesive labels containing equipment designation.
   2. Patch Panels: Label individual rows in each rack, starting at top and working down, with self-adhesive labels.
   3. Data Outlets: Label each outlet with a self-adhesive label using the same scheme defined under Faceplates.

F. Backbone Cables: Label each cable with a polyester self-adhesive wraparound label indicating the location of the far or other end of the backbone cable. Patch panel or punch down block where cable is terminated should be labeled identically.

G. Horizontal Cables: Label each cable with a polyester self-adhesive wraparound label indicating the following, in the order listed:
   1. Room number.
   2. Colon.
   3. Faceplate number.

H. Instructional Signs: Self-adhesive labels.

I. Warning Labels for Indoor Cabinets, Boxes, and Enclosures: Baked-enamel warning signs or metal-backed butyrate.
   1. Apply to exterior of door, cover, or other access.

J. Equipment Identification Labels:
   1. Indoor Equipment: Baked-enamel signs, Metal-backed butyrate, laminated-acrylic or melamine-plastic sign.
   2. Equipment to Be Labeled:
      a. Communications racks/cabinets.
      b. Uninterruptible power supplies.
      c. Power distribution components.

END OF SECTION

SECTION 27 1116
COMMUNICATIONS RACKS, FRAMES, AND ENCLOSURES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Backboards.
   2. 19-inch open frame network equipment racks.
   3. Power strips.
   4. Grounding and bonding.
   5. Labeling.

1.02 RELATED REQUIREMENTS

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

B. The following documents shall also be considered as a part of and shall relate directly to this section:
   1. Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS
   2. Section 27 0526 - GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS
   3. Section 27 0553 - IDENTIFICATION FOR COMMUNICATIONS SYSTEMS
   4. Section 27 1323 - COMMUNICATIONS OPTICAL FIBER BACKBONE CABLING
   5. Section 27 1513 - COMMUNICATIONS COPPER HORIZONTAL CABLING

1.03 ABBREVIATIONS AND ACRONYMS

A. Reference Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.04 DEFINITIONS

A. Reference Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.05 CODE REFERENCES AND STANDARDS

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.06 SUBMITTALS

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.07 QUALITY ASSURANCE

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.08 DELIVERY, STORAGE, AND HANDLING

A. Reference Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.09 WARRANTY

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.10 CLOSEOUT SUBMITTALS

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. UL listed.

B. RoHS compliant.

2.02 BACKBOARDS

A. Backboards: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches (19 by 1220 by 2440 mm).

B. Backboard Paint: White, fire-retardant paint. Apply two coats to both sides and all edges. Leave any fire-retardant plywood stamp exposed for inspection purposes.

C. Quantity: Provide one (1) sheet in each location identified on the plans.

2.03 19-INCH OPEN FRAME NETWORK EQUIPMENT RACKS

A. Approved Manufacturers:
   1. Chatsworth Products, Inc.
   2. Panduit
   3. Ortronics
   4. Engineer Approved Equal

B. Description: Four-post racks with threaded rails designed for mounting telecommunications equipment. Width is compatible with EIA-310-E, 19-inch (482.6-mm) equipment mounting with an opening of 17.72-inches (450-mm) between rails.

C. General Requirements:
   1. Frames: Modular units designed for telecommunications terminal support and coordinated with dimensions of units to be supported.
   2. Material: Extruded aluminum.
   3. Finish: Manufacturer's standard, baked-polyester powder coat.
   4. Color: Black.

D. Floor-Mounted Racks:
   1. Overall Height: As indicated on Drawings.
   2. Overall Depth: As indicated on Drawings.
   3. Four-Post Load Rating: 1000 lb (454 kg).
   4. Number of Rack Units per Rack: As indicated on Drawings.
   5. Threads: 12-24.
   6. Vertical and horizontal cable management channels, top and bottom cable troughs, grounding lug, and a power strip.
   7. Base shall have a minimum of four mounting holes for permanent attachment to floor.
   8. Self-leveling.
   9. Quantity: As indicated on Drawings.

E. Wall-Mounted Racks:
   1. Height: As indicated on Drawings.
   2. Depth: As indicated on Drawings.
   3. Load Rating: 200 lb (91 kg).
   4. Number of Rack Units per Rack: As indicated on Drawings.
   5. Threads: 12-24.
   6. Wall Attachment: Four mounting holes.
   7. Equipment Access: Integral swing.
   8. Quantity: As indicated on Drawings

F. Cable Management:
   1. Metal, with integral wire retaining fingers.
   2. Baked-polyester powder coat finish.
   3. Vertical cable management panels shall have front and rear channels, with covers.

4. Provide horizontal crossover cable manager at the top of each relay rack, with a minimum height of two rack units each.

2.04 POWER STRIPS

A. Approved Manufacturers:
   1. Chatsworth Products, Inc.
   2. Panduit
   3. Ortronics
   4. Engineer Approved Equal

B. Power Strips: Comply with UL 1363.
   1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
   2. Rack mounting.
   3. Twelve (12) 20-A, 120 VAC, NEMA WD 6, Configuration 5-20R receptacles in a vertical bar for the 4-post network rack.
   4. Five (5) 20-A, 120 VAC, NEMA WD 6, Configuration 5-20R receptacles in a horizontal bar for wall-mount network racks.
   5. LED indicator lights for power and protection status.
   6. LED indicator lights for reverse polarity and open outlet ground.
   7. Circuit Breaker and Thermal Fusing: When protection is lost, circuit opens and cannot be reset.
   8. Circuit Breaker and Thermal Fusing: Unit continues to supply power if protection is lost.
   9. Rocker-type on-off switch, illuminated when in on position.
   10. Peak Single-Impulse Surge Current Rating: 33 kA per phase.
   11. Protection modes shall be line to neutral, line to ground, and neutral to ground. UL 1449 clamping voltage for all three modes shall be not more than 330 V.

2.05 GROUNDING AND BONDING

A. Comply with requirements in Section 27 0526 - GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS for grounding conductors and connectors.

B. Rack and Cabinet TGBs: Rectangular bars of hard-drawn solid copper, accepting conductors ranging from No. 14 to No. 2/0 AWG, NRTL listed as complying with UL 467, and complying with TIA-606-B. Predrilling shall be with holes for use with lugs specified in this Section.
   1. Cabinet-Mounted TGB: Terminal block, with stainless-steel or copper-plated hardware for attachment to cabinet.
   2. Rack-Mounted Horizontal TGB: Designed for mounting in 19- or 23-inch (482.6- or 584.2-mm) equipment racks. Include a copper splice bar for transitioning to an adjoining rack, and stainless-steel or copper-plated hardware for attachment to the rack.
   3. Rack-Mounted Vertical TGB: 72 or 36 inches (1828.8 or 914.4 mm) long, with stainless-steel or copper-plated hardware for attachment to rack.

2.06 LABELING

A. Comply with requirements in Section 27 0553 - IDENTIFICATION FOR COMMUNICATIONS SYSTEMS.

B. Comply with TIA-606-B and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

PART 3 EXECUTION

3.01 INSTALLATION

A. Comply with NECA 1.

B. Comply with BICSI TDMM for layout of communications equipment spaces.

C. Comply with BICSI ITSIMM for installation of communications equipment spaces.

D. Bundle, lace, and train conductors and cables to terminal points without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

E. Coordinate layout and installation of communications equipment in racks and room. Coordinate service entrance configuration with service provider.
   1. Meet jointly with system providers, equipment suppliers, and Owner to exchange information and agree on details of equipment configurations and installation interfaces.
   2. Record agreements reached in meetings and distribute them to other participants.
   3. Adjust configurations and locations of distribution frames, cross-connects, and patch panels in equipment spaces to accommodate and optimize configuration and space requirements of telecommunications equipment.
   4. Adjust configurations and locations of equipment with distribution frames, cross-connects, and patch panels of cabling systems of other communications, electronic safety and security, and related systems that share space in equipment room.

F. Coordinate location of power raceways and receptacles with locations of communications equipment requiring electrical power to operate.

3.02 GROUNDING

A. Comply with NECA/BICSI 607.

B. Install grounding according to BICSI ITSIMM, "Bonding, Grounding (Earthing) and Electrical Protection" Ch.

C. Locate TGB to minimize length of bonding conductors. Fasten to wall, allowing at least 2 inches (50 mm) of clearance behind TGB. Connect TGB with a minimum No. 4 AWG grounding electrode conductor from TGB to suitable electrical building ground. Connect rack TGB to near TGB or the TMGB.
   1. Bond the shield of shielded cable to patch panel, and bond patch panel to TGB or TMGB.

3.03 IDENTIFICATION

A. Coordinate system components, wiring, and cabling complying with TIA-606-B. Comply with requirements in Section 27 0553 - IDENTIFICATION FOR COMMUNICATIONS SYSTEMS.

B. For fire-resistant plywood, do not paint over manufacturer's label.

C. Paint and label colors for equipment identification shall comply with TIA-606-B for Class 2 level of administration, including optional identification requirements of this standard.

D. Labels shall be machine printed. Type shall be 1/8 inch (3 mm) in height.

END OF SECTION

SECTION 27 1323

COMMUNICATIONS OPTICAL FIBER BACKBONE CABLING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. 62.5/125-micrometer, multimode, optical fiber patch cables (OM1).
   2. 9/125 micrometer single-mode, outside plant optical fiber cable (OS2).
   3. Optical fiber cable hardware.
   4. Grounding and bonding.
   5. Labeling.

B. Description:
   1. A singlemode optical fiber backbone cabling system shall provide connectivity to all ten (10) buildings located on the Newton Correctional Facility campus. The physical topology shall be routed in a ring manner. Fiber optic cabling shall enter each building inside the existing telecommunications spaces. Provide fusion splicing to maintain minimal loss. Mechanical terminations shall not be accepted. The data network shall be provided a "Path A" and "Path B" for primary and for redundancy. Terminate each building's connectivity needs to rack-mounted modular shelves. Refer to the drawings for a more detailed illustration of the requirements.
   2. Provide new 62.5 multimode fiber optic patch cables in an effort to clean up the existing Equipment Room inside Building H.

1.02 RELATED REQUIREMENTS

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

B. The following documents shall also be considered as a part of and shall relate directly to this section:
   1. Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS
   2. Section 27 0553 - IDENTIFICATION FOR COMMUNICATIONS SYSTEMS

1.03 ABBREVIATIONS AND ACRONYMS

A. Reference Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.04 DEFINITIONS

A. Reference Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.05 CODE REFERENCES AND STANDARDS

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.06 SUBMITTALS

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.07 QUALITY ASSURANCE

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.08 DELIVERY, STORAGE, AND HANDLING

A. Reference Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.09 WARRANTY

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.10 CLOSEOUT SUBMITTALS

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. General Performance: Backbone cabling system shall comply with transmission standards in TIA-568-C.1, when tested according to test procedures of this standard.

B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Flame-Spread Index: 25 or less.
   2. Smoke-Developed Index: 50 or less.

2.02 62.5/125-MICROMETER, MULTIMODE, OPTICAL FIBER CABLE (OM1)

A. Approved Manufacturers:
   1. Corning
   2. Commscope
   3. General Cable
   4. Engineer Approved Equal

B. Description: Multimode, 62.5/125-micrometer, 2-strand optical fiber patch cables.

C. Standards:
   1. Comply with ICEA S-83-596 for mechanical properties.
   2. Comply with TIA-568-C.3 for performance specifications.
   3. Comply with TIA-492AAAA for detailed specifications.

D. Jacket:
   1. Jacket Color: Orange.

E. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:
   1. Riser Rated, Nonconductive: Type OFNP or Type OFNR in listed riser or plenum communications raceway.

2.03 9/125 MICROMETER SINGLE-MODE, OUTSIDE PLANT OPTICAL FIBER CABLE (OS2)

A. Approved Manufacturers:
   1. Corning
   2. Commscope
   3. General Cable
   4. Engineer Approved Equal

B. Description: Single mode, 9/125-micrometer, 144-strand fiber, stranded loose tube, non-conductive, optical fiber cable.

C. Standards:
   1. Comply with TIA-492CAAB for detailed specifications.
   2. Comply with TIA-568-C.3 for performance specifications.
   3. Comply with ICEA S-87-640 for mechanical properties.

D. Maximum Attenuation: 0.5 dB/km at 1310 nm; 0.5 dB/km at 1550 nm.

E. Jacket:
   1. Jacket Color: Black.

2. Cable cordage jacket, fiber, unit, and group color shall be according to TIA-598-D.
3. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches (1000 mm).

2.04 OPTICAL FIBER CABLE HARDWARE

A. Approved Manufacturers:
   1. Matched Solution by the Cabling Manufacturer
   2. Engineer Approved Equal

B. Standards:
   1. Comply with Fiber Optic Connector Intermateability Standard (FOCIS) specifications of the TIA-604 series.
   2. Comply with TIA-568-C.3.

C. Cross-Connects and Patch Panels: Modular panels housing multiple-numbered, duplex cable connectors.
   1. Number of Connectors per Field: One for each fiber of cable or cables assigned to field, plus spares and blank positions adequate to suit specified expansion criteria.

D. Patch Cords: Factory-made, dual-fiber cables in 36-inch (900-mm) lengths. Confirm actual lengths needed, prior to ordering.

E. Connector Type: Type LC complying with TIA-604-10-B connectors.

F. Plugs and Plug Assemblies:
   1. Male; color-coded modular telecommunications connector designed for termination of a single optical fiber cable.
   2. Insertion loss not more than 0.25 dB.
   3. Marked to indicate transmission performance.

G. Jacks and Jack Assemblies:
   1. Female; quick-connect, simplex and duplex; fixed telecommunications connector designed for termination of a single optical fiber cable.
   2. Insertion loss not more than 0.25 dB.
   3. Marked to indicate transmission performance.
   4. Designed to snap-in to a patch panel or faceplate.

2.05 GROUNDING AND BONDING

A. Comply with requirements in Section 27 0526 - GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS for all products including but not limited to grounding conductors and connectors.

B. Comply with TIA-607-C.

2.06 LABELING

A. Comply with requirements in Section 27 0553 - IDENTIFICATION FOR COMMUNICATIONS SYSTEMS.

B. Comply with TIA-606-B and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

PART 3 EXECUTION

3.01 ENTRANCE FACILITIES

A. Coordinate backbone cabling with the protectors and demarcation point provided by communications service provider.

3.02 WIRING METHODS

A. Wiring Method: Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces, in attics, and in gypsum board

partitions where unenclosed wiring method may be used. Conceal raceway and cables except in unfinished spaces.
1. Install plenum cable in environmental air spaces, including plenum ceilings.
2. Comply with requirements for pathways specified in Section

B. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.

C. Wiring within Enclosures: Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

3.03 INSTALLATION OF OPTICAL FIBER BACKBONE CABLES

A. Comply with NECA 1, NECA 301, and NECA/BICSI 568.

B. General Requirements for Optical Fiber Cabling Installation:
1. Comply with TIA-568-C.1 and TIA-568-C.3.
2. Comply with BICSI ITSIMM, Ch. 6, "Cable Termination Practices."
3. Terminate all cables; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
4. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
5. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
6. Bundle, lace, and train cable to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIMM, "Cabling Termination Practices" Chapter. Use lacing bars and distribution spools.
7. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
8. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
9. In the communications equipment room, provide a 10-foot- (3-m-) long service loop on each end of cable.
10. Pulling Cable: Comply with BICSI ITSIMM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.
11. Cable may be terminated on connecting hardware that is rack or cabinet mounted.

C. Open-Cable Installation:
1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

D. Group connecting hardware for cables into separate logical fields.

3.04 FIRESTOPPING

A. Comply with requirements in Section 07 8413 "Penetration Firestopping."

B. Comply with TIA-569-D, Annex A, "Firestopping."

C. Comply with BICSI ITSIMM, "Firestopping" Chapter.

3.05 GROUNDING

A. Install grounding according to BICSI ITSIMM, "Grounding (Earthing), Bonding, and Electrical Protection" Chapter.

B. Comply with TIA-607-C and NECA/BICSI-607.

3.06 IDENTIFICATION

A. Identify system components, wiring, and cabling complying with TIA-606-B. Comply with requirements for identification specified in Section 270553 "Identification for Communications Systems."
   1. Administration Class: Class 2.
   2. Color-code cross-connect fields and apply colors to voice and data service backboards, connections, covers, and labels.

B. Paint and label colors for equipment identification shall comply with TIA-606-B for Class 2 level of administration.

C. Cable Schedule: Install in a prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.

D. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, backbone pathways and cables, entrance pathways and cables, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors.

E. Cable and Wire Identification:
   1. Label each cable within 4 inches (100 mm) of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
   2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.
   3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet (4.5 m).
   4. Label each unit and field within distribution racks and frames.
   5. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.

F. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA 606-B, for the following:
   1. Flexible vinyl or polyester that flexes as cables are bent.

3.07 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections.

D. Tests and Inspections:
   1. Visually inspect optical fiber jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA-568-C.1.
   2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
   3. Optical Fiber Cable Tests:
      a. Test instruments shall meet or exceed applicable requirements in TIA-568-C.1. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.

b. Link End-to-End Attenuation Tests:
   1) Horizontal and multimode backbone link measurements: Test at 850 or 1300 nm in one direction according to TIA-526-14-B, Method B, One Reference Jumper.
   2) Attenuation test results for backbone links shall be less than 2.0 dB. Attenuation test results shall be less than those calculated according to equation in TIA-568-C.1.

E. Data for each measurement shall be documented. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.

F. Remove and replace cabling where test results indicate that it does not comply with specified requirements.

G. End-to-end cabling will be considered defective if it does not pass tests and inspections.

H. Prepare test and inspection reports.

END OF SECTION

SECTION 27 1513

COMMUNICATIONS COPPER HORIZONTAL CABLING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Category 6 twisted pair cable.
   2. Twisted pair cable hardware, including plugs and jacks.
   3. Grounding and bonding.
   4. Labeling.

B. Description:
   1. Horizontal cable cabling system shall provide interconnections between the floor distributor and the equipment outlet, otherwise known as "Cabling Subsystem," in the telecommunications cabling system structure. Cabling system consists of horizontal cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for horizontal-to-horizontal cross-connection.
      a. TIA-568-C.1 requires that a minimum of two equipment outlets be installed for each work area.
      b. Horizontal cabling shall contain no more than one transition point or consolidation point between the horizontal cross-connect and the telecommunications equipment outlet.
      c. Bridged taps and splices shall not be installed in the horizontal cabling.
   2. The maximum allowable horizontal cable length is 295 feet (90 m). This maximum allowable length does not include an allowance for the length of 16 feet (4.9 m) to the workstation equipment or in the horizontal cross-connect.

1.02 RELATED REQUIREMENTS

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

B. The following documents shall also be considered as a part of and shall relate directly to this section:
   1. Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS
   2. Section 27 0526 - GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS
   3. Section 27 0533 - CONDUIT AND BACKBOXES FOR COMMUNICATIONS SYSTEMS
   4. Section 27 0544 - SLEEVES AND SLEEVE SEALS FOR COMMUNICATIONS PATHWAYS AND CABLING
   5. Section 27 0553 - IDENTIFICATION FOR COMMUNICATIONS SYSTEMS

1.03 ABBREVIATIONS AND ACRONYMS

A. Reference Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.04 DEFINITIONS

A. Reference Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.05 CODE REFERENCES AND STANDARDS

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.06 SUBMITTALS

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.07 QUALITY ASSURANCE

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.08 DELIVERY, STORAGE, AND HANDLING

A. Reference Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.09 WARRANTY

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.10 CLOSEOUT SUBMITTALS

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. General Performance: Horizontal cabling system shall comply with transmission standards in TIA-568-C.1, when tested according to test procedures of this standard.

B. Telecommunications Pathways and Spaces: Comply with TIA-569-D.

C. Grounding: Comply with TIA-607-C.

2.02 GENERAL CABLE CHARACTERISTICS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with the applicable standard and NFPA 70 for the following types:
   1. Communications, Plenum Rated: Type CMP complying with UL 1685 or Type CMP in listed plenum communications raceway or Type CMP in listed cable routing assembly.
   2. Communications, Non-plenum: Type CMR complying with UL 1666.

B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Flame-Spread Index: 25 or less.
   2. Smoke-Developed Index: 50 or less.

C. RoHS compliant.

2.03 CATEGORY 6 TWISTED PAIR CABLE

A. Description: Four-pair, balanced-twisted pair cable, certified to meet transmission characteristics of Category 6 cable at frequencies up to 250MHz.

B. Standard: Comply with NEMA WC 66/ICEA S-116-732 and TIA-568-C.2 for Category 6 cables.

C. Conductors: 100-ohm, 23 AWG solid copper.

D. Shielding/Screening: Unshielded twisted pairs (UTP).

E. Cable Rating: Riser and Plenum.
   1. Riser-rated shall be allowed in Housing Units A through E. All other buildings shall be served with plenum-rated cabling.

F. Jacket: Blue thermoplastic.

2.04 TWISTED PAIR CABLE HARDWARE

A. Description: Hardware designed to connect, splice, and terminate twisted pair copper communications cable.

B. General Requirements for Twisted Pair Cable Hardware:
   1. Comply with the performance requirements of Category 6.
   2. Comply with TIA-568-C.2, IDC type, with modules designed for punch-down caps or tools.

3. Cables shall be terminated with connecting hardware of same category or higher.

C. Source Limitations: Obtain twisted pair cable hardware from same manufacturer as twisted pair cable, from single source.

D. Cross-Connect: Modular array of connecting blocks arranged to terminate building cables and permit interconnection between cables.
   1. Number of Terminals per Field: One for each conductor in assigned cables.

E. Patch Panel: Modular panels housing numbered jack units with IDC-type connectors at each jack location for permanent termination of pair groups of installed cables.
   1. Features:
      a. Universal T568A and T568B wiring labels.
      b. Labeling areas adjacent to conductors.
      c. Replaceable connectors.
      d. 24 or 48 ports.
   2. Construction: 16-gauge steel and mountable on 19-inch (483 mm) equipment racks.
   3. Number of Jacks per Field: One for each four-pair cable indicated, plus spares and blank positions adequate to suit specified expansion criteria.

F. Patch Cords: Factory-made, four-pair cables in 48-inch (1200-mm) lengths; terminated with an eight-position modular plug at each end.
   1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure performance. Patch cords shall have latch guards to protect against snagging.
   2. Patch cords shall have color-coded boots for circuit identification.
   3. Provide a set of patch cords for 100% of the work area outlets identified on the plans. A "set" shall be defined as a cord in the field near the workstation/device as well as a cord inside the telecommunications room/space.

G. Plugs and Plug Assemblies:
   1. Male; eight position; color-coded modular telecommunications connector designed for termination of a single four-pair, 100-ohm, unshielded or shielded twisted pair cable.
   2. Standard: Comply with TIA-568-C.2.
   3. Marked to indicate transmission performance.

H. Jacks and Jack Assemblies:
   1. Female; eight position; modular; fixed telecommunications connector designed for termination of a single four-pair, 100-ohm, unshielded or shielded twisted pair cable.
   2. Designed to snap-in to a patch panel or faceplate.
   3. Standard: Comply with TIA-568-C.2.
   4. Marked to indicate transmission performance.

I. Faceplate:
   1. Four-port, vertical single gang faceplates designed to mount to single gang wall boxes.
   2. Metal Faceplate: Stainless steel.
   3. For use with snap-in jacks accommodating any combination of twisted pair, optical fiber, and coaxial work area cords.

J. Legend:
   1. Machine printed, in the field, using adhesive-tape label.
   2. Snap-in, clear-label covers and machine-printed paper inserts.

2.05 GROUNDING AND BONDING

A. Comply with requirements in Section 27 0526 - GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS for grounding conductors and connectors.

B. Comply with TIA-607-C.

2.06 IDENTIFICATION PRODUCTS

A. Comply with requirements in Section 27 0553 - IDENTIFICATION FOR COMMUNICATIONS SYSTEMS.

B. Comply with TIA-606-B and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

PART 3 EXECUTION

3.01 WIRING METHODS

A. Wiring Method: Install cables in raceways and cable trays, except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces, attics, and gypsum board partitions where unenclosed wiring method may be used. Conceal raceway and cables, except in unfinished spaces.
   1. Install plenum cable in environmental air spaces, including plenum ceilings.

B. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.

C. Wiring within Enclosures: Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools. Install conductors parallel with or at right angles to sides and back of enclosure.

3.02 INSTALLATION OF PATHWAYS

A. Drawings indicate general arrangement of pathways and fittings.

3.03 INSTALLATION OF TWISTED-PAIR HORIZONTAL CABLES

A. Comply with NECA 1 and NECA/BICSI 568.

B. General Requirements for Cabling:
   1. Comply with TIA-568-C.0, TIA-568-C.1, and TIA-568-C.2.
   2. Comply with BICSI's "Information Transport Systems Installation Methods Manual (ITSIMM), Ch. 5, "Copper Structured Cabling Systems," "Cable Termination Practices" Section.
   3. Install 110-style IDC termination hardware unless otherwise indicated.
   4. Do not untwist twisted pair cables more than 1/2 inch (12 mm) from the point of termination to maintain cable geometry.
   5. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
   6. Consolidation points may be used only for making a direct connection to equipment outlets:
      a. Do not use consolidation point as a cross-connect point, as a patch connection, or for direct connection to workstation equipment.
      b. Locate consolidation points for twisted-pair cables at least 49 feet (15 m) from communications equipment room.
   7. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
   8. Install lacing bars to restrain cables, prevent straining connections, and prevent bending cables to smaller radii than minimums recommended by manufacturer.
   9. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI Information Transport Systems Installation Methods Manual , Ch. 5, "Copper Structured Cabling Systems," "Cable Termination Practices" Section. Use lacing bars and distribution spools.
   10. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation, and replace it with new cable.

11. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
12. In the communications equipment room, install a 10-foot- (3-m-) long service loop on each end of cable.
13. Pulling Cable: Comply with BICSI Information Transport Systems Installation Methods Manual, Ch. 5, "Copper Structured Cabling Systems," "Pulling and Installing Cable" Section. Monitor cable pull tensions.

C. Group connecting hardware for cables into separate logical fields.

D. Separation from EMI Sources:
1. Comply with recommendations from BICSI's "Telecommunications Distribution Methods Manual" and TIA-569-D for separating unshielded copper communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
   a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches (127 mm).
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches (300 mm).
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches (600 mm).
3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
   a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches (64 mm).
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches (150 mm).
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches (300 mm).
4. Separation between communications cables in grounded metallic raceways, power lines, and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
   a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches (76 mm).
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches (150 mm).
5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches (1200 mm).
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).

3.04 FIRESTOPPING

A. Comply with requirements in Section 078413 "Penetration Firestopping."

B. Comply with TIA-569-D, Annex A, "Firestopping."

C. Comply with "Firestopping Systems" Article in BISCI's "Telecommunications Distribution Methods Manual."

3.05 GROUNDING

A. Install grounding according to the "Grounding, Bonding, and Electrical Protection" chapter in BICSI's "Telecommunications Distribution Methods Manual."

B. Comply with TIA-607-B and NECA/BICSI-607.

C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall, allowing at least a 2-inch (50-mm) clearance behind the grounding bus bar. Connect grounding bus bar to suitable electrical building ground, using a minimum No. 4 AWG grounding electrode conductor.

D. Bond metallic equipment to the grounding bus bar, using not smaller than a No. 6 AWG equipment grounding conductor.

3.06 IDENTIFICATION

A. Identify system components, wiring, and cabling complying with TIA-606-B. Comply with requirements for identification specified in Section 270553 "Identification for Communications Systems."
   1. Administration Class: Class 2.
   2. Color-code cross-connect fields and apply colors to voice and data service backboards, connections, covers, and labels.

B. Paint and label colors for equipment identification shall comply with TIA-606-B for Class 2 level of administration.

C. Cable Schedule: Install in a prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.

D. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors.

E. Cable and Wire Identification:
   1. Label each cable within 4 inches (100 mm) of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
   2. Each wire connected to building-mounted devices is not required to be numbered at the device if wire color is consistent with associated wire connected and numbered within panel or cabinet.
   3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet (4.5 m).
   4. Label each terminal strip, and screw terminal in each cabinet, rack, or panel.
      a. Individually number wiring conductors connected to terminal strips, and identify each cable or wiring group, extended from a panel or cabinet to a building-mounted device, with the name and number of a particular device.
      b. Label each unit and field within distribution racks and frames.
   5. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and -connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.

F. Labels shall be preprinted or computer-printed type, with a printing area and font color that contrast with cable jacket color but still comply with TIA-606-B requirements for the following:
   1. Cables use flexible vinyl or polyester that flexes as cables are bent.

3.07 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections.
   1. Tests and Inspections:
      a. Visually inspect jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA-568-C.1.
      b. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.

c. Test twisted pair cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.
   1) Test instruments shall meet or exceed applicable requirements in TIA-568-C.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.

D. Data for each measurement shall be documented. Data for submittals shall be printed in a summary report that is formatted similarly to Table 10.1 in BICSI's "Telecommunications Distribution Methods Manual," or shall be transferred from the instrument to the computer, saved as text files, printed, and submitted.

E. Remove and replace cabling where test results indicate that they do not comply with specified requirements.

F. End-to-end cabling will be considered defective if it does not pass tests and inspections.

G. Prepare test and inspection reports.

END OF SECTION

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SECTION 27 2130
DATA COMMUNICATIONS SWITCHES AND HUBS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Core Switch
   2. Distribution Layer 3 Network Switch
   3. Stacking Cables

B. Description:
   1. Provide a new data network utilizing the new singlemode fiber optic infrastructure. Provide a redundancy configuration utilizing Port/Link Aggregation and Rapid Spanning Tree.
   2. The contractor shall be responsible for working with the owner for the configuration of the data network. This shall include but not be limited to all aspects of Security/Firewalls, VLANs, Traffic Shaping, IP Addressing, integration with servers, DHCP address assignments, traffic prioritization and routing.
   3. The contractor shall work with the owner to develop a patching scheme for all devices attached to the data network. The contractor shall be responsible for patching all devices from the patch panels to the data network switches.
   4. Access Switches shall host IEEE 802.3at Power Over Ethernet (PoE) capacity to support future camera requirements.

1.02 RELATED REQUIREMENTS

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

B. The following documents shall also be considered as a part of and shall relate directly to this section:
   1. Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS
   2. Section 27 0526 - GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS
   3. Section 27 1323 - COMMUNICATIONS OPTICAL FIBER BACKBONE CABLING
   4. Section 27 1513 - COMMUNICATIONS COPPER HORIZONTAL CABLING

1.03 ABBREVIATIONS AND ACRONYMS

A. Reference Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.04 DEFINITIONS

A. Reference Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.05 CODE REFERENCES AND STANDARDS

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.06 SUBMITTALS

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.07 QUALITY ASSURANCE

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

B. Installer Qualifications: Lead technician performing the installation shall hold manufacturer's certification equal to a Cisco Certified Network Associate or better. Provide a copy of the certification during the submittal process.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Reference Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.09 WARRANTY

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

1.10 CLOSEOUT SUBMITTALS

A. Comply with Section 27 0000 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEMS

PART 2 PRODUCTS

2.01 CORE SWITCH

A. Description of Minimum Requirements:
   1. Physical:
      a. Fully populated dual redundant, modular power supplies.
      b. Fully populated and redundant modular fans/fan trays.
      c. Port Connectivity: Forty-eight (48) 1/10G SFP+ ports.
      d. BASE BID:
         1) 1 Gigabit Optical Links: Twenty (20) SFP modules at the core switch serving 1000Base-X links to each distribution switch illustrated on the drawings.The total SFP module number represents an "A path" and "B path" for primary and redundant links across the campus.
         2) 10 Gigabit Optical Links: Four (4) SFP+ modules at the core switch serving 10GBase-X links to the video surveillance server and network attached storage server.
      e. ADD ALTERNATE:
         1) 1 Gigabit Optical Links: Provide Twenty (20) additional SFP modules to serve the redundant core switch. Performance and configuration shall match the primary core. Refer to the bid form and add alternate schedule in the specifications.
         2) 10 Gigabit Optical Links: Provide four (4) additional SFP+ modules to serve the redundant core switch. These shall be provided for video surveillance system connectivity redundancy.
   2. Software/Firmware:
      a. Managed, Layer 3 services which shall include: IPv4 and IPv6 routing, multicast routing and Quality of Service (QoS) management.
      b. Port Aggregation/Link Aggregation Protocol
      c. 802.1D Spanning-tree protocol (Rapid ST)
      d. 802.1X Capable
      e. Dynamic Host Configuration Protocol (DHCP)
      f. VLAN support
      g. Access Control List support

B. Approved Manufacturers:
   1. Cisco WS-C3850-48XS-E
   2. Extreme Networks
   3. Hewlett-Packard (HP)
   4. Engineer Approved Equal

C. Quantity:
   1. BASE BID: One (1)
   2. ADD ALTERNATE - Provide one (1) additional core switch configured for redundancy and failover purposes. Refer to the bid form and add alternate schedule in the specifications.

2.02 DISTRIBUTION NETWORK SWITCHES

A. Description of Minimum Requirements for all Distribution Network Switches:
   1. Physical:
      a. Fully populated dual redundant, modular power supplies.
      b. Fully populated and redundant modular fans/fan trays.
      c. The switch shall comply with IEEE 802.3az Energy Efficient Ethernet
      d. The switch shall support the Ethernet data IEEE 802.3 protocol using auto-negotiating and auto-MDI/MDI-X features.
      e. All ports shall be full duplex.
      f. IPv4 Host Addresses: 62k
      g. IPv6 Host Addresses: 24k
      h. 4096 VLANs
   2. Software/Firmware:
      a. Managed, Layer 3 services which shall include: IPv4 and IPv6 routing, multicast routing and Quality of Service (QoS) management.
      b. Port Aggregation/Link Aggregation Protocol
      c. 802.1D Spanning-tree protocol (Rapid ST)
      d. 802.1X Capable
      e. Dynamic Host Configuration Protocol (DHCP)
      f. VLAN Support
      g. Access Control List support

B. Layer 3 Network 24-port Switch: Type 1
   1. Description of Minimum Requirements:
      a. Port Connectivity: Twenty-four (24) 10/100/1000 Ports, four (4) 1/10G SFP+ ports
      b. Power over Ethernet: IEEE 802.3at compliant (25.5 W per port)
      c. BASE BID:
         1) Optical Uplinks: Two (2) total SFP modules per switch serving a 1000Base-X links to the core switch.
      d. ADD ALTERNATE:
         1) Optical Uplinks: Provide two (2) additional SFP modules per switch serving a 1000Base-X link to the redundant core switch. Refer to the bid form and add alternate schedule in the specifications.
   2. Approved Manufacturers:
      a. Cisco WS-C3850-24P-S
      b. Engineer approved equal
   3. Quantity of Type 1 Switches: Provide quantity as illustrated on the drawings.

C. Layer 3 Network 48-port Switch: Type 2
   1. Description:
      a. Port Connectivity: Forty-Eight (48) 10/100/1000 Ports, four (4) 1/10G SFP+ ports.
      b. Power over Ethernet: IEEE 802.3at compliant (25.5 W per port)
      c. BASE BID:
         1) Optical Uplinks: Two (2) total SFP modules per switch serving a 1000Base-X links to the core switch.
      d. ADD ALTERNATE:
         1) Optical Uplinks: Provide two (2) additional SFP modules per switch serving a 1000Base-X link to the redundant core switch. Refer to the bid form and add alternate schedule in the specifications.
   2. Approved Manufacturers:
      a. Cisco WS-C3850-48P-S
      b. Engineer approved equal
   3. Quantity of Type 2 Switches: Provide quantity as illustrated on the drawings.

2.03 STACKING CABLES

A. Provide Stacking cables at Building H in which two switches can be managed as one logical switch.

2.04 SYSTEM REQUIREMENTS

A. The contractor shall be required to fully review the infrastructure test results prior to connecting any switch to ensure high quality transmission. The contractor shall also verify that the proper space has been allocated for all new data network equipment.

B. All patch cables required for the entire connectivity of the data network that pertains to video or security management shall be provided and installed by this contractor.

C. In each communications room the equipment shall be directly connected to a ground bar that is connected to the electrical ground in the building. Follow manufacturer's recommendations for grounding.

PART 3 EXECUTION

3.01 EXAMINATION

A. The contractor shall make themselves aware of the site prior to submission of the bid response.

3.02 PREPARATION

A. Each location where equipment of the data network will be placed shall be identified and reviewed prior to installation of the components.

B. All work shall be done by trained professionals with a history of work on the equipment being installed.

C. The contractor shall provide all hardware, software, cable, connecting blocks, electronics, configuration, and labor required for a complete and operating system.

3.03 USER CONNECTIVITY

A. The contractor shall meet with the owner as soon as the project has begun to discuss connectivity of the new data network switches to the new video and security management system devices. Also coordinate closely with the owner on any connectivity that requires migration from an existing switch to a new switch.

B. When the new electronics are installed, the contractor shall provide all new patch cables for all data connectivity in the rack/cabinet and to the user's device.

1. Patch cables shall be of same category as the horizontal cabling infrastructure, fiber cables, and shall be factory made and matched to length required between the patch panel and the new data network switch.

3.04 DATA NETWORK SWITCH PLACEMENT

A. The contractor shall be responsible for the placement of the data network equipment and all its components in the assigned telecommunications room or closet.

B. The contractor shall consult with the owner about placement prior to cutover.

C. All equipment shall be secured in communication racks using the maximum number of screws as there are holes provided by vendor equipment.

3.05 SYSTEM CONFIGURATION

A. The contractor shall configure and install the data network as per the owner's VLAN and security requirements.

1. Meetings shall be scheduled with the owner to discuss the configurations of all electronics and the capabilities of the system. The system shall be configured for other systems outside of this projects scope. That shall include but not be limited to: Voice-over-IP telephony and wireless access points. Contractor shall configure VLANs as well as quality of service set up with priority being given to voice and video.

2. The owner shall be made aware of all the capabilities of the data network electronics and all possible configurations and shall be able to decide all aspects of the programming and configuration.
3. The contractor shall generate a report on the requirements of the owner and shall program and configure all the data network switches to meet the owner's needs. All costs associated with the meetings and programming are to be included in the bid.
4. From the meetings the owner and contractor shall generate a plan for all configuration issues of the data network including but not limited to:
    a. IP Numbering Scheme
    b. VLAN Settings
    c. Quality of Service (QoS) Settings
    d. Network Prioritization
    e. New Data Connections
    f. Existing to be Migrated Data Connections
    g. Video Surveillance and Security Management
    h. Security Settings for Management
5. The network electronics shall not be configured with default usernames or default passwords.

3.06 LABELING

A. All supplied devices shall have a label affixed in a visible location on the front and rear of the equipment.
    1. The label shall identify the switch name and IP address.

B. All labels shall be machine printed.

C. All copper and fiber patch cables interconnecting switches shall have a self-laminating label affixed on each end of the patch cable.
    1. The label shall identify the switch and port at the opposite end of the cable.

D. All copper and fiber patch cables interconnecting switches to servers shall have a self-laminating label affixed on each end of the patch cable.

3.07 WORK AREA

A. The contractor shall provide a clean and orderly area to work in during system installation.
    1. The work areas shall be cleaned daily. All packing trash and other assorted items shall be removed at the end of each workday.
    2. Dust shall be kept to a minimum during the installation. All dust shall be removed prior to the cutover, and then again just prior to project closeout.
    3. The owner and engineer shall have access to the work area at any time during normal working hours.
    4. The owner and engineer have the right to stop work and seek answers to questions and concerns that may come up during the installation of the new data network.

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SECTION 28 0000

GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS

PART 1 GENERAL

1.01 DESCRIPTION

A. Division 28 specifications are provided to define the standards and criteria to be used to bid, plan, furnish, install, test, and document electronic safety & security systems for 18032 - Newton Correctional Facility. These specifications shall form the basis for implementation of the design, installation, inspection, and close-out process.

B. Division 28 has been designed and developed based on the most current and adopted International Series Building and Fire Code, Facility Guidelines, Iowa Administrative Code and Amendments, NFPA 72, NFPA 70 (NEC), and National Electrical Safety Code (NESC) requirements. The requirements within those documents are not superseded herein unless specifically stated. Code requirements are unable to be superseded by this document at any time. The absence of a specific reference to an element within the aforementioned codes, and standards does not relieve all parties of compliance with them.

C. Within this document use of the word “shall” marks mandatory requirements. Use of the word “may” or “should” suggests optional elements. All conflicts within this document shall be resolved by the Construction Manager in consultation with the Design Team. The standards of Owner's shall take precedence in the resolution of any dispute.

D. Unauthorized changes and/or deviations from these specifications, regardless of scale, may result in re-design, reconstruction, or re-installation of communications elements at the contractor’s expense. Contractors shall obtain formal written approval prior to bidding and prior to installation in order to deviate from these specifications. Contractors shall not deviate from code requirements.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 00 & 01 Specification Sections, apply to this section.

B. The following documents shall also be considered as a part of and shall relate directly to this section:
   1. Section 28 0505 - SELECTIVE DEMOLITION OF ELECTRONIC SAFETY AND SECURITY SYSTEMS
   2. Section 28 0533 - CONDUIT AND BACKBOXES FOR SAFETY AND SECURITY SYSTEMS
   3. Section 28 0544 - SLEEVES AND SLEEVE SEALS FOR ELECTRONIC SAFETY AND SECURITY PATHWAYS AND CABLING
   4. Section 28 0553 - IDENTIFICATION FOR ELECTRONIC SAFETY AND SECURITY SYSTEMS
   5. Section 28 2000 - VIDEO MANAGEMENT SYSTEM
   6. Section 28 4600 - FIRE DETECTION AND ALARM SYSTEM
   7. Section 28 5200 - DETENTION CONTROL SYSTEM
   8. Section 28 5210 - PERIMETER FENCE SECURITY SYSTEM

1.03 SYSTEM DESCRIPTION

A. Division 28 specifications security and life safety systems, system’s pathways, spaces, identification, testing, and documentation requirements.

B. Specific responsibilities of Division 28 include, but are not limited to:
   1. Installation of the intra-building pathways, cabling, and coordinating space requirements necessary to house the electronic safety & security systems. Pathways and spaces shall be provided to support the known systems and cabling requirements, as well as provisions for those that may be required in the future for growth purposes.

2. The procurement and installation of each electronic safety & security system and the associated components and cabling to create a fully functional system.
3. Thorough testing shall be conducted of each individual electronic safety & security system to illustrate compliance with specific performance requirements.
4. Submittal preparation and formal submission to the authority having jurisdiction to review life safety systems design.
5. Securing all necessary permits and licenses, payment of all fees, and provision of all construction work notifications.
6. Compliance with all applicable laws, ordinances, rules, and regulations.
7. Mandatory Project Manager attendance at a weekly project status meeting, with the General Contractor.

C. It is the intent of the project drawings and specifications to provide complete and fully functional Division 28 electronic safety & security systems, ready for use. Any item, not specifically shown in the project drawings or called for in the project specifications but normally required for a complete system, is to be considered a part of this contract.

1.04 CODES AND STANDARDS

A. All work shall be in compliance with the following codes and agencies. Nothing contained within these specifications shall be misconstrued to permit work not in conformance with the most stringent of applicable codes and standards. It is assumed that bidders have access to, and specific knowledge of, the listed reference materials in order to ensure conformity with them.
1. International Building Code
2. International Fire Code
3. Facility Guidelines Institute
4. National Electrical Code (NEC)
5. National Electrical Safety Code (NESC)
6. National Fire Protection Association (NFPA)
7. Iowa Administrative Code (IAC)
8. National Electronic Manufacturer's Association (NEMA)
9. Occupational Safety & Health Administration (OSHA)
10. Federal Communications Commission (FCC)

B. All new materials, equipment, and installation practices shall meet the requirements of the following standards, unless specifically instructed otherwise by the Design Team.
1. Federal, State, and local codes, rules, regulations, and ordinances.
   a. Perform all work in accordance with local jurisdiction requirements that is governing the work and as fully part of the specifications attached.

1.05 INSTRUCTIONS

A. The General Conditions, Requirements, and Special Provisions, of any larger body of specifications, of which this specification may be a part, are hereby made a part of this specification. In the event that any clauses or provisions of the larger body of specification conflict with the letter or intent of this specification, the contractor shall immediately notify the Design Team for clarification and direction.

B. Before bidding, the contractor shall diligently study and compare all contract documents and shall promptly notify the Design Team of any discrepancies or deficiencies discovered by or made known to the contractor.

C. Discrepancies: Whenever a discrepancy or inconsistency exists between related information indicated on the contract drawings and/or specifications, this contractor shall obtain additional clarification and direction from the Design Team before proceeding. For bidding purposes, this contractor shall include the labor and materials necessary to comply with the solution that results in the greatest cost to the contract.
1. If there is a conflict between applicable documents, then the more stringent requirement shall apply.

2. The failure to question any controversial item will constitute acceptance by the bidder who shall execute it to the satisfaction of the owner after being awarded the contract.

D. Deficiencies: The contractor and associated subcontractors shall resolve all known deficiencies and omissions, including non-compliance with applicable codes, with the Design Team prior to ordering materials or proceeding with the work. Any work performed prior to receipt of instructions from the Design Team will be done so at the contractor's risk.
   1. If mention has been omitted pertaining to details, items or related accessories required for the completion of any system, it is understood such item and accessories are included in the contract. After the contract is awarded, claims based on insufficient data or incorrectly assumed conditions, or claims based on misunderstanding the nature of the work, will not be recognized.

E. All devices, symbols and work illustrated shall be new work provided under this contract except work labeled existing to remain and equipment labeled to be furnished (or supplied) by others, but installed by this contractor.

F. System Continuity:
   1. Reconnect all existing items that remain in use. Provide all materials and labor required to retain continuity of existing circuits or systems that are disrupted by these alterations even though not indicated on the drawings.

1.06 COORDINATION

A. All Division 28 contractor project managers shall schedule and conduct a coordination meeting with to confirm and coordinate scope of work requirements prior to commencement of work. This shall include but not be limited to talking through desired sequence of operation for access control, wandering resident and the associated programming and labeling requirements. Project meetings shall be scheduled through the Construction Manager.

1.07 SUBMITTALS

A. Refer to Division 1 for exact submittal procedures.

B. The Division 28 contractor shall provide for review, without exception prior to material acquisition and installation, three (3) copies of the following items. Failure to submit required items shall disqualify the bidder.
   1. Product Data Sheets (Catalog Cuts)
   2. Riser/Cabling Diagrams
   3. System Schematics
   4. Specification Sheets for Test Equipment
   5. Bill of Materials
   6. Contracting Firm Qualifications and Certifications
   7. Installation Team Qualifications by Individual
   8. Current Manufacturer Certifications

C. In addition to the above submittal information, the fire detection and alarm contractor shall also adhere to the authority having jurisdiction (local and/or state) submittal requirements. The bid represented by this contractor shall include the necessary fees required for this governing body to review the project.

D. Provide throughout installation:
   1. Material samples, if requested by the design team.
   2. Periodic field quality control reports.

1.08 CLOSEOUT SUBMITTALS

A. Provide at completion of each construction phase area:
   1. System test and certification reports; summary hard copy or full test results on compact disc when requested by the owner or design team. Reports shall be submitted to the requesting party within seven (7) calendar days.

2. One (1) set of record drawings of the actual installation of the Division 28 systems. Drawings shall be given as full size originals and on disk in AutoCAD format

B. Provide at final completion, three (3) bound sets of O&M (Operating and Maintenance) Manuals formatted as defined by Division 1 and one (1) electronic copy provided on a CD/DVD disc. Each copy of the O&M Manual shall include, at minimum, items listed as follows:
   1. System test and certification reports; summary hard copy and full test results on disc. Test results shall be delivered at the completion of each project phase and at any time when called for by the Owner.
   2. Provide one (1) full-size hard copy set of record drawings (as-builts) to be submitted to the Design Team for approval, immediately upon completion of the installation.
   3. Instruction manuals including equipment and schedules, operating instructions, and manufacturer's instructions.
   4. Manufacturer warranty certificate.
   5. Warranty contacts including but not limited to: names, telephone numbers (office and mobile).

1.09 QUALITY ASSURANCE

A. Contracting firm shall constitute a company with a minimum of five (5) years successful installation experience with projects utilizing infrastructure and systems work similar to that required for this project.

B. Fire alarm contractor shall have at least one (1) NICET Level II on staff responsible for this project. Provide copies of these certificates in the submittal process.

C. Work crew, not involved in final connections to the fire alarm system (e.g. laborers delivering/moving materials, installing grounding by an electrician, or workers installing pathway elements) do not require NICET or manufacturer certification or registration.

D. Contractor shall provide with a manufacturer certification for the system solution bid, issued directly in the bidder’s company name, valid for the time frame in which the installation will be completed. Contractor shall be manufacturer certified in order to participate in the bid event.

E. The Contractor shall be knowledgeable in local, state, regional, and national codes and regulations. All work shall comply with the latest revision of codes or regulations. When conflict exists between local or national codes or regulations, the most stringent codes or regulations shall apply.

F. Only installers trained and certified by the proposed manufacturer shall be allowed to install products. Installers must possess the highest level of certification available by the manufacturer for the specific solution being installed.

G. Only installers trained and certified by the proposed manufacturer shall be allowed to install firestop products.

H. The Security Contractor-Installer (SCI) also referred to as the Detention Control contractor, shall be the single point of contact, and have total responsibility for the coordination and installation of the work shown and described in the Detention Control Drawings and Specifications. The work covered under this Section of the Specifications consists of furnishing all labor, equipment, supplies, and materials, and in performing all operations necessary for the complete installation of security equipment in accordance with the specifications and the accompanying drawings, except as specifically noted otherwise.

I. Coordinate with the construction manager the environmental and construction conditions necessary in each of the control areas and equipment rooms for systems installation and operation. Duration of installation and testing activities must be specifically addressed to permit completion of the Detention Control systems concurrently with the remainder of the facility.
   1. Prior to the installation of Security Control equipment:
      a. Verify that all construction activities within the Control & Equipment rooms are ready and available. Rooms should be temperature / humidity controlled, dust free, and secure. Do not install equipment until these conditions are met.

b. When conditions dictate storing equipment prior to installation, the temporary storage location should meet the requirements of item a. (Above). Coordinate the storage locations with the construction manager.
c. Verify that the permanent, surge protected, power source is available for connection to the equipment.
d. Verify that all circuits feeding system processors have UPS backup.
e. Verify that network connectivity is available for access to system processors across the campus serving:
    1) Programmable Logic Controller Network
    2) Detention Controls Software Platform Network

J. Qualification Requirements for Detention Controls: The Security Contractor-Installer (SCI) also referred to as the Detention Control contractor shall have total responsibility for the coordination and installation of the work shown and described in the Detention Control Drawings and Specifications. The company shall specialize in the design, fabrication, coordination, and installation of low-voltage electronics and communication control systems.

K. Prior to accepting the Detention Control contractor's bid, the following may be requested at any time to confirm contractor qualifications:
1. Prepare a list of four (4), completed, projects involving major systems similar to those described in these specifications for which the company has assumed responsibility as the SCI.
    a. Name of project and location
    b. Date of project completion
    c. Contract amount for the equipment and services for which the company had responsibility
    d. Names of the SCI’s Project Manager, Project Engineer and Field Manager
    e. Name and telephone number of an individual at each facility familiar with the performance, operation, and maintenance of the facility’s systems (preferably, the maintenance manager) References must be current or the SCI may be considered non-responsive.
    f. List the description of systems included on the project and the approximate installed value of each. Typical experience desired:
        1) Intercom & Paging
        2) Video Management
        3) Local Area Network
2. Proposed organizational chart to include the names of the SCI’s Project Manager, Project Engineer, Field Manager, Field Technicians, and Technical Support Staff
    a. For each of the individuals listed in the organizational chart, provide resumes and a delineation of the individual’s project responsibilities for this project. The resumes must include information about the individuals’ education, low-voltage systems experience, factory training, and length of time employed with the SCI.
3. For each of the specified systems in the Detention Control documents, provide a delineation of the tasks to be performed by the SCI’s staff and those tasks, if any, to be performed by Vendors. Technical proposals reflecting each subcontractor’s expertise and experience in the field of the subcontracted scope of work must be included with the SCI’s proposal.
4. The SCI shall provide a written statement that they have reviewed the Detention Control drawings and specifications and understands the specified system architecture and requirements.

1.10 SEQUENCING AND SCHEDULING

A. Existing Equipment: Maintain existing equipment fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service, and label existing fire-alarm equipment "NOT IN SERVICE" until removed from the building.

B. Equipment Removal: After acceptance of new systems, remove existing disconnected equipment and wiring.

C. Coordinate all of these procedures closely with the construction manager and owner.

PART 2 PRODUCTS

2.01 MANUFACTURER'S, PRODUCTS, AND SERVICES

A. If a bidder proposes to substitute an article, device, material, equipment, form of construction, fixture, or item other than the approved manufacturers and part numbers, listed and named in the specifications, the bidder shall certify that the proposed item is equal in quality and all aspects of performance and appearance, to the items specified. The bidder shall submit a request for substitution to the Design Team by following the instruction in Specification Section 01 2500, which must include:
   1. The name and complete description of the proposed Substitution including Drawings, performance and test data, and other information necessary for a complete evaluation; and
   2. A statement setting forth any changes that the Proposed Substitution will require in the Contract Documents or the project.

B. If the Design Team approves the proposed substitution, the Design Team shall issue an Addendum. If the Design Team does not approve the substitution, the Design Team shall inform the bidder of its decision, which is final. The Design Team may reject a proposed Substitution because the bidder failed to provide sufficient information to enable the Design Team to completely evaluate the proposed substitution without causing a delay in the scheduled bid opening.

C. Proposed substitutions received by the Design Team after the allotted time allowed by Section 01 2500 shall not be considered.

D. Bidder shall confirm all reference part numbers, listed within Division 28, as current and suitable for the items described and specified and shall file a formal RFI for all perceived discrepancies prior to bidding.

E. All materials associated with reference parts shall be included so as to constitute a complete and functional system, whether or not specifically identified and itemized.

F. Service Qualifications: There shall be a permanent service organization maintained or trained by the manufacturer which will provide service to the project site within two (2) hours of receipt of notification that service is needed. Submit name and address of service organizations during the submittal process.

2.02 SLEEVES FOR PATHWAYS AND CABLES

A. Where additional conduits are needed beyond those shown on the drawings to accommodate the installation of systems, this contractor (Division 28) shall include such provisions in this contract. Provide conduit suitable for its application and sized in accordance with industry standards. Include nylon bushings at conduit ends and firestopping as required around conduits wherever building barriers are penetrated. If necessary, this contractor shall hire a qualified contractor to perform this work.

PART 3 EXECUTION

3.01 PROJECT CONDITIONS

A. Owner's shall not be responsible for delays in work because of shutdowns due to unsafe working practices by Contractors.

B. Contractor shall clean work areas each day and remove debris properly and legally from the property. Materials and supplies stored for use in the project shall be neatly stacked outside the circulation areas. All exits and paths shall be cleaned so as to prevent dirt from being tracked into the facilities.

C. Contractor shall ensure that all building fixtures have been re-installed to their original condition at the conclusion of the final shift of the day.

D. It shall be the responsibility of the Contractor to secure any parking permits prior to the first day of work on-site.

E. Work outside of normal operating hours and days shall be coordinated with Owner's.

3.02 FINAL CLEANING

A. Division 28 Contractor shall thoroughly clean all enclosures, assemblies and field devices before they are turned over to Owner's for operation. Should the special system's room(s) be completed prior to the balance of the floor space construction that it serves, racks, cabinets, and wall frames shall be covered with plastic sheeting to repel dust and other contaminants to which they will be subjected.

3.03 WARRANTY

A. The Contractor shall submit, in the bid documents, any contractor-specific warranties or guarantees to be offered on the project.

B. The Contractor shall supply any and all necessary documentation needed to process and record the warranty(s) and to verify the installation solution.

C. System Warranty
   1. Manufacturer or the certified manufacturer representative shall agree to repair or replace Division 28 equipment and components that fail in materials or workmanship within the specified warranty period.
      a. Warranty Period: One (1) year from the date of substantial completion.

3.04 SAFETY REQUIREMENTS

A. All contract work shall be performed in accordance with the policies, procedures, and standards established by the Owner's.

B. In construction areas, all Contractor personnel shall wear personnel protection devices, as deemed appropriate by the Construction Manager and as required by OSHA for the work location and work operation being performed. Devices shall include, but not be limited to hardhats, work boots, safety eye protection, reflective vests, etc.

C. All exposed holes, pits, pipes, etc., either inside or outside the project facilities, shall be barricaded or plated and adequately secured when Contractor personnel are not present. All ladders, hanging wires, pipes, and other items protruding at a pedestrian level travel way most be removed or secured following the final shift of the day.

D. During breaks or when only a portion of work has been completed, tools shall not be left exposed where others may risk injury or attempt to use them. Windows and doors shall not be left unsecured or propped open during breaks. At the completion of the final shift each day, doors, windows, or other openings shall be adequately secured.

E. When driving on property, Contractor personnel shall observe all traffic safety regulations and pay particular attention to pedestrians. All loose material and debris on vehicles shall be adequately secured and tied down.

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SECTION 28 0505

SELECTIVE DEMOLITION OF ELECTRONIC SAFETY AND SECURITY SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Demolition and removal of selected portions of building or structure.
   2. Demolition, temporary removal, relocation, or reconfiguration of selected site elements and/or Information Technology (IT), Security or other Special Systems or infrastructure.
   3. Salvage of existing items to be reused or recycled.

B. Contractor shall include in the Bid all labor, materials, tools, transportation, storage costs, equipment, insurance, temporary protection, permits, inspections, taxes and all necessary and related items required to provide complete demolition and cutover of existing telecommunication systems shown and described in the drawings and specifications herein.

C. The Contractor is responsible for providing and coordinating phased activities and construction methods that minimize disruption to operations and provide complete and operational systems. Equipment and devices shall not be removed or reconfigured until removal or reconfiguration has been coordinated with owner and approval is given in writing.

D. The Contractor shall coordinate interfaces to existing systems that are being demolished in order to minimize disruption to the existing systems operations. Any systems outages shall be approved in advance and scheduled with Owner's.

1.02 RELATED DOCUMENTS

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

B. The following documents shall also be considered as a part of and shall relate directly to this section:
   1. Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS

1.03 PROJECT CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Field verify the existing conditions, device equipment locations to determine the extent of the demolition required. Notify the Design Team of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
   1. Hazardous materials will be removed by Owner before start of the Work.
   2. If suspected hazardous materials are encountered, do not disturb; immediately notify the Design Team. Hazardous materials will be removed by Owner under a separate contract.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1.04 DEFINITIONS

A. Reference section 28 0000 - General Requirements for Electronic Safety and Security Systems

1.05 QUALITY ASSURANCE

A. Comply quality assurance requirements listed in section 28 0000 - General Requirements for Electronic Safety and Security Systems

1.06 CODES AND STANDARDS

A. Comply with codes and standards listed in section 28 0000 - General Requirements for Electronic Safety and Security Systems

1.07 ADMINISTRATIVE REQUIREMENTS

A. Pre-Demolition Meeting
   1. Conduct a pre-demolition meeting at Project Site with Construction Manager, Owner and all affected stakeholders.
      a. Inspect and discuss condition of construction to be selectively demolished.
      b. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
      c. Existing telecommunications rooms that have demolition work may involve electrical, mechanical and architectural demolition. Review and coordinate requirements of work performed by other trades.
      d. Review areas where existing construction is to remain and requires protection.
      e. Review procedures to be followed when critical systems are inadvertently interrupted. The Contractor shall be responsible for the coordination required with Owner's prior to device removal to ensure systems that must remain operational are not compromised during the demolition process.

1.08 P2 PRODUCTS (NOT USED)

PART 3 EXECUTION

2.01 GENERAL - SELECTIVE DEMOLITION

A. Demolition and construction methods shall conform to Owner's requirements, requirements of the State of Iowa and all applicable building codes.

B. Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
   1. Proceed with selective demolition systematically. Complete selective demolition operations above each floor or tier, before disturbing supporting members on the next lower level, if applicable. Remove all abandoned cable from origin to destination.
   2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
   3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
   4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and/or portable fire-suppression devices during flame-cutting operations.
   5. Maintain adequate ventilation when using cutting torches.
   6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
   7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.

8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly.

C. Removed and Salvaged Items:
1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's designated storage area. Coordinate delivery of equipment with Owner's seven (7) days prior to delivery.
5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
5. Perform testing on reinstalled active systems and get sign-off by a the Owner or Owner's representative inspector that systems are re-connected and working properly.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Engineer, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

2.02 EXAMINATION

A. Verify that utilities have been disconnected and capped per approved procedures before starting selective demolition operations.

B. Survey existing condition of all communications systems related conduits and cables from origin to destination and correlate with requirements indicated to determine extent of selective demolition required.

C. Label all conduits and cables with origin, destination and what system they serve.

D. Consult with the Owner to determine whether systems can be disabled or whether a new parallel system needs to be installed.

E. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to the Design Team.

2.03 UTILITY SERVICES AND COMMUNICATION SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
1. Comply with requirements for existing services/systems interruptions.
2. For existing equipment with active components in them, provide dust protection and circulate cooling air with a portable air conditioning unit or other means to ensure equipment does not overheat.

B. Existing Services/Systems to Be Removed, or Relocated: Locate, identify, disconnect, and seal or cap off indicated utility services and communications systems serving areas to be selectively demolished.
1. Owner will arrange to shut off indicated services/systems when requested by Contractor. Coordinate the disconnection of all electrical circuits with the Electrical Contractor prior to disconnection.
2. Arrange to shut off indicated utilities with utility companies.

3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.

2.04 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
   1. Comply with requirements for access and protection.

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
   1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
   2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
   3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
   4. Cover and protect furniture, furnishings, and equipment that have not been removed.
   5. Comply with requirements for temporary enclosures, dust control, heating, and cooling.

2.05 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
   1. Do not allow demolished materials to accumulate onsite.
   2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
   3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

2.06 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

B. The contractor shall be required, on a daily basis, to dispose of any demolished material not required to be returned to the Owner. All materials shall be transported off of the Owner’s property at the expense of the Contractor.

C. At the end of each work day or shift, the Contractor shall be required to clean-up the work area and remove all construction debris such that the site is clean and usable without hazard to workers.

END OF SECTION

SECTION 28 0533

CONDUIT AND BACKBOXES FOR SAFETY AND SECURITY SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Conduit and Fittings.
   2. Junction Boxes.
   3. Device Boxes.
   4. Pull Boxes.
   5. Wall Boxes.
   6. Other Box Types and Requirements.

1.02 RELATED DOCUMENTS

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

B. The following documents shall also be considered as a part of and shall relate directly to this section:
   1. Section 28 2000 - Video Management System
   2. Section 28 4600 - Fire Detection and Alarm System
   3. Section 28 5200 - Detention Control System
   4. Section 28 5210 - Perimeter Fence Security System

1.03 DEFINITIONS

A. Reference section 28 0000 - General Requirements for Electronic Safety and Security Systems

1.04 SUBMITTALS

A. Comply with Section 28 0000 - General Requirements for Electronic Safety and Security Systems

1.05 CLOSEOUT SUBMITTALS

A. Comply with Section 28 0000 - General Requirements for Electronic Safety and Security Systems

1.06 QUALITY ASSURANCE

A. Refer to section 28 0000 - General Requirements for Electronic Safety and Security Systems

1.07 CODES AND STANDARDS

A. Comply with Section 28 0000 - General Requirements for Electronic Safety and Security Systems

PART 2 PRODUCTS

2.01 GENERAL

A. Refer to all of the technology and communication Drawings and details in the Construction Documents for additional requirements including, but not limited to: outlet box size, mud ring gang size, conduit size and quantity and conduit routing. The specific outlet box configuration illustrated in the details sheets shall supersede the general outlet box size, mud ring gang size, conduit size and quantity and conduit routing requirements listed in this specification.

2.02 CONDUIT AND FITTINGS

A. Conduit types:
   1. EMT shall be steel, hot-dipped galvanized or electro-galvanized, with an inner coating to protect cables and aid pulling, UL listed, and meeting the requirements of UL 797 and ANSI C80.3.

2. RMC shall be steel, hot-dipped galvanized inside and outside with factory threaded ends full cut and galvanized after threading, UL listed, and meeting the requirements of UL 6 and ANSI C80.1.
3. RNC shall be PVC Schedule 40 rigid plastic unless otherwise noted on the Drawings, shall be rated for use with 90 degree C wire, and shall conform to UL 651, WC-1094C and NEMA TC 2.
4. Flexible (flex) conduit: Flex conduit is not approved and not acceptable. Where, in rare instances, flex conduit is the only remaining viable raceway option, the Contractor shall notify the Engineer and await the Engineer's direction prior to procurement and installation.
5. Conduit bodies (LB's): Conduit bodies (LB's) are not approved and are not acceptable.

B. Fittings:
1. Provide fittings as follows:
a. EMT fittings shall be steel compression type with a nylon insulated throat for rain-tight and concrete-tight applications, steel set screw type or steel compression type for all other connections. Conduit ends shall be fitted with bushings - bushings shall be threaded type for RMC and IMC, set screw type for EMT, and have a nylon insulated throat.
b. RMC fittings shall be threaded galvanized steel. Conduit ends shall be fitted with bushings - bushings shall be threaded and have a nylon insulated throat.
c. RNC fittings shall be of same material and manufacturer as the conduit and shall be UL listed and conform to UL 514.
2. Expansion fittings shall be provided across structural joints, shall be of a design to compensate for expansion and contraction, and shall be sealed to prevent entrance of water and moisture, and shall safely deflect and expand up to twice the distance of the structural movement. Expansion fittings shall be approved for grounding duty.
3. Minimum Trade Size:
a. Communication systems conduit: 1 inch
b. All other systems conduit: ¾ inch

2.03 JUNCTION BOXES

A. Junction boxes shall be provided to serve as a transition point between pathways/raceways. Junction boxes shall be galvanized stamped steel, deep drawn one piece (without welds or tab connections), with knockouts for conduit entrances, meeting NEMA OS 1.

B. Junction boxes shall not be placed in non-accessible ceiling locations unless specifically shown on the Communications Construction Drawings or approved in writing by the Engineer prior to rough-in and installation.

C. Junction boxes in locations other than walls shall be sized according to the NEC.

D. Junction boxes in walls:
1. Unless otherwise shown on the Drawings, junction boxes shall be 4-11/16 inch by 4-11/16 inch by 2-1/8 inch deep with blank cover, and knockouts pre-manufactured to support the conduit size serving the junction box.
2. Size according to the NEC and provide the larger of the minimum size mentioned above or the NEC requirements.

2.04 DEVICE BOXES

A. General: Unless otherwise shown on the Drawings or specified herein, device boxes shall:
1. Be galvanized stamped steel, deep drawn one piece (without welds or tab connections), with knockouts for conduit entrances, meeting NEMA OS 1, and equipped with extension rings to suit construction and application.
2. Have knockouts pre-manufactured to support the conduit size serving the outlet box.

B. Device Box Types:

1. Device Box: Typically installed as an empty box with blank faceplate, conduit and pull string for future use, unless specifically noted otherwise on the Communications Construction Drawings.
   a. Shall be a minimum 4-11/16 inch by 4-11/16 inch by 2-1/8 inch deep capable of accepting a minimum of (2) 1 inch conduits.
   b. Shall be equipped with a minimum single-gang mud ring unless otherwise noted on the Drawings.
      1) Mud ring depth shall be sized according to the depth of the wall surface per the Architectural Construction Documents.
   c. Provide a blank faceplate to match the material, style and color being used on the Electrical Wiring Devices.
2. Outlet Box: Outlet boxes shall be provided to house Communications System outlets and connectors. Unless otherwise noted in the Communications Construction Drawings the typical Outlet Box(es) shall be as follows:
   a. Communications Cabling System:
      1) Shall be a minimum 4-11/16 inch by 4-11/16 inch by 2-1/8 inch deep capable of accepting a minimum of two (2) 1 inch conduits
      2) Shall be equipped with a single-gang mud ring unless otherwise noted on the Drawings or specified as follows:
         (a) Mud ring depth shall be sized according to the depth of the wall surface per the Architectural Construction Documents.
   b. Life Safety and Security Systems:
      1) Refer to system details on the Construction Documents and manufacturers requirements in the Division 28 Specifications. Coordinate with the system Contractor prior to rough-in.

2.05 PULL BOXES

A. Pull Boxes shall be code gauge sheet metal/fabricated steel continuously welded at seams and painted after fabrication. Boxes shall be complete with covers, trim, etc.

B. Minimum pull boxes sizes shall be as follows:

CONDUIT	WIDTH	LENGTH	DEPTH	ADD. WIDTH*
1”	4”	16”	3”	2”
1-1/4”	6”	20”	3”	3”
1-1/2”	8”	27”	4”	4”
2”	8”	36”	4”	5”
2-1/2”	10”	42”	5”	6”
3”	12”	48”	5”	6”
4”	15”	60”	8”	8”

1. *For each additional conduit added, increase the pull box width per this column.

C. Pull Boxes for conduits sized larger than shown in the table above shall be provided as shown on the Drawings.

2.06 WALL BOXES

A. Wall Boxes shall provide the interface for power, communication and/or audio/visual cabling within walls. Wall Boxes shall be flush style and shall be complete with covers, brackets and hardware to support installation as shown on Drawings.
   1. Wall Boxes may be combined for use by both power and communications where shown on the Drawings. When combined, provided metal dividers separating power from communications and provide separate conduits for power and communications.

2. Wall Boxes shall be complete with brackets, cover plates, and/or other means to support power, communications, and/or audio-visual type connectors shown on the Drawings or called for in the specifications.

2.07 OTHER BOX TYPES AND REQUIREMENTS

A. Provide as required according to the schedules, notes and communications details on the Construction Drawings.

PART 3 EXECUTION

3.01 CONDUIT

A. General:
1. Run conduit in the most efficient and direct route possible. Runs shall be parallel and perpendicular to building lines.
2. Route conduits as close to the deck/structure as possible.
3. Do not route conduit through areas in which flammable material may be stored, or over boilers, incinerators, hot water lines, or steam lines.
4. Conceal all conduits unless indicated otherwise, within finished walls, ceilings, and floors.
5. Keep conduits at least 6-inches away from parallel runs of flues and steam or hot water pipes.
6. Install conduits level and square and at proper elevations.
7. For conduit runs exceeding more than 100 feet in length, provide pull boxes so that no conduit segment between end points and/or pull boxes exceeds 100 feet.
8. For conduit runs which require more than two 90 degree bends, install pull boxes so that no conduit segment between end points and/or pull boxes contains more than two 90 degree bends or a total of 180 degrees of bends including offsets and kicks.
9. Ream all conduits to eliminate sharp edges. Conduits shall be reamed after threads are cut.
10. Joints shall be cut square and shall butt solidly into couplings.
11. Terminate all metal conduits with metallic threaded insulated throat bushings, PVC conduit with PVC bushings.
12. Metallic conduits entering communication rooms shall be equipped with grounding lugs.
13. Prevent foreign matter from entering conduits by using temporary closure protection. After cable installation, cap each unused conduit with a mechanical-type seal (tape is not acceptable).
14. Install expansion fittings where conduit crosses an expansion join in structure or is in an environment where temperature changes combined with conduit run length may produce expansion or contraction stress. Provide a flexible bonding jumper at least three times the nominal width of the joint.
15. Terminate conduits that protrude through a floor 2 to 3 inches above the surface of the floor.
16. Conduits shall be cleaned and dried prior to the installation of cables.
17. Route conduit through roof openings for piping and ductwork wherever possible. Where not possible, provide and route through roof jack with pitch pocket for waterproofing. Empty conduits passing through roof penetrations shall be capped and sealed weather tight.
18. Conduits passing through exterior walls and floors below grade shall be made watertight with duct plugs. Pipe sleeves and wall collars shall extend all around the conduit or entrance seals and be specifically manufactured for that purpose.
19. When using RNC, transition to RMC for all bends, stub-ups, and penetrations through foundation walls.
20. The inside radius of a bend in a conduit shall be at least 10 times the internal diameter of the conduit, regardless of size. All bends in conduits shall be done in a sweeping manner.
21. Building codes require a bushing to be placed at each end of any conduit that is used for placing communications wiring. The purpose of these bushings is to protect the cabling as

it is being placed. The Contractor will be required to ensure these bushings are in place prior to pulling wiring and not place them after the fact

22. Double-gang wall boxes that will be used in conjunction with single-gang faceplates shall include a single gang reducer plate.

B. Conduit Schedule:
   1. Buried or below grade level slab: RNC
   2. Through foundation walls: RMC
   3. Corrosive/Hazardous Areas: RMC
   4. Exposed or subject to mechanical injury: RMC
   5. All other areas (unless otherwise noted): EMT

C. Minimum Conduit Sizing, where not shown on the Drawings,:
   1. Junction Boxes in walls: 1 inch.
   2. Device Boxes: 1 inch.
   3. Floor boxes: Coordinate with the other Trades who will make use of the floor box and provide per their requirements. Conduits shall be provided per the manufacturer's requirements and recommendations for the specified floor box.
   4. Poke-thru: The size of the conduit feeding the poke-through shall be the same size as the conduit stub of the poke-through.

D. Conduit bends:
   1. A conduit bend shall not exceed 90 degrees and shall not be constructed in such a way as to reduce the effective diameter of the conduit.
   2. Conduit bends shall be sweeping, shall conform to TIA 569 bend radius requirements, and shall be a minimum of no less than 6 times the internal diameter of the conduit for conduits 2-inches or less and a minimum of no less than 10 times the internal diameter of the conduit for conduits greater than 2-inches.
   3. For conduits larger than 1-1/4 inch, bends shall be factory-manufactured. Bending conduit larger than this in the field using manual or mechanical methods is not acceptable. 1 inch and 1-1/4 inch bends shall be made in an approved bending machine or shall be factory-manufactured.
   4. The Contractor shall test each conduit with a mandrel to prove compliance with TIA and cable manufacturer bend radius requirements throughout the conduit run and shall provide evidence of such testing immediately upon request of the Engineer.
   5. The sum total of conduit bends for a conduit segment between end points/pull boxes shall not exceed 180 degrees, except one additional bend of up to 90 degrees is acceptable if the bend is located within 12 inches of the cable feed end.
   6. 90 degree conduit bodies (LB's) are not acceptable.

E. Conduit Stubs:
   1. From boxes in partition walls: Conduit stubs shall extend a minimum of 6-inches above top of partition wall and shall be angled 30 degrees toward the nearest raceway/pathway for horizontal cabling.
   2. To cable tray: Terminate conduits 2 to 4 vertical inches above the tray and within 2 horizontal inches of the edge of the tray. Conduits shall not extend over the edge of the cable tray.
   3. Through floor slabs: Arrange so curved portion of bend (if any) is not visible above finished slab.

F. Conduit/duct runs under slab: Coordinate with other trades (electrical, plumbing, etc.) prior to trenching and installation. Communications conduit/duct runs under slab shall not share a trench with conduit/duct runs from other trades.

G. Pull String for horizontal and systems cable:
   1. Equip all conduits over 3 feet long with plastic or nylon pull strings with printed footage indicators and a minimum test rating of 200 pounds. Extend pull string a minimum of 3 feet from each end. Pull strings shall be secured to avoid losing the pull string within the

conduit by either securing tying the end of each string in place, or by tying the end of each string to a washer with a diameter larger than the conduit diameter.

2. Label each pull string in a clear manner by designating, at each end of the pull string, the location of the far end of the pull string (i.e. room name, communications closet name, pull box identifier, cable tray, station identifier, etc.). Indicate pull string length on the label.

H. Bushings: The Contractor is solely responsible for ensuring that bushings (insulated throat for metallic conduit, PVC for PVC conduit) are installed at conduit end(s) prior to cable installation. Where cable is installed prior to the installation of bushings, the Contractor shall remove the cable, install the bushing, and re-install the cable at no additional cost to the Owner.

I. Labels: Label each conduit end in a clear manner by designating, at each end of the conduit, the location of the far end of the conduit (i.e. room name, communications closet name, pull box identifier, cable tray, station identifier, etc.). Indicate conduit length on the label.

3.02 JUNCTION AND DEVICE BOXES

A. General:
1. Unless otherwise indicated, boxes shall be recessed. Set boxes plumb, level, square and flush with wall. Do not exceed more than 1/16 inch tolerance for each condition. Recess outside edge and trim plates from finished surface in accordance with NEC.
2. Boxes shall be supported independently of the conduit system. Supports shall be noncombustible and corrosion resistant. Suspended boxes shall be supported with threaded rod hangers and galvanized steel clamps, or trapeze hangers such as Unistrut.
3. Install additional straps or cross-bracing to ensure a rigid installation in a steel stud system.
4. Boxes on opposite sides of fire rated walls and partitions shall be separated by a horizontal distance of at least 24 inches.
5. Unused knockouts in boxes shall be left sealed.
6. For acoustical purposes, boxes on opposite sides of a wall shall not be located back-to-back.
7. For boxes to be installed in brick, masonry or concrete, offsets shall be provided to provide for proper adjustment to finished surfaces. Exposed mortar is not acceptable around device plates.
8. In the event of discrepancies between box locations shown on the communications drawings and any other drawings in the Construction Documents, the Contractor shall notify the Engineer and await the Engineer's direction prior to installation.

B. Device Box Types
1. Device Box:
   a. Unless specifically noted otherwise on the Drawings, device boxes shall be dedicated to communications systems and shall not be shared with power.
   b. Provide with blank faceplate and pull string.
2. Outlet Box:
   a. General:
      1) Unless specifically noted otherwise on the Drawings, Outlet Boxes shall be dedicated to Communications Systems, and shall not be shared with power.
      2) The Contractor shall install the box and mudring such that the face of the mudring is flush with the face of the wall. Refer to the Architectural Construction Documents (Drawings and Specifications) for Wall Types, Materials and Installation Details.
      3) The use of dividers to divide a single box into "separate" sections for Communications Systems and power (or another function) is not acceptable.
   b. Security System(s):
      1) Refer to Drawings and Manufacturers requirements.
      2) Coordinate with Security Contractor prior to rough-in.

3.03 PULL BOXES

A. Install pull boxes in an exposed location, readily accessible both at time of construction and after building occupation. Pull boxes shall not be installed in interstitial or otherwise non-accessible building spaces.

B. If mounting a pull box on ceiling structure above ceiling grid, do not mount higher than 4 feet above grid (mount on wall instead).

C. Install pull boxes such that conduit enters and exits only from opposite ends of the box (i.e. only two sides of a box may be used for conduit entry and those two sides must be opposite one another).

D. Do not install conduits into pullboxes in such a manner as to obstruct the installation of future feeder conduits into or out of the pullbox.

E. A pull box shall not be substituted for a 90 degree bend.

F. Do not exceed one pull box per total conduit run between outlet box and termination point in a communications closet, unless otherwise shown on the Drawings. Where field conditions necessitate the use of additional pull boxes notify the Engineer and await the Engineer's direction prior to procurement and installation.

G. Pull boxes shall be rigidly mounted. Unused knockouts shall be plugged with suitable blanking devices.

H. Labels: Label each pullbox with a unique identifier. Identifiers shall be of the form “RN-YY” where “RN” is the room name of the room closest to (or containing) the pull box, and “YY” is the sequential number of the pull box for each “RN”. For example: The second pull box in the vicinity of room “201” would have the label “201-02”.

3.04 WALL BOXES

A. Set boxes plumb, level, square and flush with floor. Do not exceed more than 1/16 inch tolerance for each condition. Recess outside edge and trim plates from finished surface in accordance with NEC.

B. Boxes shall be supported independently of the conduit system. Supports shall be noncombustible and corrosion resistant. Suspended boxes shall be supported with threaded rod hangers and galvanized steel clamps, or trapeze hangers such as Unistrut.

C. Install additional straps or cross-bracing to ensure a rigid installation in a steel stud system.

D. Boxes on opposite sides of fire rated walls and partitions shall be separated by a horizontal distance of at least 24 inches.

E. Unused knockouts in boxes shall be left sealed.

F. For acoustical purposes, boxes on opposite sides of a wall shall not be located back-to-back.

G. For boxes to be installed in brick, masonry or concrete, offsets shall be provided to provide for proper adjustment to finished surfaces. Exposed mortar is not acceptable around device plates.

H. In the event of discrepancies between box locations shown on the Communications Drawings and any other Drawings in the Construction Documents, the Contractor shall notify the Engineer and await the Engineer’s direction prior to installation.

I. Covers shall be installed per manufacturer’s recommendations.

J. For wall boxes with combined power and communications circuits, install metal dividers for separation of circuits and provide separate conduits for power and communications.

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SECTION 28 0544

SLEEVES AND SLEEVE SEALS FOR ELECTRONIC SAFETY AND SECURITY PATHWAYS AND CABLING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Sleeves.
   2. Firestop Sealants.
   3. Firestop Pillows.
   4. Firestop Putty.

1.02 RELATED DOCUMENTS

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

B. The following documents shall also be considered as a part of and shall relate directly to this section:
   1. Section 28 0533 - Conduit and Backboxes for Electronic Safety and Security Systems
   2. Section 28 0553 - Identification for Electronic Safety and Security Systems

1.03 SYSTEM DESCRIPTION

A. This section shall govern the products and installation of all necessary parts, pieces and accessories of a UL listed penetration firestopping system for communications systems.

1.04 DEFINITIONS

A. Reference section 28 0000 - General Requirements for Electronic Safety and Security Systems

1.05 SUBMITTALS

A. Comply with Section 28 0000 - General Requirements for Electronic Safety and Security Systems

1.06 CLOSEOUT SUBMITTALS

A. Comply with Section 28 0000 - General Requirements for Electronic Safety and Security Systems

1.07 QUALITY ASSURANCE

A. Refer to section 28 0000 - General Requirements for Electronic Safety and Security Systems

1.08 CODES AND STANDARDS

A. Comply with Section 28 0000 - General Requirements for Electronic Safety and Security Systems

PART 2 PRODUCTS

2.01 GENERAL

A. Use only fire-stopping products that have bene tested for specific fire resistance rated construction conditions confirming to construction assembly type, penetrating item type, annular space requirements, and fire rating involved for each separate instance.

2.02 SLEEVES

A. Wall and Floor Sleeves:
   1. Fire-rated pathway devices shall be the preferred product and shall be installed in all locations where frequent cable moves, add-ons and changes will occur, such devices shall:
      a. Meet the hourly rating of the floor or wall penetrated.

b. Permit the allowable cable load to range from 0% to 100% visual fill thereby eliminating the need to calculate allowable fill ratios.
c. Not require any additional action on the part of the installer to open or close the pathway device or activate the internal smoke and fire seal, such as, but not limited to:
   1) Opening or closing of doors.
   2) Twisting an inner liner.
   3) Removal or replacement of any material such as, but not limited to, sealant, caulk, putty, pillows, bags, foam plugs, foam blocks, or any other material.
d. Permit multiple devices to be ganged together to increase overall cable capacity.
e. Allow for retrofit to install around existing cables.
f. Include an optional means to lengthen the device to facilitate installation in thicker barriers without degrading fire or smoke sealing properties or inhibiting ability of device to permit cable moves, add-ons, or changes.

2. Where single cables penetrate gypsum board/stud wall assemblies, a fire-rated cable grommet may be substituted. Acceptable products shall be molded from plenum-grade polymer and conform to the outer diameter of the cable forming a tight seal for fire and smoke. Additionally, acceptable products shall lock into the barrier to secure cable penetration.
3. Where non-mechanical products are utilized, provide products that upon curing do not re-emulsify, dissolve, leach, breakdown or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture characteristic during or after construction.
4. Where it is not practical to use a mechanical device, openings within floors and walls designed to accommodate telecommunications and data cabling shall be provided with re-enterable products that do not cure or dry.
5. Cable trays shall terminate at each barrier and resume on the opposite side such that cables pass independently through fire-rated pathway devices. Cable tray shall be rigidly supported independent from fire-rated pathway devices on each side of barrier.
6. Treat all wall penetrations that are required as a minimum of one a 1-hour rated wall. It shall also be assumed that any existing penetration used by a contractor for cabling is “owned” by that contractor. They shall be responsible for providing the appropriate fire-stopping materials to fire-stop the penetration regardless of whether fire-stopping existed at the beginning. Any fire-stopping material removed during cable installation shall be replaced with like material.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Specified Technologies, Inc.- EZ-Path Series
   2. Hilti - Speed Sleeve

2.03 FIRESTOP SEALANTS

A. Firestop Sealants: This shall be a single component latex formula that upon curing shall not re-emulsify during exposure to moisture. Firestop sealants shall be used to fill annular space around and between the wall substrate and sleeve.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Specified Technologies, Inc. - SpecSeal Series SSS Sealant
   2. Specified Technologies, Inc. - SpecSeal Series LCI Sealant

2.04 FIRESTOP PILLOWS

A. Firestop Pillow: This shall be a re-enterable, non-curing, mineral fiber core encapsulated on six sides with intumescent coating contained in a flame retardant poly bag.

B. Firestop pillows shall be used to seal large through penetrations such as those created to allow cable trays to pass through fire-rated walls.

C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Specified Technologies, Inc. - SpecSeal SSB Pillows

2.05 FIRESTOP PUTTY

A. Firestop Putty: This shall be intumescent, non-hardening, water resistant putty containing no solvents, inorganic fibers or silicone compounds.

B. Firestop Putty shall be used to seal through-penetrations such as traditional conduit sleeves.

C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Specified Technologies, Inc. - SpecSeal SSP Putty

PART 3 EXECUTION

3.01 SLEEVE INSTALLATION FOR COMMNICATION SYSTEMS PENETRATIONS

A. Comply with NECA 1.

B. Sleeves for Penetrating Above-Grade Concrete and Masonry-Unit Floors and Walls:
   1. Interior Penetrations of Walls and Floors:
      a. Seal annular space between sleeve and pathway, using fire-stop sealant appropriate for size, depth, and location of joint.
   2. Use the fire-rated prefabricated sleeve assembly as specified unless penetration arrangement requires rectangular sleeved opening. Rectangular openings shall require firestop pillows to block the annular space of a fire-rated wall.
   3. Install sleeves for wall penetrations. Perform core drilling as required to install/set the prefabricated assembly into its designated location.
   4. Install sleeves during erection of walls.
   5. Install sleeves for floor penetrations. Extend sleeves installed in floors a minimum of 2 inches (50 mm) above finished floor level. Install sleeves during erection of floors.

C. Sleeves for Conduits Penetrating Fire-Rated Gypsum Board Assemblies:
   1. Use the fire-rated prefabricated sleeve assembly as specified unless penetration arrangement requires rectangular sleeved opening.
   2. If conduit was utilized, seal space outside of sleeves with approved firestop compound/sealant for gypsum board assemblies.

3.02 SLEEVE SYSTEM INSTALLATION

A. Install through-penetration fire-stop systems and fire-resistive joint systems in accordance with the manufacturer’s instructions.
   1. Seal all openings or voids made by penetrations to ensure an air and water resistant seal.
   2. Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of through-penetration firestop systems that might hamper the performance of fire dampers as it pertains to duct work.
   3. Protect materials from damage on surfaces subjected to traffic.
   4. Apply a suitable bond-breaker to prevent three-sided adhesion in applications where this condition might occur such as the intersection of a gypsum wallboard/steel stud wall to floor or roof assembly where the joint is backed by a steel ceiling runner or track.

B. Perimeter Containment: Comply with manufacturer’s instructions for installation of perimeter fire containment system products.
   1. Seal all slab-edge openings to ensure an air and water resistant seal.
   2. Curtain wall insulation that is an integral component of the perimeter fire containment system shall be in accordance with the conditions of testing and classification as specified in the design and shall comply with thermal insulation requirements as specified in Section 07 210 Building Insulation.

C. Install type and number of sealing elements recommended by manufacturer for pathway or cable material and size. Position pathway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pathway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.03 IDENTIFICATION

A. Comply with Section 27 0553 “Identification for Communications Systems”

B. A firestop identification label shall be applied to the wall substrate adjacent to the through penetration or joint firestop system.

C. At a minimum, the label shall contain the following information:
   1. Firestop identification per Section 27 055.
   2. Fire stop product/system used
   3. Installation Company
   4. Penetration Hour Rating
   5. Installation Date

3.04 FIELD QUALITY CONTROL

A. Keep areas of work accessible until inspection by authorities having jurisdiction.

B. Where deficiencies are found, repair or firestopping products so they comply with requirements.

3.05 ADJUSTING AND CLEANING

A. Remove equipment, materials and debris, leaving area in undamaged, clean condition.

B. Clean all surfaces adjacent to sealed openings to be free of excess firestopping materials and soiling as work progresses.

END OF SECTION

SECTION 28 0553

IDENTIFICATION FOR ELECTRONIC SAFETY AND SECURITY SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
1. Color and legend requirements for labels and signs.
2. Labels.
3. Bands and tubes.
4. Tapes.
5. Signs.
6. Cable ties.
7. Fasteners for labels and signs.

1.02 RELATED DOCUMENTS

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

B. The following documents shall also be considered as a part of and shall relate directly to this section:
1. Section 28 2000 - Video Management System
2. Section 28 4600 - Fire Detection and Alarm
3. Section 28 5200 - Detention Control System
4. Section 28 5210 - Perimeter Fence Security System

1.03 DEFINITIONS

A. Reference section 28 0000 - General Requirements for Electronic Safety and Security Systems

1.04 SUBMITTALS

A. Comply with Section 28 0000 - General Requirements for Electronic Safety and Security Systems

1.05 CLOSEOUT SUBMITTALS

A. Comply with Section 28 0000 - General Requirements for Electronic Safety and Security Systems

1.06 QUALITY ASSURANCE

A. Refer to section 28 0000 - General Requirements for Electronic Safety and Security Systems

1.07 CODES AND STANDARDS

A. Comply with Section 28 0000 - General Requirements for Electronic Safety and Security Systems

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Comply with NFPA 70 and TIA 606-B.

B. Comply with ANSI Z535.4 for safety signs and labels.

C. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

2.02 COLOR AND LEGEND REQUIREMENTS

A. Equipment Identification Labels:
1. Black letters on a white field.

2.03 LABELS

A. Vinyl Wraparound Labels: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.
   1. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameters of raceway or cable they identify, that stay in place by gripping action.

B. Self-Adhesive Wraparound Labels: Preprinted, 3-mil- (0.08-mm-) thick, polyester flexible labels with acrylic pressure-sensitive adhesive.
   1. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating protective shields over the legend. Labels sized such that the clear shield overlaps the entire printed legend.
   2. Marker for Labels: Permanent, waterproof black ink marker recommended by tag manufacturer.
   3. Marker for Labels: Machine-printed, permanent, waterproof black ink recommended by printer manufacturer.

C. Self-Adhesive Labels: Polyester, thermal, transfer-printed, 3-mil- (0.08-mm-) thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.
   1. Minimum Nominal Size:
      a. 1-1/2 by 6 inches (37 by 150 mm) for raceway and conductors.
      b. 3-1/2 by 5 inches (76 by 127 mm) for equipment.
      c. As required by authorities having jurisdiction.

2.04 BANDS AND TUBES

A. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inches (50 mm) long, with diameters sized to suit diameters of raceway or cable they identify, that stay in place by gripping action.

2.05 UNDERGROUND-LINE WARNING TAPE

A. Tape:
   1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground communications utility lines.
   2. Printing on tape shall be permanent and shall not be damaged by burial operations.
   3. Tape material and ink shall be chemically inert and not subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.

B. Color and Printing:
   1. Comply with ANSI Z535.1, ANSI Z535.2, ANSI Z535.3, and ANSI Z535.4.

2.06 SIGNS

A. Metal-Backed Butyrate Signs:
   1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs, with 0.0396-inch (1-mm) galvanized-steel backing, punched and drilled for fasteners, and with colors, legend, and size required for application.
   2. 1/4-inch (6.4-mm) grommets in corners for mounting.
   3. Nominal Size: 10 by 14 inches (250 by 360 mm).

B. Laminated-Acrylic or Melamine-Plastic Signs:
   1. Engraved legend.
   2. Thickness:
      a. For signs up to 20 sq. in. (129 sq. cm), minimum 1/16 inch (1.6 mm) thick.
      b. For signs larger than 20 sq. in. (129 sq. cm), 1/8 inch (3.2 mm) thick.
      c. Engraved legend with white letters on a dark gray background.

d. Punched or drilled for mechanical fasteners with 1/4-inch (6.4-mm) grommets in corners for mounting.
e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.07 CABLE TIES

A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.
1. Minimum Width: 3/16 inch (5 mm).
2. Tensile Strength at 73 deg F (23 deg C) according to ASTM D 638: 12,000 psi (82.7 MPa).
3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
4. Color: Black, except where used for color-coding.

B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.
1. Minimum Width: 3/16 inch (5 mm).
2. Tensile Strength at 73 deg F (23 deg C) according to ASTM D 638: 12,000 psi (82.7 MPa).
3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
4. Color: Black.

C. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, and self-locking.
1. Minimum Width: 3/16 inch (5 mm).
2. Tensile Strength at 73 deg F (23 deg C) according to ASTM D 638: 7000 psi (48.2 MPa).
3. UL 94 Flame Rating: 94V-0.
4. Temperature Range: Minus 50 to plus 284 deg F (Minus 46 to plus 140 deg C).
5. Color: Black.

2.08 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 EXECUTION

3.01 PREPARATION

A. Self-Adhesive Identification Products: Before applying communications identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.02 INSTALLATION

A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.

B. Install identifying devices before installing acoustical ceilings and similar concealment.

C. Verify identity of each item before installing identification products.

D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

E. Apply identification devices to surfaces that require finish after completing finish work.

F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of communications systems and connected items.

G. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.

H. Vinyl Wraparound Labels:
1. Secure tight to surface of raceway or cable at a location with high visibility and accessibility.

2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to the location and substrate.
3. Provide label 6 inches (150 mm) from cable end.

I. Snap-Around Labels:
1. Secure tight to surface at a location with high visibility and accessibility.
2. Provide label 6 inches (150 mm) from cable end.

J. Self-Adhesive Wraparound Labels:
1. Secure tight to surface at a location with high visibility and accessibility.
2. Provide label 6 inches (150 mm) from cable end.

K. Self-Adhesive Labels:
1. On each item, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high.

L. Snap-Around, Color-Coding Bands: Secure tight to surface at a location with high visibility and accessibility.

M. Cable Ties: General purpose, except as listed below:
1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

3.03 IDENTIFICATION SCHEDULE

A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.

B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations with high visibility. Identify by system and circuit designation.

C. Accessible Fittings for Raceways and Cables within Buildings: Identify covers of each junction and pull box with self-adhesive labels containing wiring system legend.

D. Faceplates: Label individual faceplates with self-adhesive labels. Place label at top of faceplate. Each faceplate shall be labeled with its individual, sequential designation, numbered clockwise when entering room from primary egress, composed of the following, in the order listed:
1. Wiring closet designation.
2. Colon.
3. Faceplate number.

E. Equipment Room Labeling:
1. Racks, Frames, and Enclosures: Identify front and rear of each with self-adhesive labels containing equipment designation.

F. Backbone Cables: Label each cable with a vinyl-wraparound label indicating the location of the far or other end of the backbone cable. Patch panel or punch down block where cable is terminated should be labeled identically.

G. Instructional Signs: Self-adhesive labels.

H. Warning Labels for Indoor Cabinets, Boxes, and Enclosures: Metal-backed, butyrate warning signs.
1. Apply to exterior of door, cover, or other access.

I. Equipment Identification Labels:
1. Indoor Equipment: Self-adhesive label.
2. Equipment to Be Labeled:
a. Systems cabinets.
b. Uninterruptible power supplies.

c. Fire-alarm and suppression equipment.
d. Power distribution components.

END OF SECTION

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SECTION 28 2000
VIDEO MANAGEMENT SYSTEM

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Video Management Software and Licensing.
   2. Server Hardware and Storage
   3. IP Encoders
   4. 3rd Party Integration.
   5. Client Hardware.

B. Description:
   1. Provide a new software and hardware platform to route all existing 100 analog cameras to a new network video recorder. The system shall integrate with the newly designed detention control system. Ensure the proposed solution is compatible and will allow all live camera footage and associated video follow events to be accessed and controlled through the Detention Control System platform.
   2. All existing analog camera's infrastructure route back to the equipment room in Building H. Here, a stack of six (6) existing Bosch DIVAR Digital Video Recorders are installed and store recorded video. Media converters utilizing the existing multimode fiber network have been installed at all housing units and surrounding support buildings in order to transmit analog video and Pan/Tilt/Zoom Bi-Phase control signals. All existing analog digital video recorders are to be removed. All other equipment shall remain. The work involved for video surveillance shall require IP encoder installation, server & network storage installation and proper integration into the new detention controls system. See the Drawings and Details for additional information.
   3. The new video management system (VMS) shall be open platform, easy to use and designed with open architecture. The VMS shall be able to manage all the surveillance-related hardware associated with this project.

1.02 RELATED REQUIREMENTS

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

B. The following documents shall also be considered as a part of and shall relate directly to this section:
   1. Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS
   2. Section 27 1513 - COMMUNICATIONS COPPER HORIZONTAL CABLING
   3. Section 27 2130 - DATA COMMUNICATIONS SWITCHES AND HUBS
   4. Section 28 5200 - DETENTION CONTROL SYSTEM

1.03 ABBREVIATIONS AND ACRONYMS

A. Reference Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS

1.04 DEFINITIONS

A. Reference Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS

1.05 CODE REFERENCES AND STANDARDS

A. Comply with Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS

1.06 SUBMITTALS

A. Comply with Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS

1.07 QUALITY ASSURANCE

A. Comply with Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS

1.08 DELIVERY, STORAGE, AND HANDLING

A. Reference Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS

1.09 WARRANTY

A. Comply with Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS

1.10 CLOSEOUT SUBMITTALS

A. Comply with Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS

PART 2 PRODUCTS

2.01 APPROVED MANUFACTURERS

A. Provide a complete software and hardware solution from the following approved manufacturers:
   1. Video Management System Platform
      a. Milestone Systems - XProtect Professional Plus
      b. Engineer approved equal
   2. Network Video Server
      a. Intel (ByteSpeed Quote - AAAQ108493-02)
      b. Engineer approved equal
   3. Network Attached Storage for Recorded Video
      a. NEXSAN (ByteSpeed Quote - AAAQ108493-02)
      b. Engineer approved equal
   4. IP Encoders:
      a. Panasonic #VP-16-V2 (16-channel)
      b. Infinova #V2511-H (16-channel)
      c. Pelco #NET5508 (8-channel)
      d. Engineer approved equal

2.02 VIDEO MANAGEMENT SYSTEM (VMS) SOFTWARE AND LICENSING

A. Description:
   1. Provide an open platform system with published external programming interfaces that shall enable its use in ways beyond the scope of the original programmers.
      a. The VMS solution shall be compliant with ONVIF and PSIA.
   2. Provide a management layer that decouples the software from the hardware.
      a. The open platform shall allow other companies and developers to develop products that add additional functionality and versatility to the IP video surveillance solution.
   3. The software platform shall use multiple servers to run the deployment.
   4. The software shall be designed to support all encoded analog cameras illustrated on the drawings.
   5. The solution shall support devices from different vendors and be installed and serviced by a manufacturer certified integrator. Provide a copy of this certificate during the submittal process.

6. Each system shall consist of one management server, one SQL server (may reside on same machine as management server), a recording server, and an event server (may reside on the same machine as the management server).
7. The software solution shall have the ability to store video and audio recordings on any form of storage selected by the client including internal hard drives, direct attached storage, storage area network, and so on.
8. The software solution shall support archiving for optimizing recorded data storage through data storage solutions that shall combine performance and scalability with cost efficient long-term video storage.
9. The software solution shall include an alarm management function that shall make it possible to manage all alarms generated by all the components on the system, including:
    a. Internal system-related events, such as motion and archiving issues.
    b. External integrated events, such as video analytics, access controlled doors that have been open too long or forced open.
    c. Other events from third-party developed plug-ins.

B. Performance Requirements:
1. Management Server
    a. Provide a management server to control the VMS. This shall the system administrator to have full control of all system components locally or from a remote location.
    b. Administration of individual end-user access levels shall be defined within the management server.
2. Recording Server
    a. The software solution shall support the required number of recording servers.
    b. Recording servers shall be capable of recording all video feeds and communicating fully with the scheduled video surveillance cameras.
    c. Each recording server shall have a storage container where the database content, primarily recordings from the connected cameras, shall be stored.
    d. Recordings from each connected camera shall be stored in individual camera databases.
    e. The software solution shall not limit the amount of storage allocated for each connected device.
3. Event Server
    a. An event server shall manage all event and map-related communication. It shall store events, image files and map configurations, and shall make status information about the surveillance system available.
4. Management Client
    a. The VMS shall support a centralized management client to control the VMS.
    b. The management client shall provide a feature-rich administration client for system configuration and day-to-day administration of the system.
    c. The management client shall typically be installed on the VMS administrator’s workstation.
    d. The management client shall be used to authorize the recording servers connected to the system.
5. Web Viewing Client (Cross-Platform)
    a. The software solution shall support a free web viewing client accessible through Internet browsers that shall allow users to access cameras, views and recordings without installing any software.
    b. The web viewing client shall support the following browsers: Internet Explorer, Mozilla Firefox, Google Chrome, Opera and Safari.
    c. The web viewing client shall be able to run on the supported browsers without installing any additional components on the client PC.
    d. The web viewing client shall connect to the software solution through a server component that shall be installed on the software solution.

e. The software solution shall allow users of the web viewing client to make video exports without transferring the data to the client PC. It shall then be possible to download exports on-demand from the web-viewing client, or access them directly from the software solution system storage

6. Standalone Viewing Client
   a. The software solution shall include a standalone viewing client that shall be able to playback video files exported from clients in proprietary database format.
   b. The standalone viewing client shall be able to playback encrypted video files in the proprietary database format.
7. Edge Storage Support with Flexible Retrieval
   a. The VMS shall support edge storage which secures that video from cameras that can be sent to the VMS in the event that the connection between a camera and the VMS is lost, by saving recordings on the camera's internal storage and then sent to the VMS once the connection between camera and the VMS is restored.
   b. The edge storage shall ensure that the camera records the video stream directly on its own internal storage if the connection between the hardware and the recording server is terminated, for example, due to recording server crash, power failure on the recording server machine, network failure or in case of a controlled shut down of the recording server.
8. Audio
   a. The software solution shall support audio recording capabilities for any future IP cameras that are added to the system that host a built-in microphone.
9. Compression Formats
   a. The software solution shall support H.264, MPEG-4 (both ASP and SP), and MJPEG compression formats for the video stream from all devices including analog cameras connected to encoders, DVRs, and IP cameras connected to the system.
10. Video Retention Time
    a. This solution is designed for future IP camera capacity and not for current analog resolution capacity. The following parameters were found to deliver 30 days retention using the following configuration:
       1) Camera quantity: 120
       2) Minimum resolution: 3 megapixel
       3) Frame Rate: 15 fps
       4) Hours active: 24
       5) Active on Motion: 70%
       6) Compression: H.264
11. Multi-Streaming
    a. The software solution shall allow live multi-streaming from the cameras in different resolutions, formats, and frame rates.
12. Alarm Management
    a. The VMS shall support an alarm management feature which shall be a single-point alarm function that shall be integrated with the map function and provide a clear and consolidated list and overview of security and system-related alarms and give instant access to cameras.
13. Export
    a. The software solution shall have an export function that shall make it possible to export still images and video files from the VMS to external sources.
    b. The software solution shall include a storyboard export feature in which several small clips with individual timespan shall be included in one export.
    c. The software solution shall make it possible to estimate the size of an export once the export has been initiated.
    d. The export function shall support the following functionality:
       1) Export in still image format (JPEG)
14. Storage Archiving

a. The software solution shall support archiving (an automatic transfer) of recordings (archives) from a camera's live database location to another location on a time-schedule, without the need for user action, or initiation of the archiving process.
b. The VMS shall make it possible to define and configure a storage container wherein archives shall be possible to archive again and again to new locations. The live database shall automatically be divided into one hour segments, keeping the size of the open live databases as small as possible. This shall ensure that a potential database repair after a failure will be as short as possible.
c. The VMS shall make it possible to select a storage container for each device and move a device from one storage container to another. It shall be possible to move all unarchived recordings or to keep them in the old location.
d. The VMS shall make it possible to set a retention time that shall define how long recordings should stay in an archive before being deleted or archived.
e. The VMS shall provide an overview of the defined storage containers, their archives with path, and free and used space on the drives for each device, including the used storage space in the recording database, and in archives.
f. Archives shall be located on either the recording server computer or on a connected network drive. If the storage container on a network drive becomes unavailable for recording, the system shall be able to trigger actions such as automatic e-mails to defined personnel.
g. The VMS shall make it possible to access all recordings for playback, whether the recordings are archived or not.
h. The VMS shall make it possible for archiving and recording processes to take place at the same time, which shall enable recording to continue when the software solution is archiving databases.

2.03 SERVER HARDWARE AND STORAGE

A. VMS Server:
1. Description and Minimum Performance Requirements:
a. Physical footprint: 2U, rack-mounted and chassis-based.
b. Processor: Intel Xeon 4114 Silver 10-core CPU, 2.2GHz
c. Power Supply: Fully populated, dual-redundant 1300W power supplies
d. Memory: 16GB 2400MHz DDR4
e. Hard Drive: Two (2) Solid State 240GB 2.5" SATA, 6Gb/s drives.
f. Raid Controller, 8-port 12Gb/s SAS PCIe
g. DVD Drive
h. Network Adapter, 2-port PCIe3.0x8 SFP+ 10GBase-X
1) Provide two (2) SFP+ 10
i. Intel Remote Management Module
j. Software: Windows Server Standard 2016

B. Network Attached Storage:
1. Description and Minimum Performance Requirements:
a. Physical footprint: 4U, rack-mounted and chassis-based.
b. Power Supply: Fully populated, dual redundant 1500W power supplies.
c. Hard Drive Quantity: Sixty (60)
d. Hard Drives: 7200 RPM, 6 Terabytes in a RAID configuration
e. Required Capacity: 278 Terabytes
f. Maximum Capacity (for growth): 480 Terabytes
g. Maximum Cache per Controller: 16GB
h. Network Adapter: Two (2) 10Gb iSCSI ports for SFP+ modules

2.04 IP ENCODERS

A. Description:
1. Physical Footprint: 1 Rack Unit

2. Video Standards: NTSC
3. Interoperability Standard: ONVIF Compliant
4. Minimum Supported Resolutions:
    a. 720 x 480
    b. 704 x 480
    c. 704 x 240
    d. 352 x 240
5. Frame rate: Up to 30 frames per second
6. Video Input: 8 to 16 channel BNC / 75 ohm
7. Network Interface: RJ-45 100/1000Mbps
8. Video Output (looping): 8 to 16 channels BNC / 75 ohm
9. Compression: H.264

2.05 3RD PARTY INTEGRATION

A. The primary interface for video surveillance within master control and all associated command posts shall be through the Detention Control System. Provide the necessary integration that allows camera call ups and video follow events through the Detention Controls graphical user interface.

B. Provide the necessary cabling and labor to continue all existing video follow events and camera presets. Existing infrastructure routed between the Allegiant controller and the relay interface cabinet shall be intercepted and re-routed to the new PLC controls system.

2.06 CLIENT WORKSTATION HARDWARE

A. Performance Description:
    1. Processor: Intel Core i5 or better
    2. Memory: 8 Gigabytes or more
    3. Network Interface: 100/1000Mbps
    4. Graphics Adapter: PCI-Express hosting a minimum of 2GB of GDDR5 or better.
    5. Operating System: Windows 10
    6. Monitors: Provide one (1) 27" flat panel monitor for each workstation.
    7. Provide keyboard and optical mouse.

B. Quantity:
    1. Provide two (2) complete workstations and coordinate installation location with Newton Correctional.

2.07 EXTRA MATERIALS

A. Provide a quantity of four (4) 6 Terabyte hard drives that can be installed in the event of failure. Ensure the manufacturer and model of the hard drives match what has been installed.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine pathway elements intended for cables. Check raceways and other elements for compliance with space allocations, installation tolerance, hazards to the equipment, and other conditions affecting installation.

B. Examine rough-in for LAN, WAN, and IP network before device installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 WIRING

A. Wiring Method: Install cables in raceways unless otherwise indicated.
    1. Except raceways are not required in accessible indoor ceiling spaces and attics.
    2. Except raceways are not required in hollow gypsum board partitions.
    3. Conceal raceways and wiring except in unfinished spaces.

B. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

C. For communication wiring, comply with the following:
   1. Section 27 1513 "Communications Copper Horizontal Cabling."

D. Existing Coaxial Wiring:
   1. Provide neat management of all existing infrastructure that is impacted. Any coaxial connectivity that is too short shall be extended through use of a coupler and additional coaxial cabling.
   2. Migration to the new IP encoders may require re-termination of connectors. Provide necessary labor and materials to achieve this.

3.03 VIDEO SURVEILLANCE SYSTEM INSTALLATION

A. Install rack-mount encoders, servers and any other associated components in an organized manner. Provide proper labeling to the front of each device that spells out IP address and the name of the device.

B. Provide programming and installation of all necessary API's to communicate between IP encoders, servers and the Detention Controls System. Coordinate all camera numbering and labeling within the system with the facility.

C. Install client workstations and other auxiliary components at control stations and/or coordinated locations designated by the owner.

D. Ensure all existing video follow events are maintained. Confirm proper operation through testing utilizing the Detention Controls System as the main interface.

E. Identify system components, wiring, cabling, and terminals according to Section 27 0553 "Identification for Communications Systems."

3.04 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.
   1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:
   1. Inspection: Verify that units and controls are properly installed, connected, and labeled, and that interconnecting wires and terminals are identified.
   2. Pretesting: Align and adjust system and pretest components, wiring, and functions to verify that they comply with specified requirements. Conduct tests at varying lighting levels, including day and night scenes as applicable. Prepare video-surveillance equipment for acceptance and operational testing as follows:
      a. Prepare equipment list described in "Informational Submittals" Article.
      b. Verify operation of auto-iris lenses.
      c. Set sensitivity of motion detection.
      d. Connect and verify responses to alarms.
      e. Verify operation of control-station equipment.
   3. Test Schedule: Schedule tests after pretesting has been successfully completed and system has been in normal functional operation for at least 14 days. Provide a minimum of 10 days' notice of test schedule.
   4. Operational Tests: Perform operational system tests to verify that system complies with Specifications. Include all modes of system operation. Test equipment for proper operation in all functional modes.

D. Video surveillance system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.05 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose. Tasks shall include, but are not limited to, the following:
   1. Check cable connections.
   2. Check proper operation of cameras and lenses. Verify operation of auto-iris lenses and adjust back-focus as needed.
   3. Adjust all preset positions; consult Owner's personnel.
   4. Recommend changes to cameras, lenses, and associated equipment to improve Owner's use of video surveillance system.
   5. Provide a written report of adjustments and recommendations.

3.06 CLEANING

A. Clean installed items using methods and materials recommended in writing by manufacturer.

B. Clean video-surveillance-system components, including camera-housing windows, lenses, and monitor screens.

3.07 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain video-surveillance equipment.

B. Provide two (2) training events that includes a 2 hour walk-thru and demonstration of the system both through the Detention Controls system as well as the standalone client workstation. Provide direction on all aspects of administration and guide the owner on individual user privileges and access.
   1. Training shall also include guidance on physical support of the system. In the event of a hard drive failure, demonstrate how a new drive can be replaced.

END OF SECTION

SECTION 28 4600
FIRE DETECTION AND ALARM SYSTEM

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Fire-alarm control unit.
   2. System smoke detectors.
   3. Audio and Visual Notification appliances.
   4. Annunciator Panels

B. Description:
   1. Provide the Newton Correctional Facility with upgrades to each campus building's fire detection and alarm control panel. This shall require replacement of existing cabinets, panels, graphical command centers, communications cards and adding additional addressable field devices as indicated on the Drawings.
   2. The intent shall be for the Simplex system to report specific fire-related events to each building's respective command post as well as the Master Control area inside Building H. A separate system shall be provided to achieve Detention Controls and shall not be an integral solution within the Simplex platform. The existing control function shall be extracted from the current platform. Provide the necessary components, software/firmware, and labor to achieve a fully functional campus-wide upgrade of the fire detection and alarm system.

1.02 RELATED REQUIREMENTS

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

B. The following documents shall also be considered as a part of and shall relate directly to this section:
   1. Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS
   2. Section 28 5200 - DETENTION CONTROL SYSTEM

1.03 ABBREVIATIONS AND ACRONYMS

A. Reference Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS

1.04 DEFINITIONS

A. Reference Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS

1.05 CODE REFERENCES AND STANDARDS

A. Comply with Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS

1.06 SUBMITTALS

A. Comply with Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS

1.07 QUALITY ASSURANCE

A. Comply with Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS

1.08 DELIVERY, STORAGE, AND HANDLING

A. Reference Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS

1.09 WARRANTY

A. Comply with Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS

1.10 CLOSEOUT SUBMITTALS

A. Comply with Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS

1.11 SEQUENCING AND SCHEDULING

A. Comply with Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS

PART 2 PRODUCTS

2.01 SYSTEM DESCRIPTION

A. Source Limitations for Fire-Alarm System and Components: Provide system manufacturer's certification that all components provided have been tested as, and will operate as, a system.

B. Existing system is comprised of a campus-wide Simplex network that includes the following buildings and major head end components:
   1. Building A (Housing Unit)
      a. One (1) Simplex 4020 addressable (MAPnet) control panel
      b. Two (2) Simplex 4120 network cabinets
      c. Three (3) Simplex relay interface cabinets
      d. One (1) Simplex Graphical Command Center (GCC)
   2. Building B (Housing Unit)
      a. Same cabinets and control panels as listed under Building A.
   3. Building C (Housing Unit)
      a. Same cabinets and control panels as listed under Building A.
   4. Building D (Housing Unit)
      a. Same cabinets and control panels as listed under Building A.
   5. Building E (Housing Unit)
      a. One (1) Simplex 4020 addressable (MAPnet) control panel
      b. One (1) Simplex 4120 network cabinet
      c. Two (2) Simplex relay interface cabinets
   6. Building H (Support and Services)
      a. One (1) Simplex 4020 addressable (MAPnet) control panel
      b. Three (3) Simplex 4120 network cabinets
      c. Three (3) Simplex relay interface cabinets
   7. Building IPI (Iowa Prison Industries)
      a. One (1) Simplex 4020 addressable (MAPnet) control panel
   8. Building J (Warehouse/Storage)
      a. One (1) Simplex 4020 addressable (MAPnet) control panel
   9. Building K (Administration)
      a. One (1) Simplex 4020 addressable (MAPnet) control panel
      b. One (1) Simplex 4120 network cabinet
      c. One (1) Simplex relay interface cabinet
   10. Building L (Central Plant)
      a. One (1) Simplex 4020 addressable (MAPnet) control panel
      b. One (1) Simplex 4120 network cabinet

C. Refer to the Drawings to review the network diagram on how each building is connected. The intent shall be for all existing control panels to be upgraded to the new 4100ES platform and communicate with each other utilizing the new singlemode fiber optic network. Provide the necessary software/firmware and communication card updates to accommodate this complete upgrade.

D. UL-certified addressable system.

E. Automatic sensitivity control of certain smoke detectors.

F. All components provided shall be listed for use with the selected system.

G. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.02 SYSTEMS OPERATIONAL DESCRIPTION

A. Fire-alarm signal initiation shall be by one or more of the following devices:
   1. Manual stations.
   2. Heat detectors.
   3. Smoke detectors.
   4. Duct smoke detectors.
   5. Automatic sprinkler system water flow.
   6. Fire standpipe system.

B. Fire-alarm signal shall initiate the following actions:
   1. Continuously operate alarm notification appliances.
   2. Identify alarm and specific initiating device at fire-alarm control unit, connected network control panels, and remote annunciators.
   3. Transmit an alarm signal to the appropriate receiving stations.
   4. Unlock electric door locks in designated egress paths.
   5. Release fire and smoke doors held open by magnetic door holders.
   6. Switch heating, ventilating, and air-conditioning equipment controls to fire-alarm mode.
   7. Close smoke dampers in air ducts of designated air-conditioning duct systems.
      a. This appears to be achieve through contact closures sent to each building's automated system. Maintain this functionality.
   8. Record events in the system memory.

C. Supervisory signal initiation shall be by one or more of the following devices and actions:
   1. Valve supervisory switch.
   2. User disabling of zones or individual devices.
   3. Loss of communication with any panel on the network.

D. System trouble signal initiation shall be by one or more of the following devices and actions:
   1. Open circuits, shorts, and grounds in designated circuits.
   2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
   3. Loss of communication with any addressable sensor, input module, relay, control module, remote annunciator, printer interface, or Ethernet module.
   4. Loss of primary power at fire-alarm control unit.
   5. Ground or a single break in internal circuits of fire-alarm control unit.
   6. Abnormal ac voltage at fire-alarm control unit.
   7. Break in standby battery circuitry.
   8. Failure of battery charging.
   9. Abnormal position of any switch at fire-alarm control unit or annunciator.

E. System Supervisory Signal Actions:
   1. Initiate notification appliances.
   2. Identify specific device initiating the event at fire-alarm control unit, connected network control panels, and remote annunciators.
   3. Record the event on system printer.
   4. After a time delay of 200 seconds, transmit a trouble or supervisory signal to the remote alarm receiving station.
   5. Transmit system status to building management system.

2.03 FIRE-ALARM CONTROL UNIT

A. Manufacturers: Subject to compliance with requirements, provide products by the following:
   1. Simplex (4100ES)
   2. Engineer Approved Equal

B. Initiating-Device, Notification-Appliance, and Signaling-Line Circuits:
   1. Pathway Class Designations: NFPA 72, Class B.
   2. Pathway Survivability: Level 1.

C. Smoke-Alarm Verification:
   1. Initiate audible and visible indication of an "alarm-verification" signal at fire-alarm control unit.
   2. Activate an approved "alarm-verification" sequence at fire-alarm control unit and detector.
   3. Record events by the system printer.
   4. Sound general alarm if the alarm is verified.
   5. Cancel fire-alarm control unit indication and system reset if the alarm is not verified.

D. Notification-Appliance Circuit:
   1. Audible (horn) appliances shall sound using a three-pulse temporal pattern.
   2. Visual alarm appliances shall flash in synchronization where multiple appliances are in the same field of view, as defined in NFPA 72.

E. Door Controls: Door hold-open devices that are controlled by smoke detectors at doors in smoke-barrier walls shall be connected to fire-alarm system.

F. Remote Smoke-Detector Sensitivity Adjustment: Controls shall select specific addressable smoke detectors for adjustment, display their current status and sensitivity settings, and change those settings. Allow controls to be used to program repetitive, time-scheduled, and automated changes in sensitivity of specific detector groups. Record sensitivity adjustments and sensitivity-adjustment schedule changes in system memory, and print out the final adjusted values on system printer.

G. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to a remote alarm station.

H. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, be powered by 24-V dc source.
   1. Alarm current draw of entire fire-alarm system shall not exceed 80 percent of the power-supply module rating.

I. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.

J. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

2.04 SYSTEM SMOKE DETECTORS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:
   1. Source from the same manufacturer as the control unit.

B. General Requirements for System Smoke Detectors:
   1. Comply with UL 268; operating at 24-V dc, nominal.
   2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
   3. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.

4. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
5. Integral Visual-Indicating Light: LED type, indicating detector has operated.
6. Remote Control: Unless otherwise indicated, detectors shall be digital-addressable type, individually monitored at fire-alarm control unit for calibration, sensitivity, and alarm condition and individually adjustable for sensitivity by fire-alarm control unit.
    a. Rate-of-rise temperature characteristic of combination smoke- and heat-detection units shall be selectable at fire-alarm control unit for 15 or 20 deg F per minute.
    b. Fixed-temperature sensing characteristic of combination smoke- and heat-detection units shall be independent of rate-of-rise sensing and shall be settable at fire-alarm control unit to operate at 135 or 155 deg F.
    c. Multiple levels of detection sensitivity for each sensor.
    d. Sensitivity levels based on time of day.

C. Photoelectric Smoke Detectors:
1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
    a. Primary status.
    b. Device type.
    c. Present average value.
    d. Present sensitivity selected.
    e. Sensor range (normal, dirty, etc.).

D. Ionization Smoke Detector:
1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
    a. Primary status.
    b. Device type.
    c. Present average value.
    d. Present sensitivity selected.
    e. Sensor range (normal, dirty, etc.).

2.05 AUDIO AND VISUAL NOTIFICATION APPLIANCES

A. Manufacturers: Subject to compliance with requirements, provide products by the following:
1. Source from the same manufacturer as the control unit.

B. General Requirements for Notification Appliances: Connected to notification-appliance signal circuits, zoned as indicated, equipped for mounting as indicated, and with screw terminals for system connections.
1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated, and with screw terminals for system connections.

C. Visible Notification Appliances: Xenon strobe lights complying with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch-high letters on the lens.
1. Rated Light Output:
    a. 15/30/75/110 cd, selectable in the field.
    b. 177 cd high candela for gymnasium.
2. Mounting: Wall or ceiling mounted as indicated.
3. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.

4. Flashing shall be in a temporal pattern, synchronized with other units.
5. Strobe Leads: Factory connected to screw terminals.
6. Mounting Faceplate: Factory finished, red.

D. Audible/Tone Notification Appliances:
1. Comply with UL 1480.
2. Horn notification: Locate devices to ensure 15dB above ambient sound pressure levels are reached.
3. Mounting: Flush for all wall and ceiling locations.

2.06 ANNUNCIATOR PANELS

A. BASEBID:
1. Description of product:
a. Simplex TrueAlarm TrueSite Workstation
b. Full grapical interface control
c. TCP/IP, LAN/WAN enabled for up to 20 remote clients
d. Custom alarm and system messages
e. Standard fire service annunciation icons
f. Capacity for up to 100,000 points
g. Floatable dockable windows
h. Quad monitor support
i. Pan and zoom features
j. Captive and Non-Captive modes to support workstations that need to be dedicated clients or those that require multiple programs to be open.
k. Logging of up to 500,000 events
2. Quantity:
a. Eight (8)
b. Provide a complete replacement for all existing Graphical Command Centers currently installed around the campus. Refer to the details to get an accurate quantity.

B. DEDUCT ALTERNATE:
1. Description:
a. In lieu of utilizing the TrueAlarm TruSite Workstation, provide the Simplex 4100ES Network Display Unit with InfoAlarm Command Center user interface at Master Control inside Building H.
b. Remove all existing Graphical Command Centers at all housing units and support buildings.
c. 4100ES Network Display Unit Capabilities:
1) Network level annunciator and manual system/point controller.
2) Provides Alarm Silence, Trouble Ack and System Reset.
3) Master controller assembly with operator interface.
4) Service port access and capacity for up to 12,000 points.
5) Full color display using the InfoAlarm Command Center
2. Quantity:
a. One (1) Network Display Unit installed inside a 3- bay cabinet located inside of Building H's master control.
b. Provide required accessories to allow buttons and interface control to navigate all housing units and silence alarms.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.

1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.

B. Examine roughing-in for electrical connections to verify actual locations of connections before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 EQUIPMENT INSTALLATION

A. Due to the sensitive nature of this installation, coordinate any and all system work and outages with Newton Correctional Facility. Provide pre-wiring, labeling and programming (if possible) in advance of any planned cutover to minimize all down time.

B. Comply with NFPA 72, NFPA 101, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install all electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."
   1. Devices placed in service before all other trades have completed cleanup shall be replaced.
   2. Devices installed but not yet placed in service shall be protected from construction dust, debris, dirt, moisture, and damage according to manufacturer's written storage instructions.

C. Connecting to Existing Equipment: Verify that existing fire-alarm system is operational before making changes or connections.
   1. Connect any new and all existing equipment to the newly scheduled control panel in the existing part of the building.
   2. Expand, modify, and supplement existing control and monitoring equipment as necessary to extend control and monitoring functions to the new points. New components shall be capable of merging with existing configuration without degrading the performance of either system.

D. Smoke- or Heat-Detector Spacing:
   1. Comply with the "Smoke-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for smoke-detector spacing.
   2. Comply with the "Heat-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for heat-detector spacing.
   3. Smooth ceiling spacing shall not exceed 30 feet.
   4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Annex A in NFPA 72.
   5. HVAC: Locate detectors not closer than 60 inches from air-supply diffuser or return-air opening.
   6. Lighting Fixtures: Locate detectors not closer than 12 inches from any part of a lighting fixture and not directly above pendant mounted or indirect lighting.

3.03 PATHWAYS

A. Pathways above recessed ceilings and in non-accessible locations may be routed exposed.
   1. Exposed pathways located less than 96 inches above the floor shall be installed in EMT.

B. Pathways shall be installed in EMT.

C. Exposed EMT shall be painted red enamel.

3.04 CONNECTIONS

A. Disconnect the existing fire alarm control panel from all existing monitor and control points. Ensure care is taken in advance of powering any control panel down. Review programming, wire labeling and ensure everything is adequately prepared for an efficient transition to the new control panel. Re-connect all existing cabling serving the field devices and panels. Make any new connections as required to ensure a fully functional system.

3.05 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 27 0553 "Identification for Communications Systems."

B. Install framed instructions in a location visible from fire-alarm control unit.

3.06 GROUNDING

A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.

B. Ground shielded cables at the control panel location only. Insulate shield at device location.

3.07 FIELD QUALITY CONTROL

A. Field tests shall be witnessed by authorities having jurisdiction.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections.

D. Perform the following tests and inspections:
   1. Visual Inspection: Conduct visual inspection prior to testing.
      a. Inspection shall be based on completed record Drawings and system documentation that is required by the "Completion Documents, Preparation" table in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
      b. Comply with the "Visual Inspection Frequencies" table in the "Inspection" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
   2. System Testing: Comply with the "Test Methods" table in the "Testing" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
   3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
   4. Test audible appliances for the private operating mode according to manufacturer's written instructions.
   5. Test visible appliances for the public operating mode according to manufacturer's written instructions.
   6. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" section of the "Fundamentals" chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.

E. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.

F. Fire-alarm system will be considered defective if it does not pass tests and inspections.

G. Prepare test and inspection reports.

H. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.

I. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

3.08 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of manufacturer's designated service organization. Include preventive maintenance, repair or replacement of worn or defective

components, lubrication, cleaning, and adjusting as required for proper operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

1. Include visual inspections according to the "Visual Inspection Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
2. Perform tests in the "Test Methods" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
3. Perform tests per the "Testing Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.

3.09 SOFTWARE SERVICE AGREEMENT

A. Comply with UL 864.

B. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for two years.

C. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system and new or revised licenses for using software.

1. Upgrade Notice: At least 30 days to allow Owner to schedule access to system and to upgrade computer equipment if necessary.

3.10 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system.

B. Training shall be provided in three (3) 2-hour sessions. Coordinate training schedule closely with the Newton Correctional staff.

END OF SECTION

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SECTION 28 5200
DETENTION CONTROL SYSTEM

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Detention Control System Platform
   2. Programmable Logic Controller (PLC)
   3. Command Workstations
   4. Administration Computer
   5. Detention Control Door System
   6. Detention Control Intercom & Paging System
   7. Extra Materials

B. Description
   1. Provide all materials required for a fully functioning system in compliance with the performance specified.
   2. The Detention Control System (DCS) shall provide the integration and control elements for multiple security systems as specified.
   3. The DCS shall be comprised of hardware and software elements to form a complete security management and operator control system for the facility.
   4. Basic system requirements are to include, but not necessarily be limited to:
      a. DCS Software that seamlessly integrates all administrative and operational functions into a single system.
      b. DCS Servers in a redundant hot standby configuration that host the primary system software and data.
      c. DCS Command Workstations that can be used to perform operational and/or administrative functions.
      d. Integration with the Door Control (PLC) Subsystem that interfaces to door locks, lighting controls, load shedding, alarm monitoring and other miscellaneous functions.
      e. Integration with the Video Management System (VMS) for coordinated operation of the door passage communication functions and general surveillance operations. The CCTV operator workstation functions to be integrated into the DCS operator workstations.
      f. Integration with the Security Intercom for coordinated operation of door passage communication.
      g. Backbone communications via a new singlemode data network configured in a self-healing loop architecture.
      h. Status monitoring and reporting of the data network serving the DCS. Provide alarms and notifications in the event communication goes offline.
      i. Miscellaneous security system integration to control elements for inmate telephone, overhead door control, intercom, etc. required to provide complete system functionality for all specified requirements.
      j. External time synchronization service such as GPS or CDMA for synchronization of all computers and data equipment employing clocks.
      k. The system shall have an open architecture design. It shall be a true open architecture design and support industry standards for databases, networks, and video cameras.
      l. The system shall respond to inputs and output commands within
         1) 500 milliseconds. Alarms (text and graphic) shall be fully displayed on the video display within 1 second of origination.

C. Existing Conditions Summary:
   1. Newton Correctional Facility is currently served by an existing Simplex platform for both fire detection and alarm as well as detention controls. This system encompasses a total of

10 buildings as identified on the drawings. The bidding contractor shall provide a solution that upgrades the campus to a new PLC-based hardware platform that is controlled through a new software front end.

2. Master Control located inside building H hosts centralized control over the entire campus. Each housing unit's command post also has the ability to take over local control when necessary. Provide required detention control hardware and software programming to maintain this functionality.
3. All field hardware including but not limited to: 120V detention door hardware, motorized sliders, door position switches, water shut-off valves, power and lighting control and recessed wall-mount intercom stations shall remain and be re-used. Provide supervision of these existing devices as required for compatibility and security of the newly proposed detention controls system.
4. The existing campus hosts a multi-mode fiber optic ring network that serves all existing Simplex cabinets and terminals. The owner shall provide direction to assist in taking individual buildings offline when a cutover is necessary. Through the use of singlemode fiber optic "jumper" cables, nodes can be strategically taken offline. The bidding contractor shall provide headend pathways, pre-wiring, labeling and programming ahead of any building cutover to minimize downtime.
5. Existing infrastructure serving locks, sliders, control and monitor points shall be intercepted by the new PLC system. Intercepting the wiring or relay control shall be accepted with the condition that it is driven from a new programmable logic controller.
6. Coordinate the Work of this Section with that of other Sections as required to ensure that the entire work of this Project will be carried out in an orderly, complete, and coordinated fashion. Check equipment against space available as indicated on the Drawings, and make sure that proposed equipment can be accommodated. If interferences occur, bring them to the attention of Engineer. Otherwise, the Detention Controls Contractor shall, at his own expense, provide proper materials, equipment, and labor to correct any damage due to defects in his work caused by such interferences.

1.02 RELATED REQUIREMENTS

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

B. The following documents shall also be considered as a part of and shall relate directly to this section:
   1. Section 28 2000 - VIDEO MANAGEMENT SYSTEM
   2. Section 28 4600 - FIRE DETECTION AND ALARM SYSTEM

1.03 ABBREVIATIONS AND ACRONYMS

A. Reference Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS

1.04 DEFINITIONS

A. Reference Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS

1.05 CODE REFERENCES AND STANDARDS

A. Comply with Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS

1.06 SUBMITTALS

A. Comply with Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS

1.07 QUALITY ASSURANCE

A. Comply with Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS

1.08 DELIVERY, STORAGE, AND HANDLING

A. Reference Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS

1.09 WARRANTY

A. Comply with Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS

PART 2 PRODUCTS

2.01 APPROVED MANUFACTURERS

A. Manufacturer's names, catalog numbers, and trade names are used to establish a level of quality and the operational characteristics for the products and systems specified. Specified materials, products, and services shall be provided unless otherwise approved by change to the bidding or contract documents. Materials, products, and services of manufacturers listed as "approved" may only be used provided they meet or exceed the specified requirements and meet or exceed the level of quality and service established by the "specified" manufacturer.

B. Equivalent products of other manufacturers will be considered based on product data, manuals, demonstration software, and other technical information as necessary to show compliance with the specification. Information must be submitted prior to bid due date and be approved by addendum.

2.02 DETENTION CONTROL SYSTEM PLATFORM

A. Description:
   1. The Detention Control System is an integrated monitoring and control system that includes command workstations with control software, control panels, and programmable logic controllers (PLCs).
   2. The Detention Control System interfaces directly with the following systems:
      a. Detention Control Door Control System
      b. Detention Control Intercom & Paging System
      c. Video Management System

B. General Features:
   1. Failure or communication loss to one PLC shall not effect communication to the other PLCs or disrupt or delay control and monitoring of any device unrelated to the failed PLC. Furthermore, when a failed PLC is restored, the control and monitoring of devices related to the restored PLC shall immediately continue without restarting the application.
   2. Failure of any one command workstation, the administration station, or other networked computer shall not affect the operation of any other station. All command workstations shall communicate directly with the PLCs for all control and monitoring functions. Systems that utilize a file or data server to facilitate communication are not acceptable. PLCs shall be located in each equipment room as indicated on the drawings.
   3. Each command workstation shall be configured with all the software and graphic files required for all locations. Each command workstation shall automatically recognize its intended location upon startup and configure itself accordingly. If the intended location is not recognized, (as in the case of a spare command workstation), a window shall be displayed requiring selection of the current location. In the event that one command workstation must be moved, its intended location identity shall be able to be changed allowing it to be operated in a new location without software changes or updates.
   4. The system shall utilize voice instructions for alerting the operator to alarm conditions and critical control sequences such as interlock, interlock override, emergency release, and other functions. There shall also be a voice annunciation ON/OFF switch to enable and disable the voice instructions
   5. The Control Software Module shall be self-updating. All software updates shall be performed so that the operator needs only to exit and restart the Control Module for the

updates to be recognized. File copies, program installs, etc. shall not be required. Furthermore, all software and data updates shall be made via remote support over a facility-provided internet connection. Other than enabling the internet connection, all updates shall be done without requiring assistance from the facility.

a. The facility will maintain physical security on the remote support connection by physically unplugging the internet connection from the Security Control Network. (Similar to unplugging a phone line from a modem) The connection will remain unplugged at all times except when scheduled with the facility.
b. The remote support solution shall utilize only outbound connections which require no reconfiguration of existing firewalls or other safeguards. It must also be compliant with the following industry and U.S. government standards for cryptographic algorithms and security protocols:
    1) The TLS/SSL Protocol, Version 1.0 IETF RFC 2246
    2) Advanced Encryption Standard (AES), FIPS 197
    3) AES Cipher Suites for TLS, IETF RFC 3268
    4) AES Key Wrap Algorithm, IETF RFC 3394
    5) RSA, PKCS #1
    6) SHA-1, FIPS 180-1
    7) HMAC-SHA-1, IETF RFC 2104
    8) MD5, IETF RFC 1321
    9) Pseudorandom Number Generation, ANSI X9.62 and FIPS 140-2

6. All logged event data shall be initially stored on the local command workstation, and then periodically transferred to the Administration computer at intervals adjustable by the facility. The default interval shall be every 60 minutes. The facility shall also have the means to immediately transfer all data at any time as necessary. Upon confirmation of transfer, the data shall be removed from the local command workstation station so that its hard disk does not become full over time. All data shall be stored in an encrypted format to prevent alteration.
7. Each command workstation shall be controlled through a keyboard and mouse. Touchscreens are not desired to be part of this solution.

C. Command Workstation General Functions:
1. Icon Functionality:
    a. OVERVIEW: All system control shall be accomplished through graphical buttons known as ICONS. System monitoring shall be accomplished through changes in the icon's bitmap graphic and associated virtual LED. System activity shall be instigated from a field input, such as an intercom station, or from a command workstation input, such as pushing the “open” icon for a sliding gate. How the system reacts to this activity shall be defined by its FUNCTION. Each icon shall have one specific function and one unique description. For example, a function would be “intercom control and monitoring”. A description would be the architectural number for a specific intercom station. Each icon function shall be comprised of multiple icon states as required for proper operation. For example, the “intercom control and monitoring function” could have three possible states: idle, calling, and active. It could only be in one of the three possible states at any given time.
    b. ICON STATES: Each icon state shall have, at a minimum, the following properties:
        1) ICON BITMAP - The bitmap graphic that appears on the icon in the zoom view. The bitmap shall graphically depict the current state of the device.
        2) ICON STATE NAME - Each icon shall always be in one and only one of the available states. The states shall always be the same for a given function.
        3) DESCRIPTION - Describes the Icon state.
        4) COLORS - Indicates the main color of the Icon and associated virtual LED. Red shall typically indicate non-secure, emergency or alarm functions, activities, or conditions. Yellow shall typically indicate caution conditions such as intermediate steps in control sequences and "access" conditions. Green shall typically

indicate a secure condition. Other colors shall be utilized as necessary in a consistent manor.

5) SOUND - An associated sound file that plays in repeating intervals. (Usually in the alarmed state) Alarm sounds shall be distinctly discernible from each other and from intercom call-in sounds and workstation feedback sounds.
6) ALARMED - Indicates whether or not the Icon is alarmed. If alarmed, it shall also indicate what priority has been assigned. All alarms shall be displayed in the event queue sorted first by priority and second by date/time.
7) FLASHING - Specifies whether the icon bitmap and associated virtual LED flashes on and off or remains constantly on.
8) RECORD - indicates if the event is recorded to the Administration computer.
9) ICON VISIBLE - Indicates if the Icon is visible or hidden. Hidden Icons shall be used for functions such as PLC alarms where the Icon only needs to be visible in an alarmed state. This minimizes clutter on the graphics.
10) LED VISIBLE - Indicates if the status LED is visible or hidden.

D. Command Workstation Specific Functions:
1. Specific Icon Control Functions: The following descriptions may not include all control and monitoring functions for all icons required for this project, but provides a representative sample to indicate the type and level of control and monitoring expected.
2. Door Control and Monitoring
a. Swing Doors
1) CONTROLLED AND MONITORED. Selecting the Door Icon will display a control bar with several options, Unlock Door, Activate Hold Open, and Hide. Selecting the Unlock Door option will energize the lock relay for a preset time. The Door Icon shall be unsecured as long as the door is open or unlocked. When the door is closed and locked, the Door Icon shall return to the secured state. Open relay times shall be adjustable via the Administration computer.
2) HOLD OPEN. Selecting the Door Icon will display a control bar with several options, Unlock Door, Activate Hold Open, and Hide. Selecting the Activate Hold Open option will energize the lock relay. The Door Icon shall change to the hold state and the door relay shall be maintained. The Door Icon shall be unsecured as long as the door is open or unlocked. Selecting the Door Icon a second time shall de-energize the door relay. When the door is closed and locked, the Door Icon shall return to the secured state.
b. Sliding Doors
1) CONTROLLED/ MONITORED. Selecting the Door Status Icon will display a control bar with several options, Open, Stop, and Close. Selecting the ‘Open’ option will energize the Open Relay for a preset time. When the door is open, the Door Status Icon shall change to the unsecured state. To close the door, select the ‘Close’ option. The Close Relay energizes for a preset time. To stop a moving door, select the ‘Stop’ option. To start a door moving again, select the ‘Open’ or ‘Close’ option. When the door is closed, the Door Status Icon shall change to the secured state. Open and Close relay times shall be adjustable via the Administration computer.
c. CELL DOORS. Two additional options shall be presented when a cell door status icon is selected, Enable Deadlock and Call Disable.
d. MONITORED DOORS. When a monitored swing door opens, the Door Icon shall change to the alarmed state. Selecting the Door Icon shall change the Door Icon to the acknowledged state. When the door is closed, the Door Icon shall change to the field reset state. Selecting the Door Icon shall change the door Icon to the secured state.
e. CONTROLLED/ MONITORED EXTERIOR SLIDING GATE. Selecting the Door Status Icon will display a control bar with several options, Open, Stop, and Close. Selecting the ‘Open’ option will energize the Open Relay for a preset time. When the

door is open, the Door Status Icon shall change to the unsecured state. To close the door, select the 'Close' option. The Close Relay energizes for a preset time. To stop a moving door, select the 'Stop' option. To start a door moving again, select the 'Open' or 'Close' option. When the door is closed, the Door Status Icon shall change to the secured state. Open, Close and Stop relay times shall be adjustable via the Administration computer.

f. GROUP RELEASE. Doors shall be unlockable in groups. From the inactive state, select the "Group Release" icon, and then select the "Activate Group" option. The icon shall change to the active state and all doors in the related group shall open and stay open. To cancel the group release, select the "Group Release" icon, and then select the "Deactivate Group" option. The icon shall change to the inactive state and all doors shall be locked at a staggered rate.

g. INTERLOCKS and INTERLOCK OVERRIDE. Icons for all doors and gates that are members of one or more interlock groups will display a large "I" in the middle. When one door or gate of an interlock becomes unsecured, all other door or gate icons interlocked with that door change to the disabled state. To open a disabled door and override the interlock, select the Door Icon in the disabled state. Selecting the 'Override Door' option will cause a pop-up window with a flashing "Warning" to be displayed for 2.5 seconds. A second pop-up window is displayed indicating that compromising the interlock is a serious security risk. Select OK to continue. A third pop-up window is displayed confirming operator intentions. Select Ok to unlock the door and override the interlock. When all doors and gates interlocked with another door are secure, Door Icon will return to the secured state. Interlock groups are indicated on the Drawings.

h. EMERGENCY RELEASE. An Emergency Release button shall be provided to allow the emergency release of selected doors and door groups. Selecting the Emergency Release button from the Global Keypad area shall present an emergency release screen with all available emergency release icons. Selecting an emergency release icon shall highlight the effected background graphic area yellow and display a warning message with OK and Cancel options. If OK is selected a confirming message is displayed. If confirmed, the effected background graphic area shall highlight red and the door(s) shall unlock. The doors in the emergency release group shall remain unlocked and in the Active state until reset. The emergency release group shall also be added to the event queue. Selecting the Emergency Release Group icon a second time shall highlight the effected background graphic area yellow and display a warning message with OK and Cancel options. If OK is selected the release is canceled. The emergency release icon changes to the "Inactive" state. All doors in the emergency release group shall be locked at a staggered rate. The emergency release group shall be removed from the event queue. The background graphic area shall return to normal.

i. DOOR ALARM. When a swing door opens without the open control signal from the Security Control system, an alarm is initiated.
   1) DOOR DPS CHATTER. A door position switch (DPS) can chatter when a swing door is closed thereby causing a nuisance alarm. To prevent this, each door has an adjustable time period for which an alarm condition is ignored following a door being closed.
   2) DOOR OPEN-TOO-LONG. When a door is not a member of an active 'hold open' group, and remains open longer than a predefined time, the icon changes to the OTL alarm state. Selecting the icon will return it to its previous state and restart the Open-Too-Long timer. Open-Too-Long times shall be adjustable via the Administration computer.

j. CELL GROUP ACCESS. Select the group access icon to activate inmate group access for an associated area. A confirming message is displayed. Select OK to activate inmate group access. The icon changes to the active state. Icons for all intercom stations included in the Access Group will display a yellow "A" in the lower

right corner. If a member cell door is not in deadlock mode, then the call-in pushbutton from the associated cell intercom station will momentarily energize the door unlock relay instead of creating an intercom call-in. To deactivate inmate group access, select the group access icon a second time. The icon changes to the inactive state.

k. CELL DOOR DEADLOCK. After selecting the door icon, select the “Enable Deadlock” option. The door is placed in deadlock mode. The door icon changes to the ‘deadlocked’ state. The door will no longer participate in inmate group access or group release. To remove the door from deadlock mode, select the door icon a second time and select the ‘Disable Deadlock option. The door will now participate in inmate group access and group release.

3. Audio Control
   a. INTERCOM. When a call is initiated from a field intercom station, the command workstation shall “zoom” to the proper area of the facility, center the icon of the calling station on the display monitor, and change the icon to the calling state. Selecting the calling icon shall acknowledge the call and create a talk path. If applicable, an associated CCTV camera image shall display on the control room CCTV monitor. Selecting the icon a second time shall close the talk path and return the icon to the default idle state. If applicable, the associated CCTV camera image shall return to a default view. Locating the calling icon shall occur according to its position in the event queue. If a call is interrupted by an alarm with a higher priority, acknowledging that higher priority alarm shall return the graphic display to its previous view of the intercom icon. Call-ins while another intercom conversation is occurring shall be ignored until that conversation is terminated. Selecting a second intercom icon while the first one is active shall close the first talk path and open the second. The system shall be configurable to allow the facility to handle incoming calls by selecting a “Locate” icon rather than going to the calling icon automatically. This operational feature shall be adjustable via the Administration computer.
   b. PUSH-TO-TALK. Selecting the push-to-talk button shall open a talk path to the current active intercom or paging zone. The push-to-talk button shall be disabled when there is no active intercom or paging zone.
   c. INTERCOM DURESS. If a field intercom call pushbutton is held in longer then the pre-assigned time limit, a duress alarm is initiated. The icon shall change to the ‘duress’ state. Acknowledge the alarm by selecting the icon. The icon changes to the ‘active’ state and a talk path is created. The intercom now operates normally.
   d. CELL INTERCOM CALL DISABLE. To prevent nuisance calls from an intercom, select the associated Door icon and the “Call Disable” option. The Intercom icon changes to a ‘disabled’ state and intercom calls from the cell intercom station are ignored. To return to normal operation, select the associated Door icon and the “Call Enable” option. The Intercom Icon changes to an ‘idle’ state and intercom calls are again annunciated.
   e. SPEAKERS.
      1) INTERCOM. Selecting an idle IC Speaker Icon shall open a talk path to the intercom speaker and change the icon to the active state. Any other active intercom calls shall be canceled. Selecting the IC Speaker Icon a second time shall close the talk path and return the icon to the default idle state.
      2) PAGING. Selecting a paging zone Icon and activating Push To Talk shall open a talk path to be broadcast to that paging zone and change the icon to the active state. Any active intercom calls shall be canceled. Selecting the paging Icon a second time shall close the talk path and return the icon to the default idle state. Multiple paging zones can be selected simultaneously.

4. CCTV
   a. CAMERA. Selecting a camera icon shall switch on the associated camera for display on the control room CCTV monitor and changes the camera icon to the active state.

Selecting a second camera icon shall change the previous icon to inactive and new icon to active. Selecting the same camera icon a second time shall switch the camera image back to a default view and change the icon to an inactive state.

5. Alarms
   a. UPS ALARMS: A UPS alarm shall be initiated whenever battery back up is required. The associated icon shall change to the alarmed state. Selecting the UPS icon shall acknowledge the alarm. TheUPS Icon shall change to the acknowledged state. The alarm condition shall reset when battery back up is no longer required. The icon shall change to the field reset state. Selecting the UPS Icon in the field-reset state shall return the UPS Icon to the normal state. Locating the alarmed icon shall occur according to its position in the event queue. All UPS events shall be recorded on the Administration computer. Adjustable timers shall be provided to delay alarms. Timers shall be adjustable via the Administration computer.
   b. PLC ALARMS: A PLC alarm shall be initiated whenever a PLC loses battery backup, loses communication with another PLC, or has a general diagnostic alarm. The associated icon shall change to the alarmed state. Selecting the PLC icon shall acknowledge the alarm. The PLC Icon shall change to the acknowledged state. The alarm condition shall reset when the alarm clears from the PLC. The icon shall change to the field reset state. Selecting the PLC Icon in the field-reset state shall return the PLC Icon to the normal state. Locating the alarmed icon shall occur according to its position in the event queue. All PLC events shall be recorded on the Administration computer.
   c. DURESS ALARMS: When a duress alarm occurs, the icon shall change to the alarmed state. Selecting the icon shall acknowledge the alarm. The icon shall change to the acknowledged state. When the alarm condition is reset in the field, the icon shall change to the field reset state. Selecting the icon in the field-reset state shall change the icon back to the normal state. Locating the alarmed icon shall occur according to its position in the event queue. All Duress events shall be recorded on the Administration computer.
   d. ALARM HANDLING
      1) ALARM ACKNOWLEDGE/RESET. When an alarm is first received, it will be added to the event queue in order of priority and time. A continuous alarming tone will sound and the device icon changes to the alarmed state. Selecting the device icon in the alarmed state will acknowledge the alarm, silence the audible tone, and change the device icon to the acknowledged state. Once the device is reset in the field, the device icon changes to the field reset state. To reset an alarm, select the device icon in the field reset state and it will change to the normal state. All icon state changes will the recorded to the security system database as specified by the Administration Software Module.
      2) ADMINISTRATIVE ALARM SHUNT. From the Security Administration computer, alarms can be ignored or shunted during a specified period of time. In this instance, devices normally alarmed will instead change to the ‘shunted’ state. When the time period is over, normal alarming will resume.
      3) CAMERA VIDEO-FOLLOW-EVENT (VFE). Every security system device shall be able to have a camera(s) assigned to be displayed on an available alarm monitor(s) based on system events.
         (a) Assigned camera(s) shall display on the assigned alarm monitor(s) based on a “Video-On” flag.
         (b) Assigned camera(s) shall revert to default camera(s) based on a “Video-Off” flag.
         (c) When a device from the event queue is selected, the assigned camera(s) is displayed on the assigned alarm monitor(s) regardless of the device’s current state.

(d) When a door's control-bar closes, the default camera(s) is displayed on the assigned alarm monitor(s). This feature allows cameras to be displayed temporarily upon selecting a door icon (usually in the secured state).
(e) VFE shall be user configurable from the Security Administration computer.

6. Miscellaneous Functions
   a. LOGIN: Access to the system software shall be password protected and all operators shall log into the software module. A video keypad window shall be displayed that utilizes a "scramble" function so digits do not appear in the same location each time an operator logs onto the system. All log-in/log-out activities shall be recorded on the Administration computer. All Login events shall be recorded on the Administration computer.
   b. CONTROL TRANSFER: Three methods of control/transfer shall be provided:
      1) Station Transfer: To transfer a command workstation (send control to another location); select the Transfer icon in the Global Keypad Area. A confirming message pops-up. All control and monitoring functions are transferred to the designated alternate control station. A message pops-up at the alternate control station indicating that it now has control of the "transferred" station's designated control area. The transferred station shall display the login window only. Return of normal operation is accomplished by logging into the transferred station. When login is completed successfully, control and monitoring is returned to that station. The alternate control station receives a message indicating it no longer has control of the designated area. Master Control cannot be transferred.
      2) Station Takeover: To takeover a command workstation (take control from another location), select the appropriate Takeover Icon at Master Control. A confirming message pops-up. All control and monitoring functions are transferred. The station that was taken over displays "Station Disabled" and the current operator of the transferred station is logged out. Master Control receives a message indicating it now has control over the new designated control area. To return control and monitoring to the station, select the Restore Icon from Master Control. The transferred station removes the "Station Disabled" message and displays the video keypad window for login. When login is completed successfully, control and monitoring is returned to the station. Master Control receives a message indicating it no longer has control of the designated area.
      3) Command Workstation Duress: To transfer a command workstation under duress, select the Duress icon in the Global Keypad Area. A confirming message pops-up. All control and monitoring functions are transferred to Master Control. An alarm is initiated and a message pops-up at Master Control indicating it has control of the duressed station's designated control area. The station that is in duress displays "Station Disabled" and the current operator of the duressed station is logged out. At Master control; select the alarmed Icon to acknowledge the alarm. The icon changes to the disabled state. To return control and monitoring to the duressed station, select the disabled Icon from Master Control. The transferred station removes the "Station Disabled" message and displays the video keypad window for login. When login is completed successfully, control and monitoring is returned to the station. Master Control receives a message indicating it no longer has control of the designated area.
   c. STATION CONTROL. Selecting the "STATION CONTROL" icon shall display the "Station Control" window. This window allows the operator to see the status of all command workstations, take control of stations, and restore control to stations. The window shall display an icon for each command workstation. The icon shall be in the state appropriate to the location's current status (normal, transferred, disabled, taken over, etc.) Stations in the normal state shall have a "TAKEOVER" icon displayed. Stations in the transferred state shall have a "RETURN CONTROL" icon displayed. Station control applies only to Master Control.

d. EVENT QUEUE. The event queue is a list of outstanding events that either need to be addressed or monitored by the operator. The event type, location, and time of occurrence are displayed. The events are ordered by priority and time, and color-coded to indicate importance. Use the up and down scroll buttons to select an event from the queue, or select it directly with the mouse or your finger. Use the 'Locate' button to find the related icon.

e. UTILITIES. Selecting the "UTILITIES" icon shall display the "Utilities" window. Based on the operator's security level, this window allows administrative functions to be performed.

1) VOLUME UP. Selecting the volume up button allows the operator to increase the volume of the console speaker.
2) VOLUME DOWN. Selecting the volume down button allows the operator to decrease the volume of the console speaker.
3) SHOW/HIDE CURSOR. Allows the cursor visibility to be toggled on and off. This shall be provided for touchscreen operation only when the cursor may be a distraction. The cursor shall be forced visible before start-up and login.
4) SHOW/HIDE EXCEPTION ICONS. Allows the display of icons that normally are hidden. This shall be provided for maintenance purposes and shall require special security rights.
5) DISABLE/ENABLE SPEECH. Toggles whether or not voice messages are annunciated. If enabled, a voice message will be annunciated whenever an icon changes to a state that is configured for voice messaging. Each icon state can be defined to announce a voice message. See Control System Administration document - Icon States.
6) ADJUST SPEECH. Controls the features of digitized voice messaging.
   (a) Select voice from available list.
   (b) Test - Allows the operator to hear adjustments made to the digitized voice.
   (c) Save - Allows the operator to save the changes made to the digitized voice. Changes made here will be reflected in the Security Control Program voice messaging.
   (d) Exit - Closes speech adjustment window.
7) UPDATE APPLICATION. Allows the station to receive immediate application updates from Administration Software Module.
8) END PROGRAM. Shall end the Control Software Module. Access to this button shall require administrative security rights.

E. System Administration

1. The command workstation Control System shall be provided with an Administration Software Module, which shall be password protected and reside on the system's Administration computer. The Administration software shall also be capable of being operated on multiple stations simultaneously.
2. GRAPHIC DISPLAY. A means of selecting any graphic image that is viewable on any command workstation shall be provided. Views shall be displayed in one of two formats - 'zoomed in' or 'zoomed out'. 'From the 'zoomed out' format, all controlled and/or monitored areas shall be represented by colored squares (LEDs). From the 'zoomed in' format, all controlled and/or monitored areas shall be represented by selectable buttons (Icons). From the graphic views, it shall be possible to, reposition, and/or change properties of, all Icons and LEDs.
3. THE ADMINISTRATIVE COMPUTER SHALL GRAPHICALLY MONITOR (BUT NOT CONTROL) SYSTEM ACTIVITY IN REAL TIME
4. SYSTEM OPERATORS. It shall be possible to add, delete, and edit System Operators. Only operators with administrator privileges shall have access to this area. An administrator shall not be able to delete their own record or remove their administrator privilege. Operator names and passwords shall not be duplicated. Passwords must contain at least 4 digits.

5. SECURITY LEVELS. It shall be possible to add, delete, and edit Security Levels. Each operator without administrator privileges must be assigned a security level. Only operators with administrator privileges shall be allowed access to this area. A security level in use cannot be deleted.
6. ICON TYPES. Every field device in the Security System has an associated Icon Type. Multiple devices (example: Swing Door) can have the same icon type. Each icon type has multiple icon states. The following information shall be available and editable as indicated for each icon state as applicable: (Changes shall be made globally to all icons of same type)
    a. Icon Type - Name given to the specific icon type. (Read only)
    b. Displayed Text - The description that is displayed in the event queue and recorded in the event database. (Editable)
    c. Annunciated Message - The description that is annunciated for this icon type. The entire annunciated message consists of: <Icon State Annunciated Message> <Icon Type Annunciated Message> <Icon Caption>. (Editable)
    d. State No - A reference number for the icon state. (Read only)
    e. Icon State - The icon state name. (Read only)
    f. Graphic Image - The graphic image that shows on the icon when this state is active (Editable)
    g. Graphic File - The name of the bitmap file for the graphic image. (Editable)
    h. Sound File - The name of the sound file that is heard when this state is active. (Editable)
    i. Led On - The flashing on led color when this state is active. This is also used for the event queue record background color if applicable. (Editable)
    j. Led Off - The flashing off led color when this state is active. (Editable)
    k. Event Priority - The order in which the icon state is displayed on the event queue when active (Editable)
    l. Flash - Indicates whether or not the led and icon will flash when this state is active. (Editable)
    m. Icon - Indicates whether or not an icon is visible when this state is active. Icons for monitored only devices in a safe state are normally not visible to reduce graphic clutter. (Editable)
    n. Led - Indicates whether or not the led is visible when this state is active. LEDs for monitored only devices in a safe state are normally not visible to reduce graphic clutter. (Editable)
    o. Record - Indicates whether or not a record is stored in the event database whenever this state becomes active. (Editable)
    p. Voice - Indicates whether or not a digitized voice message is annunciated whenever this state becomes active. (Editable)
    q. Video On - Indicates whether or not assigned camera(s) is displayed on assigned alarm monitor(s) whenever this state becomes active (Editable)
    r. Video Off - Indicates whether or not default camera(s) is displayed whenever this state becomes active. (Editable)
7. PLC FUNCTIONS. All devices controlled or monitored by the security control system shall be listed. The following information shall be available and editable as indicated for each device as applicable: (Changes shall only effect the Individual device location)
    a. Function Type - Defines the way in which the device functions or operates. (Read only)
    b. Function Name - The device's architectural number. (Read only)
    c. Primary Location - The security station where the device is controlled under normal circumstances. (Read Only)
    d. Icon Caption - A unique name used to identify the device in reports and on the security system graphic. (Editable)

e. Record All - Indicates that a record is stored in the event database whenever the icon changes state (Editable)
f. Shunted Time Zone - Specifies a time zone when alarm events for this device are ignored. (Editable - see TIMING ZONES)
g. Unlocked Time Zone - Specifies a time zone when a door type device is held open. (Editable - see TIMING ZONES)
h. Restricted Time Zone - Specifies a time zone when a door cannot be unlocked via the command workstation or any local pushbuttons. A card access system, if present, will still function normally. (Editable - see TIMING ZONES)
i. Note - description or reference information for the device. (Editable)
j. TIMING ZONES. It shall be possible to add, delete, edit, or rename Time zones. Time zones allow actions to be performed on a scheduled basis. Time zones only apply to shunting alarms and opening doors.

8. DEVICE MAINTENANCE. The system shall record device operations every time a door is unlocked, an intercom is activated, a UPS is alarmed, or etc. The system will also allow the operator to input a 'Maintenance Interval' which specifies the number of cycles required before maintenance for that device is necessary. When device cycles reach the Maintenance Interval set value, the record is highlighted until the "Count Since Last Maintenance" value is set back to zero.
9. DEVICE TIMING. The system shall allow for specific device timing adjustments to be performed.
    a. Door
        1) Chatter Length - Time allowed for the door position switch to oscillate between secure and unsecure. Once the time has expired, an unauthorized door opening will generate an alarm.
        2) OTL Length - Time allowed for a door to be unsecured before an 'open too long' alarm is generated.
        3) Unlock Length - Amount of time the unlock relay is energized.
        4) Open Length - Amount of time the unlock relay is energized.
        5) Close Length - Amount of time the unlock relay is energized.
    b. Intercom
        1) IC Panic Length - Required duration for a field intercom button to be held down before a panic alarm is generated.
    c. UPS
        1) UPS Battery Alarm Delay - Period of time when system is operating on UPS before an alarm is generated.
10. CAMERAS / VFE. It shall be possible to assign any security device to a unique camera/monitor combination. Also known as video follow event (VFE), the assigned camera(s) are displayed on alarm monitor(s) accordingly.
    a. It shall be possible to add new cameras and associated icons to the system.
    b. It shall be possible to add new monitors to the system.
11. PLCs. It shall be possible to enable/disable polling of individual PLCs in the system. This function is mainly used during the startup phase of the security system installation to disable PLCs not yet ready to be used. During normal operation all PLCs should be enabled.
12. UTILITIES. The system shall provide a means to:
    a. Update Workstation Data - Apply changes to the security control workstations.
    b. Backup Data and Updates - Back up system data and updates to ensure that the system can be returned to its original state if necessary.
    c. Restore Data and Updates - Restore system data and updates to the systems original state if necessary.
    d. View Revision History - View all versions that have been applied to the security system since installation.

13. ADVANCED CAPABILITIES. System Operators, with the proper Security Level, shall be able to perform the following advanced functions using basic computer skills:
    a. Edit Graphics - Open displayed graphic for editing, ability to save changes or cancel. In addition to graphic changes, text can be added or changed.
    b. Add Function/Icon - Add additional controlled and/or monitored devices to the system.
    c. Delete Function/Icon - Delete controlled and/or monitored devices from the system.
14. EVENT HISTORY. Event data shall be available for viewing. By default, only the current day's events will be displayed. Previous day's events shall be able to be combined and retrieved as necessary. Previous day's events shall be able to be archived to, and retrieved from, removable data storage. The data shall be able to be sorted, filtered, grouped, and printed as necessary. Additionally, it shall be possible to save custom sorts/reports. The data shall be read only and cannot be changed. While stored on disk, the data shall be kept in an encrypted format to prevent alteration. Events shall be recorded as configured under ICON STATES and PLC FUNCTIONS sections.

F. Approved Manufacturers for DCS Platform:
1. Creative Technologies - Secured State
2. Aveva - Wonderware
3. Engineer approved Equal

2.03 PROGRAMMABLE LOGIC CONTROLLER (PLC)

A. Programmable Logic Controllers shall be provided by the Detention Controls contractor to interface the command workstations to the field devices. The PLC shall provide all control and alarm logic required providing the functions specified.

B. General Specifications:
1. Environmental ratings for all components of the PLC system, except programming equipment, shall meet or exceed the following requirements:
    a. Ambient Temperature rating of 0 to 60 C (32 to 140 F) operational and -20 to 70 C (-4 to 158 F) storage.
    b. Humidity rating of 10% to 90% Relative Humidity (non-condensing).
    c. All system modules shall be designed so as to provide for free airflow convection cooling. No internal fans or other means of cooling except heat sinks shall be required.
2. The PLC shall meet the following standards: UL Listed, CSA Certified, and CE.
3. The PLC system shall have been designed and tested to operate in an industrial environment.
4. The PLC and I/O modules shall be of modular and rack mounted construction.
5. The system power supplies shall be protected against short circuits.
6. The PLC system shall be designed so that each control area operates totally independent of one another. Failure or loss of a controller shall not hamper the operation of any other controller.
7. Programmable controller manufacturer must guarantee the availability of replacement/spare parts for a minimum of ten (10) years.
8. All I/O modules and housings must be of a standard type and fully interchangeable with previous PLC series.
9. All controllers and I/O structures of a single manufacturer shall be capable of being mounted on the same size fixing centers to allow for larger capacity controllers to be installed in the future should the facility require an expansion beyond the limits specified in the original contract documents.
10. Controllers must be capable of driving local I/O racks, where local is defined as up to one hundred (100) feet from the control unit, without the need for further intelligent interface modules.
11. When required, the system must be capable of controlling remote I/O up to a distance of 500 meters (1,640 feet) from the controller, using high-speed links with a minimum data

rate of one hundred and eighty seven (187) Kbaud. Communications over this link shall be accomplished using twisted-pair wires with an overall shield.

C. PLC Central Processing Unit
   1. The central processing unit (CPU) shall be microprocessor based, encased in a shielded enclosure to provide RFI protection, and shall provide the logic control functions and date transfer based upon the program stored in memory and the status of the inputs and outputs. The controller must be able to support up to 5,120 local I/O.
   2. The minimum standard control functions of the CPU shall include:
      a. Relay Ladder Logic
      b. Latching relays
      c. Timer clock pulses (.02s, 0.1s, 0.2s, 1s & 1m) and timers (.01 & 0.1 sec. Increments).
      d. Counters (up/down)
      e. Data comparison (=, <, >), data range comparison, and data table comparison.
      f. Data transfers (single register, blocks of registers, data distribution and collection using pointer).
      g. Synchronous shift registers forward and reverse (multiple channel length bit shifts).
      h. One-shot output and input controls.
      i. Master control relays (interlocks).
      j. Bit reads and moves.
      k. I/O forcing and setting
      l. BCD to Binary or Hexadecimal conversion.
      m. Binary or Hexadecimal to BCD conversion.
      n. I/O Refresh on command, immediate I/O inputs, and scheduled interrupt on command.
      o. On-line program editing.
   3. The following minimum modes of operation of the CPU must be selectable via a key operated switch or programming software commands:
      a. PROGRAM - Processor is not scanning program in memory and all outputs are held OFF.
      b. MONITOR - Processor is executing program and changes in user memory and data memory are allowed.
      c. RUN - Processor is executing program in memory and outputs are controlling to the program. No editing of program or data registers is allowed.
   4. The above settings shall require either a key, a programming console with a key, or programming software loaded on a computer to change the operating mode of the CPU.
   5. The processor shall incorporate extensive self-diagnostic features, which will not half the processor. In addition, separate visual indicators will annunciate at the following conditions:
      a. a.) POWER - Logic power is applied to the CPU and I/O rack from the power supply.
      b. b.) RUN - Processor is executing the program in memory and outputs are being controlled according to the program.
      c. c.) OUTPUT INHIBIT - Processor is executing program in memory according to input status, but outputs are being held in the OFF-state.
      d. d.) ALARM - A non-fatal error (such as a low memory battery condition) has occurred in the PLC hardware or program software. The PLC is still running and the outputs are being controlled according to the program.
      e. ERROR - A fatal error (such as a memory parity error) has occurred, the CPU is not scanning the program, and the outputs are held in the OFF-state.
      f. COMM - Indicating the CPU is communicating with the device connected to the peripheral port or RS-232C port.
   6. In addition to visual self-diagnostic indicators (LED's) the processor shall have a specifically designated block of a least 100 words of internal diagnostic words and bits. These shall provide more detailed system status and fault diagnostic information accessible by programming equipment or intelligent peripherals.

7. The processor must contain an error log area. This area must be able to log what error occurred and when the error happened, giving exact time and date. This area must be able to store a minimum of 1000 records.
8. At a minimum, the internal diagnostic registers shall provide the following information:
    a. Type of digital (input or output) or intelligent (analog, ASCII, etc.) I/O unit inserted in a particular slot (I/O table listing). This data should be accessible via programming console or programming software.
    b. If an I/O module is improperly mounted (wrong slot) or not in a slot (I/O verify or I/O bus error).
    c. Error codes for intelligent I/O module errors.
    d. PLC operation mode.
    e. Present and maximum scan time.
    f. Local Area Network operation status and error status.
    g. Local Area Network data Send and Receive verification and error status.
    h. Serial Host Computer interface operation and error status.
    i. Remote I/O rack operation and error status.
    j. Memory Error Area.
    k. Startup time. The start time should be updated every time the power is turned ON.
    l. Power Interruption Time.
9. A single RS232 or RS422 compatible or Fiber Optic differential communication port shall be used for software based ladder logic programming and communications to other compatible devices. The PLC system must support up to three of these ports simultaneously.
10. The data rate of the serial communications port shall be switch selectable. The following shall be the minimum available data rates: 300, 1200, 2400, 4800, 9600, and 19,200 baud.

D. PLC Processor Memory
1. The program storage medium shall be Battery Backed Random Access Memory (RAM). The memory shall be housed in the same enclosure as the processor.
2. Whenever any words (contacts, coils, entire rungs, etc.) of program memory have been deleted, the remaining program shall automatically be repositioned in memory so as to fill the void left by the deleted words. The automatic use of NOP's to replace deleted words of program memory is not acceptable.
3. Program memory area shall not be used to store data values (numbers) or I/O image table. A unique memory register area which is separate from ladder logic (program) memory shall be used to store data values.
4. In addition to the program memory area, the processor must contain a word addressable only area, used for internal data storage and manipulation. This area must be a minimum of 8K words in size.
5. Typical scan time for 1K words of ladder program memory shall not be greater than 0.15 ms.
6. Memory word size shall not be less than 16 bits.
7. In order to detect short pulse duration on selected inputs, it shall be possible to use immediate bit refresh update I/O units or program an immediate I/O refresh command in the ladder logic program.
8. To minimize word utilization for program storage in the CPU, no words must be required wire spaces or wire connects within the rungs and no word space must be required to mark the start of a new rung.
9. Each word of memory shall incorporate a parity bit for memory error checking accompanied by a visual indication of a CPU memory error.
10. The CPU shall maintain its RAM program memory indefinitely, regardless of battery status, as long as AC power is applied to the system.

11. If AC power is removed from the system, the RAM memory backup battery shall retain program and register memory for a minimum of 5 years from date of purchase or for at least 2 weeks after the first appearance of the “battery low” warning.
12. The PLC must have the ability to utilize two methods of memory filing. The ability to utilize FLASH memory cards. The ability to utilize the PLC’s extended data memory areas as file memory. File memory can be used to store the entire user program, I/O memory contents, and/or parameter area contents.
13. All PLCs must have the ability to utilize a real-time clock. For monitoring:
    a. the time that power interruptions,
    b. the time that the PLC was turned ON, and
    c. the total time the PLC has been ON.

E. PLC Relay Equivalents, Special Functions Outputs & Instructions:
1. The processor shall be equipped with no less than 71,204 dedicated internal relay bits, used to store and manipulate data internally.
2. The number of normally open (NO) and normally closed (NC) contacts of an internal relay bit shall be unlimited, dependent only upon program memory capacity.
3. It shall be possible to make any internal coil into a one scan one-shot with a single command.
4. It shall be possible to program any internal coil as a latching relay with both a latch and an unlatch rung segment.
5. It shall be possible to program multiple Master Control Relay (MCR’s). It shall be possible to use programming equipment, host computers, or the actual ladder logic program to operate special PLC instructions, which perform the following functions:
    a. Halt the operation of the CPU.
    b. Place the CPU in the output inhibit mode.
    c. Return the processor to the RUN mode by clearing ladder halt commands or by mode change from a host computer or programming console.

F. PLC General Purpose Storage Registers
1. Each register shall be 16 bits in length and capable of storing a four digit BCD (0000 to 9999) or Hexadecimal (0000 to FFFF) value.
2. Programming techniques shall allow all registers to be programmed as a totalizing counter, totalizing timer, part of a shift register, or for numerical or ASCII data storage.
3. It shall be possible to monitor and alter any register value via a programming console or host computer using programming software without halting the CPU.
4. It shall be possible to alter individual bits of any storage register using a programming console or host computer using programming software halting the CPU.
5. It shall be possible to set the value of any single storage register or any contiguous block of storage registers with the use of a single programming command.
6. It shall be possible to preset any value into any single storage register or any contiguous block of storage registers with the use of a single programming command.
7. Programming techniques shall allow the access and use of any single bit or of all individual bits of information from any zone of a shift register, regardless of size. The accessing of any individual bit shall be possible with a single rung of ladder programming.
8. The CPU shall be equipped with no less then 32,767 general-purpose data memory registers. In addition, any internal relay registers not used for real I/O or as individual contacts and coils may be used as general- purpose data memory registers.
9. Register data shall be retained in the event of AC power loss as long as the ladder program is retained.

G. PLC Counters and Timers
1. There shall be no less than 4,096 timers and 4,096 counters in the CPU. All counters and timers shall be capable of storing four digit decimal values from 0000 to 9999.

2. Programming techniques shall allow for cascading of timers and counters. It shall be possible to program memory retentive times that can be started and halted without being automatically reset.
3. It shall be possible to program a reset contact or data comparison so that a timer can be halted and its present value reset to zero.
4. Programming techniques shall allow for programming ON delay and OFF delay timers.
5. It shall be possible to program UP, DOWN, and bi-directional counters.
6. It shall be possible to program a reset bit or data comparison command that will halt and reset a counter.
7. Programming techniques shall provide for as many timer or counter comparison values as desired.
8. Programming techniques will allow for decoding an interval of a timer or a counter (between range or compare instruction). Up to 16 ranges or intervals of a timer or counter shall be able to be acted upon with a single ladder command.

H. PLC Data Functions, Shift Registers
1. It shall be possible to program the transfer of data between one data storage register and another, between an input or output channel and a storage register, or to transfer a constant value to any data storage register using a single command.
2. It shall be possible to perform a block transfer of a contiguous block of data registers to any other non-overlapping contiguous block of data registers, regardless of block size with a single ladder command.
3. It shall be possible to transfer any one constant to any contiguous block of data registers, regardless of block size with a single ladder command.
4. It shall be possible to program data transfer, data comparison, data value increment, data value decrement or any other mathematical operation on a data register either once every scan as long as the controlling rung is true or to execute these functions for only one scan at the leading edge of the controlling rung going true.
5. It shall be possible to perform Binary to BCD or BCD to Binary conversion of data in any data register with a single instruction.
6. Shift registers must be capable of shifting individuals bits, digits, or entire words either once per scan or for only one scan when their controlling rung goes true. The bit and digit shift registers must be able to shift either up or down.
7. The only limit to shift register size shall be the amount of contiguous data words available in memory to be used by that shift register.

I. PLC Digital Inputs and Outputs
1. Each input or output module shall be a self-contained unit housed within an enclosure so that no part of its circuit board is exposed to contact by handling.
2. Input and output units shall be UL listed, CSA certified and CE.
3. Pressure type screw terminals will accept one No. 12 or two No. 14 stranded or solid wires.
4. Convenience marker strips shall be provided adjacent to the I/O field wiring terminals for user labeling of all I/O points.
5. It shall be possible to replace any I/O module without removing or disturbing user field wiring.
6. Input and output modules shall be available in 8, 16, 32, 64, and 96 points per unit. The 32, 64, and 96-point units shall not be multiplexed I/O and shall have a thumbscrew secured, high density connector capable of accepting individual soldered or crimped connector pins or ribbon cable via IDC type connector configuration.
7. All high-density DC input or output units shall be solid state in nature. The output units shall be transistor type for long life and high DC reliability. Reed relays are not acceptable.

J. PLC Remote Inputs and Outputs
1. The remote I/O system shall be compatible with all of the company’s modular mid-sized and large PLCs and I/O units.
2. All power for the remote I/O on a rack will be supplied by that rack’s power supply unit.

3. The communication between the local PLC system and the remote I/O racks shall be continuous, full duplex, serial communications with a data rate of at least 1.5 Mbaud.
4. The remote I/O system shall support a total of at least 512 remote I/O points with one remote master.
5. The maximum number of remote I/O points at any single drop shall be determined by the number and density of the individual I/O units on the rack rather than any internal per-rack limitation.
6. The communications media for the remote I/O system shall be field terminable, 200-micron optical fiber with a maximum transmission distance of not less than 800 meters between drops without a repeating mechanism.
7. Remote I/O Network shall be available in fiber or wire options to allow greater flexibility.
8. The remote I/O system shall have a group of pre-assigned diagnostic registers which shall be used to report system faults to the main processor.
9. In the event of a failure of a particular drop on the remote I/O system, the CPU shall be capable of being configured to either issue an alarm and continue to run or to shutdown in an error condition as it would in the event of local I/O failure.
10. In the event of failure of a remote I/O drop, all output points on that drop shall be turned OFF.
11. In the event of a remote I/O drop failure, the remote I/O System must be capable of restarting automatically once the error is cleared.
12. Remote drops shall have the capability of supporting a programming/diagnostic port.

K. Network Options
1. Networking options must include Ethernet, Profibus DP, DeviceNet, and Omron's SYSMAC bus remote I/O and ControllerLink network. Ethernet communications must support TCP, UDP, and FTP protocols. The PLC should have the ability to generate e-mail messages to be sent via WAN or LAN, to report errors, provide scheduled maintenance and status reports. In addition, FTP (file transfer protocol) can be used to transfer data files between a host computer and or FLASH memory card and the PLC's memory.

L. PLC Programming Equipment
1. It shall be possible to program and monitor any PLC from a single Host Computer via the LAN.
2. Programming software must be compatible with Microsoft® Windows® 10 Professional
3. The programming software must not require the use of any hardware protection key, any special internal circuit board on the computer, or any sort of floppy disk to operate.
4. Programming Laptop Computer (minimum requirements)
    a. Microsoft® Windows® 10 Professional operating system with the latest service packs.
    b. Intel® Core™ i5-8400H Processor (Quad Core 2.50GHz, 8MB cache)
    c. 256GB M.2 NVMe PCIe SSD Class 40 Hard Drive
    d. 16GB, DDR4-2400MHz SDRAM, 2 DIMMS
    e. 1000Base-T Network Adapter (USB device, if necessary)
    f. Manufacturer:
        1) Specified: Dell Precision Series
        2) Approved Equals:
            (a) Hewlett Packard
            (b) Lenovo

M. PLC Programming
1. It shall be possible to program relay contacts in series using some form of "line wrap" software feature when the programmer runs out of horizontal space on a single line. The length of any rung, in parallel contacts, must be a maximum of at least 22 lines.
2. Any ladder or ladder element delete function must require at least two steps to prevent accidental deletion of any part of the ladder program.

3. If a programming console is used, it must provide display of I/O number, program address location, type of contact or element (coil or contact, series or parallel, bit or word, NO or NC, and etc.) status during monitoring and forcing indication.
4. It shall be possible to search the program for any contact number, coil number, storage register type and number, address location, or special function number that the CPU supports.
5. It shall be possible to delete all or part of anything without affecting the remainder of the program. In either case, the program must automatically recompile to accept the new addition or remove the gap left by any deletion.
6. It shall be possible to force any input, output, or internal bit ON or OFF using either the programming console or the computer-based programming software.
7. Programming of nested branches and rungs with multiple outputs must be possible.
8. It shall be possible to program any given I/O point or internal bit or register as often as desired.
9. Using the computer-based programming software, it shall be possible to simultaneously display the following information for any desired rung:
    a. The ON or OFF state of any contact or coil.
    b. The contents of any given storage register.
    c. Whether a coil is standard, normally closed, one-shot, or a latching relay.
10. The computer-based programming software must be capable of displaying non-adjacent rungs during program monitoring operation.
11. If a rung of logic is satisfied then the complete line should be highlighted not just the contacts/coils.
12. Monitoring or any bit/word across the network from any PLC should be supported to aid troubleshooting.
13. It should also be able to:
    a. Operate without using the mouse.
    b. Navigate using directory tree displays.
    c. Enter bit input/output instructions with function keys.
    d. Split the screen 2 or 4 ways.
    e. Convert from text inputs to ladder programs by either inputting mnemonics to ladder diagram displays or convert text input with text editors or word processors.
    f. Program with names rather than specific addresses.
    g. Have the ability to utilize name, addresses, I/O comments, and other data from Microsoft Excel.
    h. Drag and drop DOS files between Memory Cards in the computer and in the PLC.
    i. Display error histories from the CPU Unit with time stamping.
    j. Protect programs from access using passwords.
    k. Have the ability to run and monitor multiple programs all at one time.

2.04 COMMAND WORKSTATIONS:

A. Control Software Module
1. Purpose: The primary purpose of the command workstation System is to provide a means by which an operator can monitor and control specific aspects of a facility as simply and efficiently as possible. This is accomplished through an intuitive dynamic graphical operator interface. Events that occur without initiation by the operator (intercom calls, for example) shall be brought to the immediate attention of the operator so that they may deal with the event without searching or delay. Events that are initiated by the operator (station transfers, for example) shall as much as possible be grouped together for intuitive access.
2. Main Components: The command workstation System Graphical User Interface is comprised of six main components:
    a. MAIN VIEW - Provides an overall status of the current geographical area being monitored. The area graphic is displayed along with virtual LED lights that indicate the status of each controlled and/or monitored device.

b. ZOOM/CONTROL VIEW - Provides a larger view of the current geographical area. The area graphic is displayed with Icons that indicate the status of each devise and facilitate their control.
c. AERIAL GRAPHIC VIEW - Provides a geographical reference. The portion of the zoom/control view that is currently visible is always highlighted in the aerial view. This allows the operator to maintain a constant reference to the geographical position of the zoom/control view.
d. GLOBAL KEYPAD - All security system operations other than graphic positioning and icon controls are handled in this area through multiple button controls. Examples would be Emergency Release, Control Transfer, Log Off, Duress, etc. Specific functionality can be unique to a given project and is described hereafter. The global keypad shall always be available and shall not be hidden by other windows.
e. EVENT QUEUE - A tabular listing of all pending events listed first by priority and second by date/time. The background of each table record shall be colored to match the current state of its related icon. Up and down arrow buttons shall be provided for scrolling from the command workstation. A “Locate” button shall be provided to locate the associated icon of the current record and center it on the display. The Select button shall be disabled when the event queue is empty. The event queue shall always be available and shall not be hidden by other windows.
f. STATUS AREA - Provides text information regarding current icon status, current system status and current date and time. The status area shall always be available and shall not be hidden by other windows.

3. Graphic Operation:
   a. Provide a single dynamic image, (zoom/control view) without breaks, from which the operator can intuitively maneuver the entire geographical area for each of the following:
      1) Site Plan
      2) Each floor of each building
      3) For Pod Control locations, provide one image for each pod area
      4) The image shall be accurate and proportionally scaled to the actual building layout and of sufficient size as to accommodate all monitored and controlled devices in the form of icons. The icons shall be positioned proportional to the devices actual position relative to building graphic (leader lines are not acceptable). The icons as shown on the command workstation monitor shall be no smaller than ½ inch square. The icons shall be spaced far enough apart so that an operator will not be at risk of inadvertently selecting the wrong icon. The image shall be oriented correctly from the perspective of the station operator for areas that are visible from the station location.
   b. Traditional systems that divide a geographical area (such as one floor of a building) into multiple, sometimes overlapping, “tiles”, “pages”, or “screens” are not acceptable.
   c. All graphic operations shall occur in real time without delay.
   d. Selecting anywhere on the main or aerial views will zoom and center the specific location.
   e. Dragging the zoomed view will provide dynamic panning of that view.
   f. Dragging on the highlighted portion of the aerial view will dynamically reposition the zoomed view.
   g. All field initiated events, such as intercom calls, alarms, and etc., shall cause the proper view of the facility to be brought to the operator, zoomed in, with the associated Icon centered on the command workstation monitor.
   h. Selecting any graphical icon or button shall generate a short audible tone.

B. LCD Monitor
   1. Each command workstation monitor shall have, at a minimum, the following components and features:
      a. 27” wide-aspect ratio LCD Flat Panel

b. 1920 X 1080 resolution
c. Built-in speakers
d. Warranty:
   1) 3 years
e. Approved Manufacturers:
   1) Dell (Basis of Design)
   2) LG
   3) Samsung

C. Computer Command Workstation Configuration:
1. The computer command workstation shall include, at a minimum, the following components, and features:
   a. Microsoft® Windows® 10 Professional operating system with the latest service packs.
   b. Intel® Core™ i5 8400 Processor (6-Core, 9MB of cache, up to 4.0GHz) or faster
   c. 24GB of RAM. .
   d. 1TB 7,200 RPM 3.5" SATA, 6.0Gb/s Hard Drive with 8MB Cache or faster
   e. NVidia GeForce GTX 1050Ti.
   f. 1000Base-T Network Interface as required to communicate with PLC and LAN.
   g. 16X DVD+/-RW SATA.
   h. USB Keyboard and 2 Button Optical Mouse with Scroll.
2. Approved Manufacturers:
   a. Dell (Basis of Design)
   b. Hewlett Packard
   c. Lenovo
3. Quantity:
   a. Ten (10)
   b. Refer to the drawings to confirm all locations.

2.05 ADMINISTRATION COMPUTER:

A. The Administration computer shall include, at a minimum, the following components, and features:
1. Microsoft® Windows® 10 Professional operating system with the latest service packs.
2. Intel® Core™ i5 8400 Processor (6-Core, 9MB of cache, up to 4.0GHz) or faster
3. 24GB of RAM
4. 1TB 7,200 RPM 3.5" SATA, 6.0Gb/s Hard Drive with 8MB Cache or faster
5. NVidia GeForce GTX 1050Ti.
6. 1000Base-T Network Interface as required to communicate with PLC and LAN.
7. 16X DVD+/-RW SATA.
8. USB Keyboard and 2 Button Optical Mouse with Scroll.

B. Approved Manufacturers:
1. Dell (Basis of Design)
2. Hewlett Packard
3. Lenovo

C. Quantity:
1. One (1)
2. Locate this inside Building H Equipment Room near Master Control

2.06 DETENTION CONTROL DOOR SYSTEM

A. Interface Boards:
1. Interface boards shall be UL Listed or Recognized.
2. Interface Boards shall utilize standardized, multi-conductor cables for connections to the PLC input & output modules. All field terminations inside the equipment enclosures shall be made to Interface Boards. Terminations shall not be made directly to PLC modules.

3. Interface boards shall be constructed for mounting on standard 19" E.I.A. mounting rails and shall have 3/4" aluminum support angles at the top and bottom for maximum rigidity.
4. Interface boards shall be provided with a power LED that will indicate power is being supplied to the board.
5. Interface boards' control power busses shall be fused.
6. Interface Boards shall provide proper separation of Class 1 and Class 2 circuits as defined by Article 725 of the National Electric Code.
7. Interface boards shall contain no active circuitry or control logic.
8. All terminals shall be "quick disconnect" types such that no tools are required to disconnect wiring should a board replacement be necessary.
9. Interface Board labeling shall be consistent with the PLC so that no cross-reference is required to trace circuits.
10. All terminals shall be factory labeled using printed labels. Field installed or hand written labels are not acceptable. Labels shall be consistent with system documentation indicating project specific ID numbers.
11. Termination boards shall be warranted for 10 years from the date of shipment.
12. BOARD TYPES:
    a. Interposing Relay Board
        1) 16 relays per board.
        2) Relays shall be plug-in, electro-mechanical type, rated at 10 amps each minimum.
        3) Each relay output shall be individually fused to protect field wiring to the device.
        4) Each relay shall have an associated LED to indicate when its' individual coil is energized.
        5) Approved Manufacturers:
            (a) Creative Technologies (Basis of Design)
            (b) Omron
            (c) Allen Bradley
    b. Input/Output Break-Out Board
        1) 16 Points
        2) 16 Inputs or Outputs per board. Boards shall be mounted in pairs for a total of 32 points in 19 inches of horizontal space (side-by-side)
        3) Each input/output point shall have an LED to indicate if the point is currently active. Each input/output termination point shall have its corresponding “common wire” termination point located adjacently for ease of troubleshooting field devices. Terminating all “common wires” at a separate location is not acceptable.
        4) Approved Manufacturers:
            (a) Creative Technologies (Basis of Design)
            (b) Omron
            (c) Allen Bradley
    c. Control Panel Interface Board
        1) Field cable interfaces via standard 50 pin TELCO connector
        2) 48 Points per board
        3) Approved Manufacturers:
            (a) Creative Technologies (Basis of Design)
            (b) Omron
            (c) Allen Bradley

2.07 DETENTION CONTROL INTERCOM & PAGING SYSTEM

A. Description:
    1. All existing field intercom door stations shall remain. They shall interface with a new head end as described within these specifications.

2. The dedicated intercom system equipment shall interface with the command workstation Control System, which provides the control functions for each system.
3. Dedicated Intercom: The dedicated intercom system provides two-way communication between the master stations and all existing field intercom stations housed at each building on campus.
4. The Programmable Logic Controllers shall provide outputs to the video switcher to display the appropriate video camera on the control station's monitor while an intercom link is connected.
5. General Paging: General paging provides the amplification, control, and termination capabilities required between specified consoles and paging speaker zones. Access to the paging system is via the Intercom Master Stations
6. Intercom stations shall be transferred when control and monitoring is transferred via the Security Monitoring and Control System.

B. Materials:
1. Intercom Master Stations: Each dedicated intercom master station shall be equipped and wired as required to affect the functions as described in the command workstation Control System. Each system shall include the following:
   a. Programmable Logic Controller (PLC) based audio switching system to perform the functions described herein.
   b. Equipment necessary to effect balanced audio switching.
   c. All software and programming necessary to perform the functions described herein.
   d. All power supplies and amplifiers required.
   e. Each Master Intercom Station shall consist of a remote intercom amplifier with separate microphone and speaker, volume up & down, and push-to-talk buttons.
   f. Gooseneck type, microphone with cardioid pattern, permanently mounted.
   g. Construction shall be of 16-gauge stainless steel. Momentary pushbuttons shall be provided for volume up, volume down, and push-to-talk functions. The gooseneck microphone shall be removable, low impedance, electret condenser type, with a frequency response of 80 Hz - 18 kHz. The speaker shall be 2 watt, 8 ohm, with a frequency response of 150 Hz - 12 kHz. An internal circuit board shall be provided with all necessary terminals and relays. All terminals shall be "quick disconnect" type such that no tools are required to disconnect wiring for board replacement. Receptacles shall be provided on the exterior of the station for a foot operated push-to-talk switch and a headset with microphone. Upon inserting the headset plug into its receptacle all talk and listen functions shall transfer to the headset. The master station shall contain no active circuitry or control logic. All control functions shall be performed by a Programmable Logic Controller
   h. Approved Manufacturers:
      1) Creative Technologies (Basis of Design)
      2) Automation Displays, Inc.
2. Master intercom amplifiers
   a. Approved Manufacturers:
      1) Tech Works (Basis of Design)
      2) Rauland
      3) Dukane
   b. All functions of the intercom amplifier shall be accessed through PLC outputs. (Push-to-talk, volume up & down, page mode relay, audio enable)
3. Remote Intercom Station:
   a. Each existing remote intercom station is flush mounted where shown on the drawings with push button call origination to the master station. Interface these stations with the new master intercom head end.
      1) Manufacturer:
         (a) Atlas Sound VPVT Series (25V)

4. Interface Boards. All intercom stations and Paging zones shall be connected to interface boards. Interface Boards shall utilize PLC manufacturers' style of input/output cables for connections to the PLC input & output modules. All field terminations inside the equipment enclosures shall be made to Interface Boards. Terminations shall not be made directly to PLC modules.
    a. Termination Boards shall be UL Listed or Recognized.
    b. Each control point on each interface board shall have an LED to indicate if the point is currently active.
    c. Interface boards shall be provided with a power LED for each power type supplied to the board that will indicate power is being supplied to the board.
    d. Interface boards' control power busses shall be fused.
    e. Interface Boards shall provide proper separation of Class 1 and Class 2 circuits as defined by Article 725 of the National Electric Code.
    f. Interface boards shall contain no active circuitry or control logic.
    g. All board terminations shall be plugable to facilitate board replacement.
    h. Termination boards shall be warranted for 10 years from the date of shipment.
5. BOARD TYPES:
    a. Audio Relay Board
        1) 16 relays per board.
        2) Relays shall be rated at 2 amps each.
    b. Approved Manufacturers:
        1) Creative Technologies (Basis of Design)
        2) Omron
        3) Rauland
6. Lightning Protection: ALI cables entering or leaving a building shall be protected Silicon Avalanche Diode protection devices. These devices shall be installed in the appropriate enclosure and grounded to the grounding system.

2.08 EXTRA MATERIALS

A. One PLC Processor

B. One PLC input module

C. One PLC output module

D. One PLC network communication module

E. One PLC power supply

F. One PLC backplane

G. One of each type of power supply used

H. One 500GB hard drive, compatible with Administration computer

I. One computer configured identical to the other command workstation computers, including all software and files to serve as a replacement for any other command workstation computer.

PART 3 EXECUTION

3.01 INSTALLATION

A. Equipment shall be installed as close as practicable to the locations shown on the Drawings.

B. Coordinate location of equipment and conduit with other trades to minimize interferences.

C. Secure the equipment using fasteners suitable for the use, materials, and loads encountered.

D. In security areas, exposed equipment and materials, including screws and other fasteners, shall be tamperproof. Cover plates shall have beveled edges.

E. All components/equipment (PLCs, termination boards, power supplies, network switches and etc.) shall be rack mounted in Type 1, Equipment Racks.

1. All components/equipment shall be fabricated into racks using UL 508A as a standard. (Enclosure and all internal equipment and wiring as a single entity)

F. Prior to the installation of Security Control equipment:
   1. Verify that all construction activities within the Control & Equipment rooms are complete. Rooms should be temperature / humidity controlled, dust free, and secure. Do not install equipment until these conditions are met.
   2. When conditions dictate storing equipment prior to installation, the temporary storage location should meet the requirements of item 1. (Above)
   3. Verify that the permanent, surge protected, power source is available for connection to the equipment.
   4. Verify that all circuits feeding system processors have UPS backup.
   5. Verify network connectivity is available to system processors.
      a. Programmable Logic Controller Network
      b. Command Workstation Network

G. Contractor shall install all necessary conductors and make final connections to the locking system hardware and controls as required to effect the locking, monitoring and control functions.

H. All conductors from the security equipment enclosures to electrically operated door locks shall be minimum 14 Ga. Copper THWN. All conductors from the security equipment enclosures to door position switches and bolt position switches shall be minimum 16 Ga. Copper THWN. Install the number of conductors required to provide the control and monitoring functions specified.

I. Programmable Logic Controllers (PLC) shall be utilized to perform functions as specified.

J. The door locking PLC's and command workstation Stations shall be powered from a UPS.

K. Electrical contractor shall furnish and install all breakers, wiring, and etc. to provide protected branch circuits to all security equipment.

L. In each equipment room, Uninterruptible Power Supplies (UPS) shall have the same power source (Emergency Panel) as Door lock circuits. PLCs shall monitor UPS for loss of power. Upon loss of power, all locks in an active group release shall be de-energized until power is regained, at which time locks shall be re-energized sequentially.

M. Interposing relays for door lock control shall be plug-in type with hold down clip and LED indicator. AC or DC types shall be selected as appropriate for the application. Each door lock/relay circuit shall be individually fuse- protected to isolate shorted circuits

N. Install all equipment in accordance with manufacturer's recommendations and training.
   1. Do not install additional equipment in racks without written permission of manufacturer and consultant.

O. Installation shall comply with the National Electric Code. Provide proper separation of all wiring and circuit types.

P. Install all equipment in accordance with manufacturer's recommendations.

3.02 PROTECTION AND CLEANING OF SYSTEMS AND EQUIPMENT

A. Protect all materials and equipment from physical damage, dirt, moisture, cold, and rain during transportation, storage and throughout the construction period.

B. During installation, equipment shall be protected against entry of foreign matter. Vacuum clean all equipment both inside and outside before operating.

C. Damaged equipment shall be returned to "like-new" condition or be returned to supply source for repair or replacement.

D. Damaged paint on equipment and materials shall be repainted and finished with the same quality of paint and workmanship used by manufacturer so repaired areas are not obvious.

3.03 POWER DISTRIBUTION

A. Electrical contractor shall provide electrical power to locations and equipment as required by the Detention Control systems.

3.04 COMPLETION

A. General: Upon completion of the work, remove excess debris, materials, equipment, apparatus, tools, and the like and leave premises clean, neat and orderly. Vacuum clean all equipment and enclosures to remove any dirt, dust, or foreign matter that may have accumulated during installation.

B. Testing:
   1. Factory Testing:
      a. All components of the door control system shall be operationally tested together with the exception of the end devices. At this time, all components of the system, such as command workstation, Administration Computer, Network Switches, Control Panels, Power Supplies, Interface Boards, and interconnecting wiring shall be complete and fitted with their connectors. Factory testing shall take place at the manufacturer's fabrication facility.
      b. Give notice at least 4 weeks prior to system testing as the Owner may wish to be present to verify substantial completion of system.
   2. Site Testing: After complete installation of the system in the field, all problems shall be corrected prior to final testing. Once the Contractor is satisfied that the system is operating satisfactorily, operation of the entire system shall be demonstrated to the Owner. If, during this final demonstration, it becomes evident that there are still problems with the system, the demonstration will be cancelled and rescheduled when all problems are corrected.

3.05 TRAINING

A. Training Notification
   1. The SCI shall notify the Architect/Engineer of tentative training schedule at least two weeks prior to the first building cutover. The SCI shall be furnished with the names of all participants and if they are to receive operational only or operational/maintenance training. An adequate training room on site, preferably in close proximity to the central (master) control room shall be provided by the owner.
   2. Training Time:
      a. Operational - 12 Hours
      b. Maintenance - 12 Hours
      c. The above time requirements can be divided up as needed to fit the owner's schedule. Coordinate this directly with the Newton Correctional Staff.

B. Training Documentation
   1. The SCI shall video record each training module. The SCI shall structure the tape for easy reference by the facility’s training officer for future use. The SCI shall prepare a tape index denoting the location on the tape where each training module begins and ends.

C. The SCI shall be trained and certified as required by the Detention Controls System manufacturer.

END OF SECTION

SECTION 28 5210
PERIMETER FENCE SECURITY SYSTEM

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Enclosures
   2. Lightning Protection
   3. Sensor Post Processors
   4. Sensor Post Cabling and Accessories
   5. Microwave Zone

B. Description:
   1. The existing system is a horizontal array of parallel, pre-tensioned barbed wires attached to sensors to form a combined fence and sensor. The wires are attached to anchor posts at each end of a sector and the sensors are mounted to one of twenty-seven different sensor posts located typically midway between the anchor posts.
   2. There are fifteen (15 existing) perimeter zones that shall be maintained and upgraded as part of this project.
   3. Provide an upgrade to the existing system's sensor posts and head end equipment. Equipment shall be replaced with Senstar's new StarNet II platform complete with Ultralink hardware at each sensor post. See additional specification sections for the head end components.
   4. All existing cabling infrastructure serving the perimeter fence shall be re-used.
   5. If the existing cabling topology will allow, provide a coordinated and organized cutover to the new Senstar platform by taking only a single zone offline at a time. Utilize the return path cabling to upgrade the first zone and install shorting plugs to allow the existing system to stay online.
   6. Provide all necessary cabling, hardware, software and associated labor for a fully functional upgrade to StarNet II.

1.02 RELATED REQUIREMENTS

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

B. The following documents shall also be considered as a part of and shall relate directly to this section:
   1. Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS
   2. Section 28 5220 - PERIMETER FENCE SECURITY HEAD END

1.03 ABBREVIATIONS AND ACRONYMS

A. Reference Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS

1.04 DEFINITIONS

A. Reference Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS

1.05 CODE REFERENCES AND STANDARDS

A. Comply with Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS

1.06 SUBMITTALS

A. Comply with Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS

1.07 QUALITY ASSURANCE

A. Comply with Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS

1.08 DELIVERY, STORAGE, AND HANDLING

A. Reference Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS

1.09 WARRANTY

A. Comply with Section 28 0000 - GENERAL REQUIREMENTS FOR ELECTRONIC SAFETY & SECURITY SYSTEMS

PART 2 PRODUCTS

2.01 APPROVED MANUFACTURERS

A. Senstar Corporation (Quotes Q-05877-1 and Q-05692-2)
   1. The quote number may not include all components and is referenced as a starting point. Ensure that full design is taken into account and all necessary items are included.

B. No Engineer Approved Equal

2.02 ENCLOSURES

A. The existing 50-pin signal processor (SPRU) is hermetically sealed and located inside the sensor post.

B. The new processor that is replacing the original SPRU shall be housed in a weatherproof NEMA 4 enclosure. The enclosure shall be capable of being mounted on posts. Provide these enclosures at each of the twenty-seven sensor posts.

2.03 LIGHTNING PROTECTION

A. The signal processor and the standalone transponder shall include internal components to protect circuitry from electrostatic discharge (ESD) and lightning. This protection shall include, but not be limited to, relay contacts, input power, and communication lines. The system shall comply with MIL-STD-9094 for Lightning and Electronic transients.

B. The installer shall provide a solid earth ground that is properly connected to the enclosure. The installer shall follow standard industry procedures to provide separate grounding for the fence.

2.04 SENSOR POST PROCESSORS

A. Processor description
   1. The signal processor shall contain the electronics necessary to perform the collection and redistribution of sensor switch closure information. The processor shall operate as a networked unit and shall be located inside the sensor post with the sensor switch array. The sensor post shall have a tamper switch that activates when the sensor post cover is removed.
   2. Alternatively, a transponder shall be available to translate switch closure information into relay contact closures. It shall operate as a standalone unit and shall be housed in a weatherproof enclosure, when installed outdoors. The enclosure shall have a tamper switch that activates when the cover is opened.

B. Signal processor operation
   1. Distributed processing
      a. Signal processors distributed along the perimeter shall perform the collection and redistribution of sensor switch closure information. The failure of one processor shall not affect the other processors along the perimeter. Each processor shall provide coverage for up to 60 m (200 ft.) of perimeter.

C. Alarm inputs and outputs
   1. Each new processor shall host 8 dry contact inputs and 8 relay outputs.

2. The signal processor shall identify, by type, intrusion, tamper and communications cable failure alarms.
3. An alarm caused by an attempt to penetrate the wire array shall be identified as an intrusion alarm. The processor shall identify to the Central Controller in which group of wires, from a possible seven groups, that the intrusion has occurred. For a typical 2-m (6.6-ft.) fence height, this shall provide a vertical resolution of intrusion no greater than 50 cm (20 in.).
4. An alarm caused by opening the enclosure of the sensor post and/or the signal processor shall be identified as a tamper alarm. Tamper alarms shall be distinctive from intrusion alarms and shall be reported as supervisory alarms.
5. Alarms caused by power failure, internal electronic failure, or tampering with the communications cable shall be identified as fail alarms. Fail alarms shall be distinctive from intrusion alarms and shall be reported as supervisory alarms.
6. Supervisory alarms shall continue until the fault is corrected.

D. Communications
1. Provide required RS-422 interface card in order to communicate between sensor posts and back to the head end.

E. Powering Requirements
1. The signal processor shall be powered at 24 VDC.
2. Provide required DIN rail-mounted power supply to support new processor.

F. Sensor calibration
1. Once installed according to manufacturer's instructions, the sensors shall require no calibration.

2.05 SENSOR POST CABLING AND ACCESSORIES

A. Shorting Cable Assemblies:
1. Provide thirty (30) 50-pin D-sub style shorting cables to allow for continued operation of the existing system while the new zones are cutover. Install one (1) shorting plug for each sensor post that is taken offline and cutover.

B. Head end Communications:
1. Provide the required RS-422 to USB conversion in order to interface the perimeter fence network with a new Starnet server.

2.06 MICROWAVE ZONE

A. Existing Work Description:
1. Remove the existing microwave transmitter/receiver pair installed between Building K and Building H. Refer to the site plan drawings for specific location.

B. New Work Description:
1. Provide one (1) new transmitter/receiver pair perimeter microwave detection sensor.
2. Specifications:
   a. Operational Range: 5 meters to 200 meters
   b. Beam Width: 20 centimeters to 8 meters
   c. Velocity Response: 3 cm/sec to 15 m/sec
   d. Operating Voltage: 12 - 48 VDC
      1) Provide NEMA enclosure and DIN mounted power supply as required.
   e. Frequency Range: FCC 24.075 - 24.175 GHz
   f. Communications: Senstar Ultralink platform
      1) Provide necessary modules to communicate alarms back to the head end.
3. Approved Manufacturer:
   a. Senstar Ultrawave
   b. No engineer approved equal

PART 3 EXECUTION

3.01 SYSTEM INSTALLATION AND COMMISSIONING

A. The system shall be installed and commissioned in accordance with the manufacturers' recommended procedures, as defined in the product's installation and setup guides.

B. Prior to installation, the installer shall have completed a training program and be certified by the manufacturer. Alternatively, the installer shall be required to have the manufacturer, or their designate, provide qualified technical support for the installation and commissioning of the system.

C. Acceptance tests shall be performed in accordance with standard procedures, available from the manufacturer.

D. System maintenance and repair

E. System maintenance shall include periodic visual inspections of the site and operational checks of the effectiveness of the detection zones.

3.02 RECALIBRATION REQUIREMENTS

A. There shall be no requirement to recalibrate the system after initial calibration.

3.03 PRODUCT SUPPORT

A. The supplier shall provide technical support and warrant that spare parts and assemblies shall be available for a minimum of 10 years.

3.04 PRODUCT CERTIFICATIONS

A. The product shall be manufactured in accordance with ISO 9002 standards.

B. All outdoor components shall comply with MIL-STD-810C.

C. The system shall comply with MIL-STD-9094 for Lightning and Electronic transients.

D. The system shall comply with MIL-STD-461/462 for Electromagnetic and Radio Frequency Interference (EMI/RFI).

END OF SECTION

SECTION 28 5220
PERIMETER FENCE SECURITY HEAD END

PART 1 GENERAL

1.01 SYSTEM SUMMARY

A. The contractor shall install a Security Management System (SMS) that manages alarms and events generated by Perimeter Intrusion Detection Systems (PIDS) and integrated security products.

B. The SMS software shall run on Microsoft Windows operating systems and be designed to manage daily routines and activities as well as crisis situations. It shall enable an organization to reduce its reaction time, improve its efficiency and safeguard its personnel and property.

C. The user interface shall be optimized for operator efficiency and ease-of-use. The location and coverage area of each security sensor shall be displayed visually on a map. When an alarm occurs, the operator shall be able to quickly determine its location, type, and severity as well as receive alarm-specific procedural information. If any cameras are associated with the sensor, the SMS shall be able to issue instructions to an external Video Management System (VMS).

D. The SMS shall be optimized to support sensors and software that use Senstar communication protocols. This includes, but is not limited to, the following systems: FlexZone, the Senstar LM100, FiberPatrol, FlexPS, OmniTrax, UltraLink, UltraWave, XField and the Alarm Logic Engine. Third-party security products, connected via dry-contact alarm relays, shall also be supported. Third-party security products may also be integrated in software via the Silver Network protocol.

E. The SMS shall be designed as an open platform that enables integrations with other systems.

1.02 WARRANTY

A. The product shall be under warranty for a minimum of two years from the date of purchase.

1.03 REFERENCES

A. The following acronyms and abbreviations are used in this document:

B. GB: Gigabyte

C. PDF: Portable Document Format

D. PC: Personal Computer

E. PIDS: Perimeter Instruction Detection System

F. SMS: Security Management System

G. SQL: Structured Query Language

H. VMS: Video Management System

PART 2 PRODUCTS

2.01 SECURITY MANAGEMENT SYSTEM

A. The contractor shall supply a Security Management System (SMS).

B. The SMS shall monitor, display, and manage alarms and events generated by Perimeter Intrusion Detection Systems (PIDS).

C. The SMS shall be able to manage other security products when integrated with the site's PIDS.

2.02 APPROVED MANUFACTURERS

A. The StarNet 2™ Security Management System from Senstar Corporation (www.senstar.com) meets the requirements stated in this document.

2.03 ARCHITECTURE AND NETWORK REQUIREMENTS

A. The SMS shall use a 3-tier client/server/database architecture that uses off-the-shelf hardware and software, provides subsystem isolation, and simplifies maintenance and upgrades.

B. The SMS shall be scalable in size, ranging from a single workstation combining the client, server, and database, to a dedicated server with workstations in different physical locations.

C. The SMS shall be future-proof, in that it runs on off-the-shelf, upgradable PC hardware, uses the Windows operating system, and supports industry-standard IT policies and procedures.

D. The SMS shall support industry-standard IT processes for the backup of alarm and event data as well as sensor configurations.

2.04 HARDWARE AND OPERATING SYSTEM REQUIREMENTS

A. Application server:
   1. The application server shall be compatible with the following operating systems:
      a. Microsoft Windows 7 Professional (32-bit or 64-bit)
      b. Windows 10
      c. Microsoft Server 2008 R2
      d. Microsoft Server 2012
      e. Microsoft Server 2016
   2. Client workstation:
      a. The client application shall be compatible with the following operating systems:
         1) Microsoft Windows 7 Professional (32-bit or 64-bit)
         2) Windows 10
         3) Microsoft Server 2008 R2
         4) Microsoft Server 2012
         5) Microsoft Server 2016
      b. Up to 100 workstations shall be supported per deployment.
      c. The client workstation's hardware specifications shall be met by an off-the-shelf professional workstation that meets the following minimum specifications: i5 processor, 8 GB RAM, and a 1080p display.
      d. The client workstation shall support input from a keyboard and mouse.
      e. The client application shall support common computer monitor display aspect ratios, including widescreen (16:9).
      f. The client application shall be designed to run-full-screen to prevent inadvertent or unauthorized manipulation of application windows.
   3. Database:
      a. The system shall store its sensor and configuration data in a Microsoft SQL database. The application shall support:
         1) Microsoft SQL Server 2008 R2 Express
         2) Microsoft SQL Server 2008 R2 Standard
         3) Microsoft SQL Server 2014 (included with system)
         4) Microsoft SQL Server 2016

2.05 FEATURES

A. The system shall support the following features:
   1. Centralized or distributed management of at least 10,000 intrusion detection sensor input points.
   2. Integration of alarms and geographical maps in an easy-to-use graphical interface. Each configured sensor shall be able to represent a geographical location and coverage area.
   3. Geographical, tabular, visual, iconic, and audible representations of alarms
   4. Ability to issue commands to third-party video surveillance and recording systems. The system shall support both manual and automatic issuance of camera and video control commands.
   5. Alarm prioritization, sorting, filtering, and assigning
   6. Alarm escalation (rule triggering if an alarm is unacknowledged or not reset after a configured amount of time)

7. A rule engine service that can perform automatic actions based on status or manual changes.
8. User interface controllable by keyboard and mouse.
9. Graphical, point-and-click configuration of security sensors. Perimeter sensors shall be configured by drawing lines on the map to indicate their coverage area.
10. Centralized user management and access control with at least 4 types of users, each of which having a different and customizable set of permissions.
11. Report generation (user activity, alarms/events, and status).
12. On-screen display of alarm and scheduled-based operator procedures.
13. On-screen display of the active state of a sensor (alarm, secure, tamper, fault, or disconnected).

2.06 CAPABILITIES

A. The system shall provide real-time situational awareness of the status of the perimeter and intrusion detection sensors.
   1. Maps: The system shall graphically depict the sensors and alarms onto a set of custom geographic or spatial maps.
      a. The system shall enable the facility owner to import their own JPEG (.jpg) images for use as maps.
      b. The system shall support at least 128 individual maps. Using the maps as a visual guide, the system administration shall be able to add sensors using a point-and-click interface in order to represent their real-world locations and coverage.
      c. Workstation-specific maps: The system shall enable specific maps to be assigned to individual workstations
      d. Alarm monitoring and notifications:
         1) The system shall support the monitoring of a minimum of 10,000 sensor input points.
         2) Alarms shall be indicated on the workstation in a combination of ways: geographical position on a map, tabular, visual, iconic, and audio. For perimeter alarms, the entire coverage area line shall flash and ranging information displayed, if supported.
         3) The system shall support a 2-stage alarm process where alarms are first acknowledged, then closed when the cause is resolved.
         4) Individual alarms shall be routable to specific workstations.
         5) Sorting: The operator shall be able to sort alarms by different criteria, including time, type, station, and priority.
         6) Filtering: The operator shall be able to limit the display of alarms to just those that apply to his or her workstation, if enabled by the systems configuration.
         7) Processing: The operator shall be able to acknowledge an alarm and take the necessary action. Upon securing the alarm, the alarm shall be closed and the reason recorded.
         8) Auto-processing: The system shall provide a configurable auto-acknowledge function where alarms are automatically acknowledged and/or reset.
         9) Forwarding: The operator shall be able to forward alarms to other workstations for processing in multi-workstation environments.
         10) Escalation: The system shall be able to trigger a rule if an alarm is not unacknowledged or not reset by an operator after a configured amount of time.
         11) Type: The system shall differentiate between sensor alarms, tamper alarms, (e.g. enclosure open), and diagnostic alarms (e.g. system failures or maintenance).
         12) Masking: The system shall enable operators to:
         13) Temporarily disable or mask an alarm, if the permission is enabled in the system’s configuration.

14) Mask an alarm permanently until an operator unmasked it, if the permission is enabled in the system's configuration.
(a) If an equipment failure causes a sensor or zone to go offline (partially or fully), the system shall indicate the affected area.
(b) Emails: The system shall provide the option of auto-generating and sending of email messages in response to alarms.
(c) Color and symbol: The system shall use a system of color codes and symbols indicate the nature and type of an alarm.

e. Video integration:
1) The system shall enable manual or automatic video controls in response to alarms.
2) The system shall enable pre-programmed video procedures in response to alarms.
3) The system shall be able to generate custom ASCII text strings in response alarms.

f. Network status:
1) The system shall provide a visual summary of the current state of the sensor network, the database, and security subsystems.

g. Response procedures:
1) The system shall display on-screen procedures and tasks for each type of routine or emergency event.

2. Alarm procedure management:
a. The system shall provide alarm-specific procedures (checklists) for operators.
b. Procedures shall be centrally managed by system administrators.

3. Note management:
a. The system shall enable operators to record time-stamped typed notes into the system to record observations or other concerns as they related to specific alarms.

4. Auditing and reporting:
a. The system shall enable reports to be generated in the following formats: on-screen, Portable Document Format (.pdf), and Excel-compatible comma-separated values (.csv).
b. The system shall maintain a history of alarms and user events.
c. The system shall generate the following reports:
1) Audit: View the activity, actions, response time, and received events for each user over a selected period of time.
2) Events: View the generated events over a selected period of time, including the sensors involved, the time and duration, the location, resolution reasons, notes, and any performed tasks.
3) Sensors: View the status of each sensor over a selected period of time.

5. Security and access control:
a. The system shall limit access to configuration and operation functions according to a client workstation's IP address.
b. The system shall provide user access control through the use of user accounts, passwords, groups, and permissions.
c. The system shall support user authentication.
d. User accounts and group privileges shall be centrally managed from an administration account.
e. User Groups shall have configurable permissions to enable organization to customize them according to their own requirements.

6. System configuration
a. Sensor configuration:
1) The system shall receive status and state information from the security sensors whereby events and output points can be monitored and managed.

2) The system shall enable system administrators to configure the placement and display of alarm sensors using a graphical, select-and-place interface.
3) The coverage area of perimeter sensors shall be configured by drawing multi-segment lines on the map. For sensors with ranging capabilities, the system shall enable the operator to configure its ranging values.
4) The system shall provide the option to enable and disable sensors based on a schedule.
5) Each sensor shall receive a priority level to assist operators in prioritizing and sorting alarms.
6) The system shall enable alarms to be generated based on defined conditions.

b. Image/map management:
1) The system shall enable system administrators to upload custom images (.jpg) to use as maps by the system. The maps will be used for both the placement of sensors as well as the display of active alarms for the operators.

c. Network configuration:
1) The system shall enable the system administrators to centrally manage access to the following components: database, client workstations, and sensor network.

d. Importing and exporting:
1) The system shall support a means to import an existing configuration or export the current configuration for backup or deployment purposes.

7. Localization:
a. The system shall provide the option for operators to dynamically switch between languages in multi-lingual environments.
b. Supported languages shall include English, French, Spanish, and Russian.

8. Customizable user interface:
a. The system shall enable the customer to provide custom sensor maps and audio notifications.
b. Screen and audio output shall be directable, via PC hardware, to other devices.

2.07 SYSTEM INTEGRATION

A. The SMS shall support integration with sensors using the Silver, FiberPatrol, and CCC protocols.

B. The system shall have the capability to be integrated with the facility owner's new or existing intrusion detection systems.

C. The system shall have the capability to issue commands to third-party video surveillance and recording systems.

D. The system shall enable a deployment to be pre-configured off-site, so that the SMS software can become fully functional after installation with minimal on-site configuration.

E. The SMS shall be able to manage, monitor and control third-party security equipment via their SDK/API

PART 3 EXECUTION

3.01 SYSTEM INSTALLATION

A. The system shall be installed in accordance with the manufacturer's recommended procedures as defined in the manufacturer's documentation for the system.

3.02 SYSTEM CONFIGURATION

A. The system shall be configured in accordance with the manufacturer's recommended procedures as defined in the documentation for the system. If bundled with an intrusion detection system, the system may be configured prior to delivery and installation.

3.03 USER DOCUMENTATION

A. The supplier shall provide user documentation that explains how to install, configure, operate and maintain the software.

3.04 TRAINING

A. The supplier shall provide training materials that provide instruction in the installation, configuration, and operation of the system.

B. The supplier shall offer professional training services to assist the organization in meeting their training requirements.

END OF SECTION