RHODES HALL B50 LAB RENOVATION

Project Manual & Specifications

June 15, 2026

Owner

Cornell University
Ithaca, New York 14853

Architect

Richard McElhiney Architects LLC
450 Seventh Ave. Suite 2701
New York, New York 10123

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INSTRUCTIONS TO BIDDERS

Project:	Rhodes Hall B50 Lab Renovation
Owner:	Cornell University Ithaca, New York 14853
Architect:	Richard McElhiney Architects LLC 450 Seventh Ave. Suite 2701 New York, New York 12123

1. BID DOCUMENTS

The Bid Documents provided electronically by the Owner will consist of the following:

(1) Instructions to Bidders.

(2) Bid Proposal Certification Form.

(3) General Conditions of the Contract and Division 1 - "General Requirements", and Supplemental Conditions.

(4) Drawings and Specifications.

(5) Addenda and/or bulletins issued prior to date of opening of Proposals.

Bid Documents are available electronically in the Owner's electronic project management Bid Portal under the Bid Package Invitation – Invitation Documents Tab.

Dataflow, Inc. maintains the current set of Documents and all addenda and is the contracted supplier for printed plans and specifications for this project. Contact Dataflow at CUProjects@goDataflow.com.

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2. EXAMINATION OF SITE AND CONTRACT DOCUMENTS

a. Each Bidder shall acquaint themselves with location conditions as they exist, as well as the character of the necessary work to be carried out under the proposed Contract. A Pre-Bid Zoom meeting will be scheduled and include: a review of project related information, an opportunity to ask and receive responses to Bidder questions, and make such inquiries as are necessary to fully understand the subject facilities, physical conditions and/or restrictions attendant to the work under the Contract.

b. Boring information, water levels, indications of sub-surface conditions and similar information given on the Drawings or in the Specifications are furnished only for the convenience of the Bidders. The Owner, Architect and Consulting Engineer make no representation regarding the character and extent of the soil data or other sub-surface conditions to be encountered during the work and no guarantee as to the accuracy or validity of interpretation of such data or conditions is made or intended.

c. Each Bidder shall also thoroughly examine and become familiar with the Drawings, Specifications and associated Bid Documents.

d. By submitting a Bid, the Bidder covenants and affirms that the Bidder has carefully examined all of the Bid Documents including Drawings, Specifications, and the Addenda and Bulletins, if any, as well as posed any questions associated with the Site, and that Bidder is satisfied as to the nature and location of the work, the general and local conditions, and all matters which may in any way affect the work or its performance.

3. DISCREPANCIES

a. Should a Bidder find discrepancies in or omissions from the Drawings, Specifications and associated Bid Documents, or be in doubt as to their meaning, Bidder shall at once enter the item in the Q&A Board of the Owner’s electronic management Bid Portal and an Addenda with written instructions will be sent to all bidders. Neither the Owner nor the Architect will be responsible for oral instructions. Every request for such interpretation should be in writing and entered into the electronic project management Bid Portal Q&A Board. Inquiries received in advance of the deadline established at the Pre-Bid conference will be given consideration.

4. PRE-BID CONFERENCE

a. A pre-bid conference has been scheduled for 2:00 PM, August 11, 2026, in Room 102C of Humphreys Service Building or via Zoom at:
https://cornell.zoom.us/j/97238325875?pwd=4Aj2PD0orVCm11JCQlzbZTOekGLgFR.1&from=addon
A Pre-bid walkthrough will follow and will meet at Rhodes Hall B50, 136 Hoy Road, Ithaca, New York.

The Pre-Bid Conference is designed to assist Bidders in understanding the Contract Documents, the opportunity to pose clarifying questions or make inquiries regarding Contract Documents. Results will be published in an Addendum.

b. NOTE: All Contractors/Subcontractors attending the walkthrough are REQUIRED to sign a Release if using Cornell equipment. You are also required to have appropriate PPE including, but not limited to, all current OSHA regulations and at a minimum the use of eye protection foot protection, hand protection, head protection, hearing protection and fall protection. Additionally, the Borrower shall provide their own five-point safety harness where required.

5. ASSUMPTION OF RISK

Contractors/Subcontractors are expected to bring to jobsite all applicable personal safety devices required or needed to view the Scope of Work. Use of Cornell equipment or tools, with or without permission, involves inherent risk of injury to User(s). Any use of Cornell equipment is conditioned upon the assumption of all risks attendant to the use of any tools or equipment – including personal injury, death or permanent disability – arising from the Use of Cornell equipment or tools. These risks also include but are not limited to: accidents, collisions, falling, as well as unforeseen risks resulting in injuries to User and/or bystanders. Participation in a walkthrough or similar activity constitutes acceptance of risk assumption.

6. BID SUBMISSION

Bid Submissions must include the following:

a. Base Bid entered into the electronic project management Portal broken down per the Bid Scope Tab Schedule of Values (Step 1: Bid Form of the Response Form tab).

b. Additional Required Information:

1. Bid Proposal Certification Form
2. Bid Bond
3. Bond Surety Company
4. Bonding Rate for Change Orders
5. Proposed Project Team and Resumes
6. Proposed Project Schedule
7. Substitutions

c. Bid Proposal Certification Form: The Bid Proposal Certification Form shall be signed by the Principal(s) or Officer(s) legally authorized to bind the Bidder, and to execute such documents on behalf of their respective firms or organizations, and the Certificates included in the Bid Proposal Certification Form shall be completed accordingly. Bidder's legal name should be fully and accurately stated. Completed form shall be without interlineation, alterations, or erasures unless initialed and dated by the signer; Owner expressly reserves the right to accept or reject any or all bids, and to waive irregularities or informalities in its sole and reasonable discretion.

d. Bid Bond: Each Bidder will be required to furnish a Bid Bond electronically via the electronic project management Bid Portal in the amount of 10% of the Bid Amount. Such Bid Bond shall guarantee that the Bidder will execute the Contract if it is awarded to him in conformity with his Proposal. Such Proposal Guarantee Bond shall include a statement that the Insurer shall, at the option of the Bidder, be willing to provide to the Bidder the Contract Bonds as described in 13 below.

7. SALES AND USE TAX EXEMPTION

a. The Owner, Cornell University, a non-profit educational institution, is exempt from payment of certain Sales and Use Taxes.

8. FEDERAL EXCISE TAX

a. The Owner, Cornell University, a non-profit educational institution, is exempt from payment of certain Federal Excise Taxes.

9. TAX EXEMPT STATUS

a. Bidders shall inform all prospective subcontractors and suppliers from whom they expect to obtain proposals or quotations of the tax-exempt status of the Owner as set forth above and request that they reflect anticipated tax credits in their proposals or quotations.

10. EXEMPTION CERTIFICATES

a. At the Contractor's request, following the award of a Contract, Contractor exempt purchase certificates will be furnished by the Owner to the Contractor with respect to such tax-exempt articles or transactions as may be applicable under the Contract.

11. TRADE SUBCONTRACTORS, MATERIAL SUPPLIERS

a. Each portion of the work shall be performed by an organization equipped and experienced to do work in that particular field, and no portion of the work shall be reserved by the Bidder to himself unless he is so equipped and experienced. Subcontracts shall be awarded only to parties satisfactory to the Owner and the Architect. Each subcontractor and materials supplier shall be approved individually.

b. In the spaces provided in the electronic project management Bid Portal Bid Scope form, the Bidder shall list all portions of the work he proposes to perform directly with his own forces.

c. A list of names from which the Bidder proposes to select subcontractors, materials suppliers, and/or manufacturers for the principal trades or subdivisions of the work is required as part of the Proposal.

d. In the Bid Scope Tab in the electronic project management Bid Portal, a list of the principal trades or subdivisions of the work for which such a listing is required, together with the provisions which govern the listing, selection and approval of principal subcontractors.

12. UNIT PRICES

The Bidder agrees, if awarded the Contract, to perform work "In addition to" or "deducted from" the scope of the Contract Documents as directed by the Owner and/or Architect, computed in accordance with the unit prices, which prices include all overhead, profit and other expense items in connection therewith, subject to the terms of the Contract Documents.

a. Certain Unit Prices may be requested. If requested, a form will be attached to these instructions and will need to be completed and uploaded to the electronic project management Bidding Portal Response Form – Step 3 – Additional Required Information Custom Fields. All Bidders are required to bid on all Unit Prices without exception.

b. All unit prices include the installation or omission, complete for each item, together with all work in connection therewith and shall include all shoring, bracing, dewatering and other incidental work.

c. Unit prices shall be the total compensation for the item and includes all overhead, profit and any other charges of the Contractor and/or subcontractor in connection therewith.

d. Adjustments will be computed on net variation of total quantities of like items.

e. The Owner reserves the right to accept or reject any or all of the unit prices listed below prior to the execution of the Contract.

13. SUBSTITUTIONS

a. Proposals shall conform to the requirements of the Bid Documents.

b. The Bidder may offer substitutions for any item of material or equipment, element of work, or method of construction set forth in the Bid Documents, with the exception of Form of Contract, General Conditions and General Requirements - Division 1, are to be entered into the electronic project management Bid Portal Response Form – Step 3 – Additional Required Information Custom Fields by listing each proposed substitution, together with the amount to be deducted from the Base Bid if the substitution is accepted on the form supplied with these instructions. However, the Bidder is cautioned to make his base proposal on the materials and items specified by name or other particular reference.

14. ALTERNATE PROPOSALS

a. Certain Alternate Proposals may be requested by the Owner and are included in the General Requirements. They will be listed in the Bid Scope Tab in the electronic project management Bid Portal. All Bidders are required to bid on all Alternates without exception.

b. Alternate Proposals shall include all overhead, profit and other expenses in connection therewith.

15. METHOD OF SUBMISSION

a. Base Bid shall be prepared and electronically submitted via the electronic project management Bid Portal. All required fields and attachments in the electronic project management Bid Portal must be completed.

b. Bid Proposal Certification Form shall be prepared electronically submitted as an attachment via the electronic project management Bid Portal Response Form – Step 3 – Additional Required Information Custom Fields.

c. Completed and responsive Bid Proposals shall be submitted through the electronic project management Bid Portal no later than 2:00 PM on August 27, 2026.

d. Bid Proposals shall not contain any recapitulation of the work to be done. No oral, written, electronic or telephonic proposals, or modifications will be considered.

16. BID OPENING

a. Completed and responsive Bid Proposals will be opened electronically via the electronic project management Bid Portal. Responsive Bid results will be posted to the Facilities Contracts website at: https://fcs.cornell.edu/awarded-projects.. The Owner reserves the right to postpone the date and time of opening of proposals at any time prior to the date and time announced in this Instruction to Bidders or amendments thereto.

17. AWARD OF CONTRACT

a. It is the intent of the Owner to enter into a Contract with one General Contractor for the entire project. All labor and services and materials and supplies, etc. are to be provided in accordance with the Contract.

b. Award of the Contract shall be made to the bidder submitting the lowest responsive and responsible base bid who, in the opinion of the Owner, is qualified to perform the work. The competence and responsibility of the Bidders' proposed principal subcontractors will be considered in making the Award.

c. The Owner reserves the right to reject any or all Proposals, and to waive any informalities in Bidding. Contract award shall be subject to approval of Cornell University’s Contractors Qualification Statement.

d. Bidder expressly warrants and commits that its Proposal shall remain unchanged and in full force and effect at the Owner’s option for a period of not less than ninety (90) calendar days following the bid opening date.

e. Bidders may submit, recall, modify, resubmit or withdraw their Bids through the electronic project management Bid Portal up until the Bid Due Date and Time.

f. The Owner reserves the right to accept any of the Alternate Proposals listed within thirty (30) calendar days following the award of a construction contract or such other time as may be agreed to by the Owner and Contractor.

18. SCHEDULE OF VALUES

a. The successful Bidder shall submit a complete "Schedule of Values" showing the amounts allocated to the various trades, suppliers, subcontractors, installers and General Contractor's work, aggregating the total sum of the Contract. If requested by the Owner or Architect, the complete "Schedule of Values" shall be submitted prior to award of Contract.

19. PERFORMANCE AND LABOR AND MATERIALS PAYMENT BONDS

Prior to commencement of on-site construction activities, the successful Bidder shall furnish the Owner with "Performance" and “Labor and Material Payment Bonds", each in the amount of 100% of the Contract Price. Each of these Bonds are to be in a form with such sureties as the Owner may approve. The cost of such bonds shall be included in the Bidders Proposal.

20. START OF WORK

a. Work at the site shall be started within fourteen (14) calendar days from the date of issuance of written authorization to proceed and shall achieve substantial completion of the project no later than December 15, 2026.

1. NOTE: Prior to commencement of any on-site construction activities, the successful Bidder shall:

i. Furnish the Owner with fully executed and satisfactory Payment and Performance bonds. No on-site construction activities may commence until executed and satisfactory bonds are in place for the subject project.

b. The construction schedule and completion are critical. The Contractor shall provide adequate labor and equipment in the Bid to ensure that no slippage of the schedule will occur.

21. ADDENDA AND BULLETINS

a. Bidders must acknowledge in Step 3 of the Bid Response in the electronic project management Bid Portal each Addendum and/or Bulletin issued during the bidding period.

22. REQUIRED POST-AWARD SUBMISSIONS BY THE APPARENT LOW BIDDER

a. Within fourteen days after bid opening:

(1) Six-Month Workforce Projection

b. Upon Execution of Contract:

(1) Insurance Certificate
(2) Performance Bond
(3) Labor and Material Payment Bond
(4) Schedule of Work (bar chart)
(5) Federal Tax Identification Number

END OF SECTION

RHODES HALL B50 LAB RENOVATION

Cornell University, Ithaca, New York

BID PROPOSAL CERTIFICATION FORM

Vendor Name:	
Type of Firm, State of Incorporation if Applicable	
Street Address, City, State, Zip	

Having carefully examined the Instructions to Bidders, the "Conditions of the Contract" (General, Division 1 - "General Requirements"), Supplemental Conditions, the Drawings, Specifications and associated Bid Documents dated June, 15, 2026, as prepared by Richard McElhiney Architects LLC, 450 Seventh Avenue, Suite 2701, New York, New York 10123, as well as the premises and conditions affecting the work, proposes to furnish all material, equipment, labor, plant, machinery, tools, supplies, services, applicable taxes and specified insurance necessary to perform the entire work, as set forth in, and in accordance with the said documents.

1. Receipt of the Addenda to the Terms and Conditions, Drawings or Specifications has been acknowledged in the Owner's electronic project management Bid Portal.

2. Milestone Dates

    a. The undersigned agrees, if awarded the Contract, to commence work at the site within fourteen (14) calendar days after date of issuance of written notice to proceed and to achieve substantial completion of the project no later than December 15, 2026.

    b. The Contractor shall provide adequate labor and equipment in the Bid to ensure that no slippage of the schedule will occur. Contractor shall attach a Project Duration Schedule to this form that meets the duration established.

    c. Following are additional Milestone Dates:

    d. The undersigned agrees, if awarded the Contract, to furnish a "Construction Progress Schedule" consistent with the agreed upon Construction Duration showing the starting and completion dates for all principal trades and subdivisions of the Work, together with such additional information related thereto as may reasonably be required. Such schedule shall be in conformance with General Requirements, Section 01 32 16, 1.3, A.

3. Proposed Principal Subcontractors

    a. The undersigned agrees, if awarded the Contract, to employ subcontractors from the list submitted in the electronic project management Bid Portal Response Form – Step 3 – Additional Required Information Custom Fields subject to the following provisions:

        i. The Owner and Architect reserve the right to review the list of "Proposed Principal Subcontractors" prior to the award of the Contract, and to delete from it the name or names of any to whom they may have a reasonable objection. The Contractor may make the final selection of principal subcontractors at his option from the resulting list after the award of the Contract.

4. Contractor Team:

    a. The Owner reserves the right to reject the names of any Project Manager or Superintendent provide in the electronic project management Bid Portal submission to whom they have a reasonable objection.

5. Bonds

    a. Bid Bond. A Bid Bond in the amount of a minimum of 10% of Bid Amount is attached to the electronic project management Bid Portal Response Form – Step 3 – Additional Required Information Custom Fields.

    b. Performance and Payment Bonds. Prior to commencement of any on-site construction activities, the undersigned expressly agrees if awarded the Contract, to deliver to Owner executed "Performance" and "Labor and Material Payment Bonds" in such forms as are acceptable to the Owner and in an amount equal to 100% of the Contract Sum.

    c. Such bonds will be furnished by the Surety entered into the electronic project management Bid Portal Response Form – Step 3 – Additional Required Information Custom Fields

    d. Bonding Rate for Change Orders has been entered into the electronic project management Bid Portal Response Form – Step 3 – Additional Required Information Custom Fields

6. Bid Scope - Schedule of Values

    a. The undersigned agrees, prior to the award of a construction contract and upon the request of the Architect or Owner, to submit a complete, itemized and detailed "Schedule of Values" including Alternates elected, if any, showing the amount allocated to the various trades and subdivisions of the work, aggregating to the total Contract Sum submitted in the electronic project management Bid Portal.

7. Substitutions

    a. The Base Bid is predicated on compliance with the Drawings and Specifications without substitutions.

    b. The Bidder may offer substitutions for any item noted in the Specifications, with the exception of Form of Contract, General Conditions and General Requirements - Division 1.

c. Any Substitutions are to be entered into the electronic project management Bid Portal Response Form – Step 3 – Additional Required Information Custom Fields by listing each proposed substitution, together with the amount to be deducted from the Base Bid if the substitution is accepted.

d. The Owner reserves the right to accept or reject any proposed substitution.

e. The sum stated includes any modifications of work or additional work that may be required by reason of acceptance of substitution. Substitute materials must be approved and accepted by the Owner in writing before same may be used in lieu of those named in the Specifications.

8. Unit Price Schedule

a. The undersigned agrees, if awarded the Contract, to perform work "In addition to" or "deducted from" the scope of the Contract Documents as directed by the Owner and/or Architect, computed in accordance with the unit prices form uploaded in the electronic project management Bid Portal Response Form – Step 3 – Additional Required Information Custom Fields, which prices include all overhead, profit and other expense items in connection therewith, subject to the terms of the Contract Documents.

b. All unit prices include the installation or omission, complete for each item, together with all work in connection therewith and shall include all shoring, bracing, dewatering and other incidental work.

c. Adjustments will be computed on net variation of total quantities of like items.

d. The Owner reserves the right to accept or reject any or all of the unit prices entered into the electronic project management Bid Portal Response Form – Step 3 – Additional Required Information Custom Fields prior to the execution of the Contract.

9. Acceptance

a. The undersigned agrees that the amount submitted for the Base Bid and any Alternates and Unit Pricing along with the required attachments in the Response Form – Step 3 – Additional Required Information Custom Fields submitted in the electronic project management Bid Portal have been reviewed and are accurate.

b. It is understood and agreed that the Owner expressly reserves the right to accept or reject any or all bids, and to waive irregularities or informalities in its sole and reasonable discretion.

c. Upon acceptance of Bidder's Proposal, Bidder expressly agrees and affirms to hold its unchanged Bid Proposal for ninety (90) calendar days. The undersigned will execute an Agreement between Contractor and Owner, amended and/or supplemented, if required, in accordance with the Proposal as accepted. Nothing contained herein shall preclude Bidder and Owner from mutually agreeing upon a Contract based upon the unchanged Bid Proposal if the time elapsed from Award is in excess of ninety (90) calendar days.

d. The undersigned acknowledges the following Addendum(s) (if applicable):

Addendum No. __ dated ____.

e. It is understood and agreed that award of the Contract shall be made to the bidder submitting the lowest responsive and responsible bid who, in the opinion of the Owner, is qualified to perform the work.

f. The undersigned agrees to furnish Owner satisfactory and executed Performance and Payment Bonds prior to the commencement of any Work on-site.

g. The undersigned acknowledges as Contractor to be and remain exclusively in control of the Project site and Work, as well as the Project's Health & Safety Plan, measures, and/or protocols, for the duration of construction activities.

h. Alternates:

1. The undersigned, if awarded the Contract, proposes to perform work in addition to or in place of the scope of the work shown and specified herein associated with the Base Bid in accordance with the Alternate Proposals, which amounts are to be added or deducted to the amount of the Base Bid as indicated for the Alternates specified in Division 1 of the Specifications.

2. It is understood that the Owner reserves the right to accept or reject any of the Alternate Proposals provided in the electronic project management Bid Portal within Thirty (30) calendar days following the award of a construction contract or such other time as may be agreed to by the Owner and Contractor.

The following documentation is required to be submitted electronically in the electronic project management Bidding Portal Response Form – Step 3 – Additional Required Information Custom Fields

- ☐ This Form with Proposed Milestone Schedule – signed and executed
- ☐ Bid Bond
- ☐ Proposed Project Team Resumes

_____
(Bidder)

By: _____

Title: _____

Business Address: _____

Dated: _____

CERTIFICATE OF NON-COLLUSION

By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief:

a. The prices in this bid have been arrived at independently without collusion, consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor.

b. Unless required by law, the prices that have been quoted in this bid have not been knowingly disclosed, directly or indirectly, by the bidder and will not knowingly be disclosed by the bidder to any other bidder or any competitor prior to opening.

c. No attempt has been made or will be made by the bidder to induce any other persons, partnership, or corporation to submit or not submit a bid for the purpose of restricting competition.

_____
(Bidder)

By: _____

Title: _____

Dated: _____

CERTIFICATE AS TO CORPORATE BIDDER

I, _____, certify that I am the _____ of the Corporation named as Bidder within this Bid Form for General Contractors; that _____, who signed said Bid Form on behalf of the bidder was then _____ of said Corporation; that I know his signature; that his signature thereto is genuine and that said Bid Form and attachments thereto were duly signed and executed for and on behalf of said Corporation by authority of its governing body.

_____

(Secretary-Clerk)

Dated: _____

G E N E R A L C O N D I T I O N S

FOR

RHODES HALL B50 LAB RENOVATION

CORNELL UNIVERSITY
ITHACA, NEW YORK

GENERAL CONDITIONS

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ARTICLE 1 -- INTERPRETATION OF CONTRACT DOCUMENTS

Section 1.01 - Owner

A. The Owner is Cornell University as identified in the Agreement and referred to throughout the Contract Documents as the "Owner" or "Cornell University".

B. Ownership of Documents: All drawings, specifications, computations, sketches, test data, survey results, photographs, renderings and other material relating to the Work, whether furnished to or prepared by the Contractor, are the property of Cornell University. The Contractor shall use such materials or information therefrom only in connection with the Work of this Contract. When requested, the Contractor shall deliver such materials to Cornell University.

C. The Owner shall give all orders and directions contemplated under the Contract relative to the execution of the Work. The Owner shall determine the amount, quality, acceptability, and fitness of the Work and shall decide all questions which may arise in relation to said Work. The Owner's estimates and decisions shall be final except as otherwise expressly provided.

D. Any differences or conflicts concerning performance which may arise between the Contractor and other Contractors performing Work for the Owner shall be adjusted and determined by the Owner.

E. The table of contents, titles, captions, headings, running headlines, and marginal notes contained herein and in said documents is intended to facilitate reference to various provisions of the Contract Documents and in no way affect the interpretation of the provisions to which they refer.

Section 1.02 - Meaning and Intent of Specifications, Plans and Drawings

The meaning and intent of all specifications, plans and drawings shall be determined in a manner approved by the Owner.

Section 1.03 - Order of Precedence

A. Should a conflict occur in or between or among any parts of the Contract Documents that are entitled to equal preference, the more expensive way of doing the Work, the sounder technique or workmanship, or better quality or greater quantity of material shall govern, unless the Owner directs otherwise so directs in writing.

B. Drawings and specifications are reciprocal. Anything shown on the plans and not mentioned in the specifications, or mentioned in the specifications and not shown on the plans, shall have the same effect as if shown or mentioned in both.

C. Requirements of reference standards form a part of these specifications to the extent indicated by the reference thereto. When provisions of reference standards conflict with provisions in these specifications, the specifications shall govern.

ARTICLE 2 -- CONTRACTOR

Section 2.01 - Contractor's Obligations

A. The Contractor shall, in good workmanlike manner, perform all the Work required by the Contract within the time specified in the Contract. The Contractor shall comply with all terms of the Contract, and shall do, carry on, and complete the entire Work to the satisfaction of the Owner.

1. All labor for this project which is normally under the jurisdiction of one of the local unions as covered in the contract between the Tompkins-Cortland Building Trades Council, Maintenance Division and Cornell University shall be performed by Union labor.

B. The Contractor shall furnish, erect, maintain, and remove such construction plant and such temporary Work as may be required.

C. The Contractor shall provide and pay for all labor, material, tools, equipment, machinery, as well as utility connections, transportation, and all other facilities and services necessary for the proper execution and completion of the Work, except as otherwise specified elsewhere in the Contract Documents.

D. Whenever a provision of the Specifications conflicts with agreements or regulations in force among members of trade associations, unions, or councils which regulate or distinguish what work shall or shall not be included in the work of a particular trade, the Contractor shall make all necessary arrangements to reconcile such conflict without delay, damage, or cost to the Owner and without recourse to the Architect or the Owner. In case progress of the Work is affected by undue delay in furnishing or installing items of material or equipment required under the Contract because of a conflict involving such agreement or regulations, the Owner or the Architect may require that other material or equipment of equal kind and quality be provided at no additional cost to the Owner.

Section 2.02 - Contractor's Title to Materials

A. The Contractor warrants that the Contractor has full, good and clear title to all materials and supplies used by the Contractor in the Work, free from all liens, claims or encumbrances.

B. All materials, equipment and articles which become the property of the Owner shall be new unless specifically stated otherwise.

Section 2.03 - "Or Equal" Clause

A. Whenever a material, article or piece of equipment or method is identified on the plans or in the specifications by reference to manufacturers' or vendors' names, trade name, catalogue number, or make, no others or alternatives may be substituted. Any and all other "Or Equal" considerations will be handled under this Section in accordance with General Requirements, Section 01 25 00.

B. Where the Architect approves a product proposed by the Contractor and said proposed product requires a revision or redesign of any part of the Work covered by this Contract, or the Work covered by other contracts, all said revision(s) or redesign(s), and all new drawings and details required thereto shall be provided by the Contractor and shall be approved by the Architect. All time spent by the Architect or its agents to evaluate the proposed substitution and or necessary engineering cost to accommodate the requested change shall be reimbursed to the Owner by the Contractor via the Change Order procedure.

Section 2.04 - Quality, Quantity and Labeling

A. The Contractor shall furnish materials and equipment of the quality and quantity specified in the Contract. Unless otherwise provided, all materials and articles incorporated into the Work shall be new and of the most suitable grade of their respective kinds for the purpose. When required by the Contract Documents or when directed by the Owner, the Contractor shall supply the Owner's Representative, for their acceptance, full information concerning any material which the Contractor contemplates incorporating into the Work. Materials and articles installed or used without such acceptance shall be at the risk of subsequent rejection.

B. When materials are specified to conform to any standard, the Owner may require that the materials delivered to the Site shall bear manufacturer's labels stating that the materials meet said standards.

C. The above requirements shall not restrict or affect the Owner's right to test materials as provided in the Contract.

D. Whenever several alternative materials or items are specified by name or other particular reference for one use, the Owner's Representative may require the Contractor to submit in writing a list of the particular materials or items the Contractor intends to use before the Contract is executed.

Section 2.05 - Superintendence by Contractor

A. The Contractor shall employ a full-time effective, responsive and competent construction superintendent and necessary staff; the construction superintendent shall devote full time to the Work and shall have full authority to act for the Contractor at all times. The Contractor shall provide the Owner with the names and authority of such personnel in writing.

B. If at any time the superintendent is not satisfactory to the Owner, the Contractor shall, if requested by the Owner, replace said superintendent with another superintendent satisfactory to the Owner. There shall be no change in superintendent without the Owner's approval.

C. The Contractor shall remove from the Work any employee of the Contractor or of any Subcontractor when so directed by the Owner.

Section 2.06 - Subsurface or Site Conditions

A. The Contractor acknowledges that it has assumed the risk and that the Contract consideration includes such provision as the Contractor deems appropriate and adequate to account for all subsurface conditions as the Contractor could reasonably anticipate encountering from the provisions of the Contract Documents, borings, rock cores, topographical maps and such other information as the Owner made available to the Contractor or from their own inspection and examination of the site prior to the Owner's receipt of Contractor bids.

B. In the event that the Contractor encounters subsurface physical conditions at the site differing substantially from those shown on or described or indicated in the Contract Documents and which could not have been reasonably anticipated from the aforesaid information made available by the Owner or from the Contractor's inspection and examination of the site, the Contractor shall give immediate notice to the Owner of such conditions before they are disturbed. Such notice shall include probable cost and/or any impact to the Project Schedule. The Owner will thereupon promptly investigate the conditions and if Owner finds that they do substantially differ from that which should have been reasonably anticipated by the Contractor, the Owner shall make such changes in the drawings and specifications as may be necessary and a change order shall be issued.

Section 2.07 - Representations of Contractor

The Contractor represents and warrants:

A. That the Contractor is financially solvent, sufficiently stable to secure the required payment and performance bonds, and is sufficiently experienced in and competent to perform the subject Work or retain qualified subcontractors to perform elements of the Work pursuant to the Project’s plans and specifications;

B. That the Contractor is familiar with all Federal, State, or other laws, ordinances, orders, building codes, rules and regulations, which may in any way affect the Work;

C. That any temporary and permanent Work required by the Contract can be safely and satisfactorily constructed.

D. That the Contractor has carefully examined the Contract and the Site of the Work and that, from the Contractor's own investigations is satisfied as to the nature and location of the Work, the character, quality and quantity of surface and subsurface materials likely to be encountered, the character of equipment and other facilities needed for the performance of the Work, accounted for weather days, the general and local conditions, and all other materials or items which may affect the Work. The Contractor has correlated those observations with the requirements of the Contract Documents and has made all other investigations essential to a full understanding of the Work and the difficulties which may be encountered in performing the Work.

Section 2.08 - Verifying Dimensions and Site Conditions

A. The Contractor shall take all measurements at the Site and shall verify all dimensions and site conditions at the Site before proceeding with the Work. If said dimensions or conditions are found to be in conflict with the Contract, the Contractor immediately shall refer said conflict to the Owner.

B. During the progress of Work, the Contractor shall verify all field measurements prior to fabrication of building components and equipment, and proceed with the fabrication to meet field conditions.

C. The Contractor shall consult all Contract Documents to determine exact location of all Work and verify spatial relationships of all Work. Any question concerning said location or spatial relationships shall be submitted in a manner approved by the Owner.

D. Specific locations for equipment, pipelines, ductwork and other such items of Work, where not dimensioned on plans, shall be determined in consultation with the Owner and other affected Contractors and Subcontractors.

E. The Contractor shall be responsible for the proper fitting of the Work in place.

F. Should Contractor's failure to perform services under this section result in additional costs to the Owner, the Contractor shall be responsible for such additional costs.

Section 2.09 - Copies of Contract Documents for Contractors

A. The Contractor will have access to view and download the Bid Documents in the Owner's electronic project management system.

B. All drawings, specifications, and copies thereof furnished by the Owner are the property of the Owner. They are not to be used on other work with the exception of the signed Contract Set, are to be returned to the Owner along with the As-Builts at the completion of the Work.

Section 2.10 - Meetings

The Contractor and all subcontractors as requested shall attend all meetings as directed by the Owner or the Owner's Representative.

Section 2.11 - Related Work

The Contractor shall examine the Contract for related work to ascertain the relationship of said work to the Work under the Contract.

Section 2.12 - Surveys and Layout

Unless otherwise expressly provided in the Contract, the Owner shall furnish the Contractor all surveys of the property necessary for the Work, but the Contractor shall lay out the Work.

Section 2.13 - Errors, Omissions or Discrepancies

The Contractor shall examine the Contract thoroughly before commencing the Work and report in writing any errors or discrepancies to the Owner or the Owner's Representative.

Section 2.14 - Project Labor Rates

The Contractor shall submit to the Owner, for review and approval, within thirty (30) days after Contract is awarded all trade labor rates inclusive of fringe benefits, taxes, insurance for the duration of the individual craft agreement in accordance with Exhibit E. Revised rates shall be provided within thirty (30) days of signing any new agreements with the individual crafts during this project.

Section 2.15 – Daily Reports

The Contractor's Construction Superintendent shall submit a Daily Report to the Cornell University Project Manager or the Resident Field Engineer at the job site. Such reports shall, at a minimum, contain the following information:

Name of Project
Project Number
Date of Report
Weather Conditions
Equipment on the site
Contractors on site including name and number of employees on site for each contractor
Work/area and activity for each contractor
Overtime worked and planned work progress
Environmental problems and corrections
Other information, such as special events, occurrences, materials delivered, accidents or injuries, recommendations, suggestions, visitors, inspections, equipment start-up and check out, occupancy, etc.

ARTICLE 3 -- INSPECTION AND ACCEPTANCE

Section 3.01 - Access to the Work

The Owner and Architect, or their duly authorized representatives, assistants, or inspectors shall at all times and for any purpose have access to the Work and the premises used by the Contractor, and the Contractor shall provide safe and proper facilities therefor. In addition, the Contractor shall, whenever so requested, give the Owner and Architect or their duly authorized representatives access to the proper invoices, bills of lading, specifications, etc., which may be required in determining the adequacy and/or quantity of materials used in completion of the Work.

Section 3.02 - Notice for Testing

If the Contract Documents, laws, ordinances, rules, regulations, or orders of any public authority having jurisdiction require any Work to be inspected, tested, accepted, or approved, the Contractor shall give the Owner timely notice of its readiness and of the date arranged so the Owner may observe such inspection, testing, or approval. The Contractor shall bear all costs of such inspection, tests, and approvals unless otherwise provided.

Section 3.03 - Inspection of Work

A. The Contractor will cooperate in all ways to facilitate the inspection and examination of the Work. The inspections and examinations will be carried out in such a manner that the Work will not be delayed.

B. All Work, all materials whether or not incorporated in the Work, all processes of manufacturer, and all methods of construction shall be, at all times and places, subject to the inspection of the Owner and the Owner shall be the final judge of the quality and suitability of the Work. Any Work not approved by the Owner shall immediately be reconstructed, made good, replaced or corrected by the Contractor including all Work of other Contractors destroyed or damaged by said removal or replacement.

C. Required certificates of inspection, testing, acceptance, or approval shall be secured by the Contractor and promptly delivered to the Owner.

Section 3.04 - Inspection and Testing

All materials and equipment used in the Work shall be subject to inspection and testing in accordance with accepted standards to establish conformance with specifications and suitability for uses intended, unless otherwise specified in the Contract. If any Work shall be covered or concealed without the approval or consent of the Owner, said Work shall, if required by the Owner, be uncovered for examination. If any test results are below specified minimums, the Owner may order additional testing. The cost of said additional testing, any additional professional services required, and any other expenses incurred by the Owner as a result of said additional testing shall be paid by the Contractor. Reexamination of any part of the Work may be ordered by the Owner, and if so ordered the Work must be uncovered by the Contractor. If said Work is found to be in accordance with the Contract, the Owner shall pay the cost of reexamination and replacement. If said Work is found not to be in accordance with the Contract, the Contractor shall pay the cost of reexamination and replacement.

Section 3.05 - Defective or Damaged Work

If, in the opinion of the Owner, it is undesirable to replace any defective or damaged materials or to reconstruct or correct any portion of the Work injured or not performed in accordance with the Contract Documents, the compensation to be paid to the Contractor shall be reduced by an amount which, in the judgment of the Owner, shall be deemed to be equitable.

Section 3.06 - Acceptance

No previous inspection shall relieve the Contractor of the obligation to perform the Work in accordance with the Contract Documents. No payment, either partial or full, by the Owner to the Contractor shall excuse any failure by the Contractor to comply fully with the Contract Documents. The Contractor shall remedy all defects, paying the cost of any damage to other Work resulting therefrom.

ARTICLE 4 -- CHANGES IN WORK

Section 4.01 - Changes

A. The Owner, without invalidating the Contract, may order and approve changes within the general scope of the Contract and the Contractor shall promptly comply with such change orders.

B. A change order is a written direction to the Contractor signed by the Owner, issued after execution of the Contract, authorizing a change in the Work, extra work, or an adjustment in the Contract price or time of performance.

C. No claims for changes, extra work or additional time to complete the Contract or an adjustment in the Contract price shall be allowed unless such change is ordered in writing by the Owner.

D. The Owner shall determine the amount by which the Contract consideration is to be increased or decreased by a change order by one (1) or more of the following methods:

1. By agreement with the Contractor.

2. By applying the applicable price or prices previously bid and approved.

   (i) To the extent that Unit Prices are applicable, as determined by the Owner, work shall be priced and paid for or credited in accordance with such Unit Prices; except that a Unit Price shall not apply to any portion of work which is either reduced or increased by more than 25%. Said Unit Prices shall be valid for the duration of the project as applicable, unless stipulated elsewhere in the Contract Documents.

   (ii) For Unit Price items, additions and deletion of like items shall be algebraically summed and then multiplied by the applicable Unit Prices. For Direct Labor and Material items, all additions and deletions shall be algebraically summed for each subcontractor and then multiplied by the applicable markup.

   (iii) Unit Prices are for work complete, measured in place and cover profit and all other costs and expenses. Unit Prices include, without limit, all conditions of the contract and all general requirements such as layout, reproduction of Drawings and Specifications, testing and inspection, shop drawing and sample coordination, supervision (field and home office), small tools and expendable items, insurance, taxes, temporary facilities and services, including access and safety, "as-built" drawings, and general and administrative overhead and profit.

3. By estimating the fair and reasonable cost of:

   (i) Labor, including all wages, required wage supplements and insurance required by law paid to employees below the rank of superintendent directly employed at the Site.

   (ii) Materials

   (iii) Equipment, excluding hand tools, which in the judgment of the Owner, would have been or will be employed exclusively and directly on the Work. When submitting change orders, equipment which is common to the project scope at hand is expected to be previously paid for as overhead / general conditions to the project. Special rental equipment or tools not common to the project that are required to perform the change order will be accepted as additional costs.

4. By determining the actual cost of the extra work in the same manner as in Subsection 3 except the actual costs of the Contractor shall be used in lieu of estimated costs.

E. Mark-up Percentages

1. Work performed by the Contractor: Where the Work is performed directly by the Contractor by adding to the total of such estimated costs a sum equal to fifteen percent (15%) thereof.

2. Work performed by a Subcontractor: Where the change order work is performed by a Subcontractor under contract with the Contractor, by adding a sum equal to fifteen (15%) of said costs for the benefit of said Subcontractor, and by adding for the benefit of the Contractor an additional sum equal to ten percent (10%) of said costs.

3. Work performed by a Sub-Subcontractor: Where work is performed by a Sub-Subcontractor, by adding the sum equal to fifteen percent (15%) of said costs for the benefit of said Sub-Subcontractor, by adding for the benefit of the Subcontractor an additional sum equal to five percent (5%) of said cost and by adding for the benefit of the Contractor an additional sum equal to five percent (5%) of said cost. The maximum aggregate of all mark-up percentages may not exceed twenty five percent (25%).

4. No Markup on Bonds and Insurance Costs: Change Order cost adjustments due to increases or decreases in bond or insurance costs (if applicable) shall not be subject to any Markup Percentage.

5. Overtime Pay: No mark-up shall be paid on the premium portion of overtime pay.

6. Direct and Indirect Costs Covered by Markup Percentages: As a further clarification, the agreed upon Markup Percentage is intended to cover the Contractor's profit and all indirect costs and expenses associated with the change order work. Items intended to be covered by the Markup Percentage include, without limit: home office expenses, branch office and field office overhead expense of any kind; project management; superintendents, general foremen; estimating, engineering; coordinating; expediting; purchasing; detailing; legal, accounting, data processing or other administrative expenses; reproduction of drawings and specifications; shop drawings and sample coordination; "as-built" drawings; permits; auto insurance and umbrella insurance; pick-up truck costs; parking permits; cellular phones; testing and inspection; temporary facilities; access and safety provisions; and warranty expense costs. The cost for the use of small tools and/or tools already in use on site are also to be considered covered by the Markup Percentage. Small tools shall be defined as tools and equipment (power or non-power) with an individual purchase cost of less than $750

7. Deduct Change Orders and Net Deduct Changes: The application of the markup percentage will apply to both additive and deductive change orders. In the case of a deductive change order, the credit will be computed by applying the percentage so that a deductive change order would be computed in the same manner as an additive change order. In those instances where a change involves both additive and deductive work, the additions and deductions will be netted and the markup percentage adjustments will be applied to the net amount

F. Regardless of the method used by the Owner in determining the value of a change order, the Contractor, within thirty (30) calendar days after a request for the estimate of value shall submit to the Owner a detailed breakdown of the Contractor's estimate, including all subcontractors details, of the value of the Change Order Work, in the format detailed in Exhibit A. Each submission shall include an electronic .pdf format of all documentation.

G. Unless otherwise specifically provided for in a change order, the compensation specified therein includes and shall constitute a full payment for both the Work covered or arising from the order and for any damage or expense incurred by the Contractor by any delays, including any and all impacts, known or unknown, or delays to other Work to be done under the Contract resulting from said change order. The Contractor expressly waives all rights to any other compensation for said damage or expense.

H. The Contractor shall furnish satisfactory bills, payrolls and vouchers covering all items of cost and when requested by the Owner shall give the Owner access to accounts and records relating thereto.

Section 4.02 – Claims for Extra Work

If the Contractor claims (i) that any work it has been ordered to do is extra work or (ii) that it has performed or is going to perform extra work or (iii) that any action or omission of the Owner or the Architect is contrary to the terms and provisions of the Contract, the Contractor shall:

A. Promptly comply with such order;

B. Notwithstanding the provisions of this Agreement, Article 4 of these General Condition and any other provisions of the Contract documents to the contrary, file with the Owner, within fourteen (14) calendar days after being ordered to perform the work claimed by it to be extra work or within fourteen (14) calendar days after commencing performance of the extra work, whichever date shall be the earlier, or within fourteen (14) calendar days after the said action or omission on the part of the Owner or the Architect occurred, a written notice of the basis of its claim and request a determination thereof;

C. Notwithstanding the provisions of this Agreement and any other provisions of the Contract documents to the contrary, file with the Owner, within thirty (30) calendar days after said alleged extra work was required to be performed or said alleged extra work was commenced, whichever date shall be the earlier, or said alleged action or omission by the Owner or the Architect occurred, a verified detailed statement, with documentary evidence, of the items and basis of its claim;

D. Produce for the Owner's examination, upon notice from the Owner, all its books of account, bills, invoices, payrolls, subcontracts, time books, progress records, daily reports, bank deposit books, bank statements, checkbooks and cancelled checks, showing all of its actions and transactions in connection with or relating to or arising by reason of its claim, and submit persons in its employment and in its subcontractors' employment for examination under oath by any person designated by the Owner to investigate any claims made against the Owner under the Contract, such examination to be made at the offices of the Contractor; and

E. Proceed diligently, pending and subsequent to the determination of the Owner with respect to any such disputed matter, with the performance of the Contract and in accordance with all instructions of the Owner and the Architect.

F. The Contractor's failure to comply with any or all parts of Section 4.02 shall be deemed to be: (i) a conclusive and binding determination on its part that said order, work, action or omission does not involve extra work and is not contrary to the terms and provisions of the Contract; and (ii) a waiver by the Contractor of all claims for additional compensation or damages as a result of said order, work, action or omission. The provisions of Section 4.02 is to promptly afford the Owner opportunity to cancel or revise any order, change its plans, mitigate or remedy the effects or circumstances giving rise to a claim or take such other action as may seem desirable and to verify any claimed expenses or circumstances as they occur. Compliance with such provisions is essential whether or not the Owner is aware of the circumstances of any order or other circumstances which might constitute a basis for a claim and whether or not the Owner has indicated it will consider a claim in connection therewith.

G. No person has power to waive or modify any of the foregoing provisions and, in any action against the Owner to recover any sum in excess of the sum certified by the Owner to be due under or by reason of the Contract, the Contractor must allege in its complaint and prove compliance with the provisions of this Section.

Section 4.03 - Form of Change Orders

All change orders shall be processed, executed and approved via the Owner's Electronic project management system Change Order Process. No payment for change order Work shall be due the Contractor unless a change order has been issued and approved as noted above and processed via the electronic project management system.

ARTICLE 5 -- TIME OF COMPLETION

Section 5.01 - Time of Completion

A. The Work shall be commenced at the time stated in the written order of the Owner and shall be completed no later than the dates of completion specified in the Contract. All required overtime to maintain progress schedule is included in the Base Bid.

B. The date of beginning and the times for completion of the Work, as specified in the Contract, are essential conditions of the Contract.

C. The Work shall be prosecuted diligently at such rate of progress as shall insure substantial and full completion within the time specified. It is expressly understood and agreed, that the times for the completion of the Work described herein is a reasonable time, taking into consideration the average climatic range and usual business and labor conditions prevailing in the locality of the Site.

D. Time is of the essence on each and every portion of the Work. In any instance in which additional time is allowed for the completion of any Work, the new time of completion established by said extension shall be of the essence. If in the Architect's or Owner's judgment, it becomes necessary at any time during construction to accelerate and/or complete certain areas of the project, the Contractor shall concentrate efforts and manpower on designated areas.

E. Where Work occurs within occupied areas, perform same only on the approved schedule, so as not to interfere with normal operation of occupied areas.

F. The Contractor shall not be charged with damages or any excess cost if the Owner determines that the Contractor is without fault and the Contractor's reasons for the time extension are acceptable to the Owner. The Contractor shall not be charged with damages or any excess cost for delay in completion of the work if the Owner determines that the delay is due to:

1. any preference, priority or allocation order duly issued by the Government of the United States or the State of New York;

2. unforeseeable cause beyond the control and without the fault or negligence of the Contractor, and approved by the Owner, including, but not limited to, acts of God or of public enemy, acts of the Owner, fires, epidemics, quarantine, restrictions, strikes, freight embargoes and unusually severe weather.

G. The time for completion can only be extended by change order and may be extended for:

1. all of the Work, or

2. only that portion of the Work altered by the change order.

H. Any claim for extension of time shall be made in writing to the Owner not more than ten (10) days after the commencement of the delay; otherwise it shall be waived.

ARTICLE 6 -- TERMINATION

Section 6.01 - Termination for Cause

In the event that any provision of this Contract is violated by the Contractor or by any Subcontractor of the Contractor, the Owner may serve written notice upon the Contractor, and upon the Contractor's surety, if any, of the Owner's intention to terminate the Contract. The notice shall briefly state the reasons for the termination and shall specify a termination date. If arrangements satisfactory to the Owner are not made to remove and remedy the violation, the Contract shall terminate upon the date specified by the Owner in the notice. In the event of termination, the Owner may take over and complete the Work at the expense of the Contractor. The Contractor and Contractor's surety shall be liable to the Owner for all costs thereby incurred by the Owner. In the event of such termination the Owner may take possession of and may utilize such materials, appliances, and plant as may be located on the Site and which may be necessary or useful in completing the Work.

Section 6.02 - Termination for Convenience of Owner

The Owner, at any time, may terminate the Contract in whole or in part. Any said termination shall be effected by delivering to the Contractor a notice of termination specifying the extent to which performance of Work under the Contract is terminated and the date upon which said termination becomes effective. Upon receipt of the notice of termination, the Contractor shall act promptly to minimize the expenses resulting from said termination. The Owner shall pay the Contractor for costs actually incurred by the Contractor up to the effective date of said termination, but in no event shall the Contractor be entitled to compensation in excess of the total consideration of the Contract. In the event of said termination the Owner may take over the Work and prosecute same to completion.

Section 6.03 - Owner's Right to do Work

The Owner may, after notice to the Contractor, without terminating the Contract and without prejudice to any other right or remedy the Owner may have, perform or have performed by others all of the Work or any part thereof and may deduct the cost thereof from any monies due or to become due the Contractor.

ARTICLE 7 -- DISPUTES

Section 7.01 - Disputes Procedure

A. If the Contractor claims that any Work which the Contractor has been ordered to perform will be Work which should have been authorized or directed by change order, or that any action or omission of the Owner is contrary to the terms of the Contract, the Contractor shall:

1. File a notice with the Owner which sets forth the basis of the Contractor's claim and requests a resolution of the dispute. Such notice shall be filed within fifteen (15) working days after being ordered to perform the disputed work or within fifteen (15) working days after commencing performance of the disputed work, whichever is earlier, or within fifteen (15) working days after the act or omission of the Owner which the Contractor claims is contrary to the terms of the Contract.

2. Proceed diligently with the performance of the work in accordance with the instructions of the Owner pending the resolution of the dispute by the Owner.

3. Promptly comply with the order of the Owner regarding the disputed matter.

4. Any such decision, or any other decision of the Owner in respect to a dispute, shall be final unless the Contractor, within ten (10) working days after such decision, shall deliver to the Owner a verified written statement which sets forth the Contractor's contention that the decision is contrary to a provision of the contract. Pending the decision of the Owner, the Contractor shall proceed in accordance with the original decision. The Owner shall determine the validity of the Contractor's claim and such determination shall be final. The Contractor may file a notice with the Owner reserving its rights in connection with the dispute but shall comply with the Owner's decision and complete the work as directed.

B. No claim for additional costs regarding changed or extra work shall be allowed unless the work was done pursuant to a written order of the Owner.

C. The value of claims for extra work, if allowed, shall be determined by the methods described in the Contract. Refer to Article 4 of these General Conditions.

D. The Contractor's failure to comply with any or all parts of Article 7 shall be deemed to be:

1. a conclusive and binding determination on the part of the Contractor that the order, work, action or omission is not contrary to the terms and provisions of the Contract;

2. a waiver by the Contractor of all claims for additional compensation, known or unknown, including time extensions, or damages as a result of said order, work, action, or omission.

ARTICLE 8 -- SUBCONTRACTS

Section 8.01 - Subcontracting

A. The Contractor may utilize the services of Subcontractors.

B. The Contractor shall submit to the Owner, in writing, the name of each proposed Subcontractor and Sub-Subcontractor, as required by the Contract. The Contractor shall not award any Work to any Subcontractor or Sub-Subcontractor without the prior written approval of the Owner.

C. The Contractor shall be fully responsible for the Work, acts and omissions of Subcontractors, and of persons either directly or indirectly employed by Subcontractors.

D. The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the Work to bind Subcontractors to the Contractor by the terms of the Contract insofar as applicable to the Work of Subcontractors, indemnification and to give the Contractor the same power to terminate any subcontract that the Owner may exercise over the Contractor.

E. The Contractor's use of Subcontractors shall not diminish the Contractor's obligation to complete the Work in accordance with the Contract. The Contractor shall control and coordinate the Work of Subcontractors.

F. Nothing contained in the Contract shall create any contractual relationship between Subcontractors and the Owner.

ARTICLE 9 -- COORDINATION AND COOPERATION

Section 9.01 - Cooperation with Other Contractors

A. Normally, the Work will be performed by a single Contractor. However, the Owner reserves the right to perform work related to the Work with its own forces or award separate contracts. In that event, the Contractor shall coordinate its operations with the Owner's forces or separate Contractors.

B. The Owner cannot guarantee the responsibility, efficiency, unimpeded operations or performance of any contractor. The Contractor acknowledges these conditions and shall bear the risk of all delays including, but not limited to, delays caused by the presence or operations of other contractors.

C. The Contractor shall keep informed of the progress and workmanship of other contractors and shall notify the Owner immediately of lack of progress or defective workmanship on the part of other contractors where said delay or defective workmanship may interfere with the Contractor's operations.

D. Failure of a Contractor to keep so informed and failure to give notice of lack of progress or defective workmanship by others shall be construed as acceptance by the Contractor of said progress and workmanship as being satisfactory for proper coordination with the Work.

E. If the Contractor notifies the Owner, in writing, that another contractor on the Site is failing to coordinate the work of said contractor with the Work, the Owner shall investigate the charge. If the Owner finds it to be true, the Owner shall promptly issue such directions to the other contractor with respect thereto as the situation may require. The Owner shall not be liable for any damages suffered by the Contractor by reason of the other contractor's failure to promptly comply with the directions so issued by the Owner, or by reason of another contractor's default in performance.

F. If the Owner shall determine that the Contractor is failing to coordinate the Work with the work of other contractors as the Owner has directed:

1. the Owner shall have the right to withhold any payments due under the Contract until the Owner's directions are complied with by the Contractor; and

2. the Contractor shall indemnify and hold the Owner harmless from any and all claims or judgments for damages and from any costs or damages to which the Owner may be subjected or which the Owner may suffer or incur by reason of the Contractor's failure promptly to comply with the Owner's directions.

G. Should the Contractor sustain any damage through any act or omission of any other contractor having a contract with the Owner or through any act or omission of any Subcontractor of said other contractor, the Contractor shall have no claim against the Owner for said damage.

H. Should any other contractor having a Contract with the Owner sustain damage through any act or omission of the Contractor or its Subcontractor, the Contractor shall reimburse said other contractor for all said damages and shall indemnify and hold the Owner harmless from all said claims.

ARTICLE 10 -- PROTECTION OF RIGHTS, PERSONS AND PROPERTY

Section 10.01 - Accidents and Accident Prevention

A. The Contractor shall at all times take reasonable precautions for the safety of persons engaged in the performance of the Work. The Contractor shall comply fully with all applicable provisions of federal, state, and local law. The Contractor alone shall be responsible for the safety, efficiency and adequacy of the Contractor's Work, plant, appliances and methods, and for any damage which may result from the failure or the improper construction, maintenance, or operation of said Work, plant, appliances and methods.

B. The Contractor shall maintain an accurate record of all cases of death, occupational disease, public health statistics or information, and injury requiring medical attention, pursuant to government authority, or causing loss of time from work, arising out of or in the course of employment on Work under the Contract, and shall immediately notify the Owner in writing of any injury which results in hospitalization or death, or significant near miss incidents that had the potential to result in serious injury or death. The Contractor shall upload all completed Contractor and Subcontractor incident investigation forms and reports within five (5) working days of the incident. The report shall include the extent of damage or injury, the persons involved and their employers, the number of days persons are hospitalized, and any other pertinent information required by Cornell University. Such reporting shall be submitted on the electronic project management system Accident Form.

C. The Contractor shall provide to the Project Manager, Material Safety Data Sheets (OSHA Form 20 or the equivalent) for all chemicals to be used on site. All chemicals requiring any precautionary measures (e.g., special storage or disposal requirements, personal protective equipment, or additional ventilation), shall be brought to the attention of Cornell University for review and approval, prior to their use on site.

1. All chemicals brought on site by the Contractor shall be clearly labeled. The label shall state the identity of the chemical, any associated hazards, and the Contractor's name.

2. All Contractor employees who are using chemicals shall be made aware of the hazards associated with their use. Safe chemical handling procedures in accordance with OSHA or other governmental agencies, and manufacturer's recommendations shall be used at all times.

3. The Contractor shall dispose of all chemicals in accordance with EPA and Cornell University requirements, regardless of the size of the container or the quantity of waste, and must receive prior approval of Cornell University.

4. A Contractor's Waste Material Disposal Plan form is required (with or without waste) to be submitted with submission of the first payment. The form can be found at:
   https://ehs.cornell.edu/sites/default/files/FRM-CWMDP-Contractor-Waste-Material-Disposal-Plan-IPDF.pdf

D. The Contractor shall be responsible for the initiation, maintenance and supervision of safety precautions and programs in connection with the Work.

E. The Contractor shall, at all times, guard the Owner's property from injury or loss in connection with the Work. The Contractor shall, at all times, guard and protect the Contractor's Work. The Contractor shall replace or make good any said loss or injury unless said loss or injury is caused directly by the Owner.

F. The Contractor shall have full responsibility to install, protect and maintain all materials and supplies in proper condition and forthwith repair, replace and make good any damage thereto until Final Acceptance.

Section 10.02 - Adjoining Property

A. The Contractor shall be required to protect all the adjoining property and to repair or replace any such properties damaged or destroyed by the Contractor, its employees or subcontractors thereof, by reason of, or as a result of activities under, for or related to the Contract.

Section 10.03 - Emergencies

A. In case of an emergency which threatens loss or injury to persons or property, the Contractor will be allowed to act, without previous instructions from the Owner, in a diligent manner, to the extent required to avoid or limit such loss or injury, and the Contractor shall notify the Owner immediately thereafter of the action taken.

Section 10.04 - Bonds

A. Before commencing the performance of any work covered by the Contract, the Contractor shall furnish to the Owner any required Bonds. The failure of the Contractor to supply the required Bonds within ten (10) days after the Contract signing shall constitute a default on the part of the Contractor.

Section 10.05 - Risks Assumed by the Contractor

A. Indemnification. The Contractor shall defend, indemnify and hold harmless the Owner and its trustees, officers, agents and employees from and against all claims, damages, losses, fines, and expenses, including reasonable attorneys' fees, arising out of or resulting from the performance of the Work including, but not limited to, bodily or personal injury, sickness, disease, death, or injury or damage to tangible property, to the extent they arise out of or result from:

1. any negligent act or omission, or intentional or willful misconduct, violation of law, or breach of this Contract by the Contractor, or any of its subcontractors, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, or

2. any injury to an employee of the Contractor, its subcontractors, anyone directly or indirectly employed by them. The indemnification obligation under this section shall not be limited by the amount or type of damages, compensation or benefits payable by or for the Contractor under workers' compensation, disability benefit or other employee benefit laws.

B. In the event that Contractor is requested but refuses to fully comply with and honor its indemnification obligations hereunder, then the Contractor shall, in addition to all other obligations, pay the cost, including reasonable attorneys' fees, of bringing an action to enforce such indemnification obligations.

C. Neither the Owner's final acceptance of the work to be performed hereunder nor the making of any payment shall release the Contractor from its obligations under this Section. The enumeration elsewhere in the Contract of particular risks assumed by the Contractor or of particular claims for which the Contractor is responsible shall not be deemed to limit the effect of the provisions of this Section or to imply that the Contractor assumes or is only responsible for risk or claims of the type enumerated.

Section 10.06 - Contractor's Compensation and Liability Insurance

A. The Contractor shall procure and maintain, at its own cost and expense, until final acceptance by the Owner of all the work covered by this Contract, the following kinds of insurance:

1. Worker's Compensation Insurance. A policy complying with the requirements of the laws of the State of New York, including Coverage B - Employer's Liability with limits as follows: (1) Bodily injury by accident - $1,000,000 each accident; (2) Bodily injury by disease - $1,000,000 each employee; and (3) Bodily injury by disease - $1,000,000 policy limit. This policy shall provide a Waiver of Subrogation in favor of the Owner.

2. Contractor's Comprehensive General Liability Insurance. A standard commercial general liability insurance policy, with contractual, completed operations, explosion, collapse and underground property damage coverage's issued to and covering the liability of the Contractor for all work and operations under this Contract and all obligations assumed by the Contractor under this Contract. The Contractor shall provide Broad Form Commercial General Liability Insurance, and the Owner shall be an additional insured in the policy utilizing additional insured endorsements CG 20 10 10 01 and CG 20 37 10 01 or their equivalents and provide a Waiver of Subrogation in favor of Owner. The completed operations coverage's shall be maintained for not less than two years after acceptance of the work or until the end of the applicable Statute of Repose, whichever is greater. The limits of the Commercial General Liability policy shall be as follows:

$ 1,000,000	Each Occurrence
$ 1,000,000	Personal and Advertising Injury per Occurrence
$ 2,000,000	General Aggregate
$ 2,000,000	Completed Operations

a) No exclusionary language or limitations relating to soils or earth movement.

b) No exclusions for Bodily Injury and Property Damage, Labor Law (240) products liability/completed operations coverage (including any product manufactured or assembled), premises operations, blanket contractual liability (for this agreement), broad form property damage, personal and advertising injury, independent contractor's liability, mobile equipment, elevators, damage from explosion, collapse and underground hazards ("XCU") cross-liability, cross suits or severability of interest clauses are acceptable.

3. Automobile Liability Insurance. A policy covering the use in connection with the work covered by the Contract Documents of all owned, non-owned and hired vehicles bearing, or, under the circumstance under which they are being used, required by the Motor Vehicle Laws of the State of New York to bear license plates. This policy shall name Owner as an Additional Insured and provide a Waiver of Subrogation in favor of Owner. The coverage under such policy shall be not less than a combined single limit for Bodily Injury and Property Damage of:

COMBINED SINGLE LIMIT	
$ 1,000,000	Each Accident

4. Umbrella Liability Insurance. Umbrella and/or Excess Liability policy(ies) will be provided on a following form basis subject to limits not less than $5,000,000 per occurrence and follow-form of the primary General Liability, Automobile Liability, and Employers Liability policies. These policies shall contain an endorsement stating that any entity qualifying as an additional insured on the insurance stated in the Schedule of Underlying Insurance shall be an Additional Insured on the Umbrella/Excess liability policy and that they apply immediately upon exhaustion of the insurance stated in the Schedule of Underlying Insurance as respects to the coverage afforded to any Additional Insured. No trailing retentions on Umbrella or Excess Liability policy(ies) shall be allowed without Owner prior written consent. When approved in advance by Owner, the policies provided in this section may have policy limits lower than indicated above if the excess liability insurance policy limits provided by Contractor, when combined with the corresponding underlying policy limits, total at least the sum of all required minimum policy limits required by this section.

$ 5,000,000 Each Occurrence/Aggregate

5. Professional Liability Insurance. Contractor shall purchase and maintain Contractor's Professional Liability Insurance if Contractor or any of its Subcontractors or agents will provide any design, engineering or other professional services under the Subcontract Documents, covering Subcontractor and Sub-subcontractors, and their respective professionals, for liability for negligent acts, errors, or omissions, arising out of the performance of the Contractor's Work. The Retroactive date must be prior to start of the Work required under this Agreement. Coverage must be maintained for a minimum period of 3 years or until the applicable Statute of Repose, whichever is greater. The policy shall contain a blanket endorsement for contractual liability and afford coverage on a claim made basis:

$ 2,000,000 Each Occurrence Aggregate

6. Contractors Pollution Liability Insurance: Contractor shall purchase and maintain Pollution Liability Insurance as will protect the Owner and Contractor from claims of Bodily Injury, Property Damage and cleanup, which may arise out of or result from Contractor's operations under the Contract and for which the Contractor may be legally liable. Pollution liability coverage shall extent to microbial matter including mold, mold remediation and diminution in value. The insurance shall be maintained from inception of the Work through the earlier of Substantial Completion or Final Payment. This insurance shall include coverage and limits as follows.

$ 2,000,000 Each Occurrence/Aggregate

7. Unmanned Aerial Vehicle (UAV): If Contractor or any of its Subcontractors or agents will operate an Unmanned Aerial Vehicle ("UAV"), a policy of UAV insurance shall be provided on a standard form providing coverage for bodily injury (including death) and property damage on an "occurrence" basis with a combined single limit per occurrence of $2,000,000. This coverage may also be provided by endorsement to the Commercial General Liability policy.

Contractor is responsible to follow the Cornell University UAV Policy, located at:
https://www.risk.cornell.edu/events-and-staffing-main-page/use-of-drones/

PDF of Insurance requirements per the above Cornell University Policy:
https://bpb-us-e1.wpmucdn.com/blogs.cornell.edu/dist/8/4200/files/2016/09/UAV-Guidelines-28wl46t.pdf

8. Contractor's Equipment. Contractor shall purchase and maintain coverage for its property and equipment to be used in the prosecution of the Contract Work. Such coverage shall be on a Replacement Cost basis. A Waiver of Subrogation in favor of Owner for any loss to Contractor's tools, equipment, machinery, and appliances shall be provided prior to the commencement of the Contract Work.

B. In addition to maintaining all of the above insurances, the Contractor shall indemnify and hold harmless the Owner and its agents and employees from and against liability, including additional premium due because of the Contractor's failure to maintain coverage limits as required under this section.

C. Insurance similar to that required of the Contractor shall be provided by or on behalf of all subcontractors to cover their own operations performed under this Contract. The Contractor shall be held responsible for any modifications in these insurance requirements as they apply to subcontractors.

A. Subcontractors' Insurance: Before permitting any of its Subcontractors to perform any Work, Contractor shall require and verify that all subcontractors maintain insurance meeting all the requirements stated herein, and Contractor shall ensure that Owner is an additional insured on insurance required from subcontractors. Such Additional Insured endorsement shall be attached to the certificate of insurance in order to be valid and on a form at least as broad as ISO Additional Insured Endorsement CG2010 1093 with CG2037 1001 or an endorsement providing equivalent or broader coverage. The policy shall not contain any exclusions for New York Labor Law§§ 200, 240, 240(1), 241, 241(6) and any related sections, and their insurance certificate or accompanying letter from Authorized Representative must specifically state the same. If any sub contractor's coverage does not comply with the foregoing provisions, Contractor shall defend and indemnify the Owner from any damage, loss, cost, or expense, including attorneys' fees, incurred by Owner as a result of subcontractor's failure to maintain required coverage.

B. Subcontractor insurance shall be in such amounts and against such risks as is consistent with Contractor's customary practices for such types of subcontracts for projects of similar type and capacity to the Project, PROVIDED that such insurance shall at least be in such amounts and against such risks as is customarily carried by persons engaged in similar businesses in the same geographic area.

C. Applicable subcontractor minimum insurance limits shall be:

For Subcontracts 1,000,000 or less:

- Workman's compensation as per Section 10.06.A.1

- Comprehensive General Liability as per Section 10.06.A.2 with the following limits:

BODILY INJURY AND PROPERTY DAMAGE LIABILITY (BROAD FORM)	
$ 1,000,000	Each Occurrence
$ 2,000,000	Aggregate

- Automobile Liability Insurance as per Section 10.06.A3
- Professional Liability Insurance – if applicable to the Subcontractor's Scope of Work – as per Section 10.06.A.5 with the following limits:

  Minimum Limits Required: $2,000,000 per claim and $2,000,000 aggregate

- Umbrella/Excess Liability as per Section 10.06 A.4 with the following limits:

  Not less than $5,000,000 per occurrence

- Pollution Liability Insurance as per section 10.06.A.6 with the following limits:

  Not less than $2,000,000 aggregate

For Subcontracts $1,000,000 or more:

- Workman's compensation as per Section 10.06.A.1

- Comprehensive General Liability as per Section 10.06.A.2 with the following limits:

BODILY INJURY AND PROPERTY DAMAGE LIABILITY (BROAD FORM)	
$ 1,000,000	Each Occurrence
$ 2,000,000	Aggregate

- Automobile Liability Insurance as per Section 10.06.A3

- Professional Liability Insurance – if applicable to the Subcontractor's Scope of Work – as per Section 10.06.A.5 with the following limits:

  Minimum Limits Required: $2,000,000 per claim and $2,000,000 aggregate

- Umbrella/Excess Liability as per Section 10.06A.4 with the following limits:

  Not less than $10,000,000 per occurrence

- Pollution Liability Insurance as per section 10.06.A.6 with the following limits:

  Not less than $5,000,000 aggregate

D. Before commencing the performance of any work covered by the Contract, the Contractor shall furnish to the Owner a current certificate or certificates, in duplicate, of the insurance required under the foregoing provisions including copies of subcontractor's certificates. Such certificates shall be on a form prescribed by the Owner, shall list the various coverage's and shall contain, in addition to any provisions hereinbefore required, a provision that the policy shall not be changed or cancelled and that it will be automatically renewed upon expiration and continued in force until final acceptance by the Owner of all the work covered by the Contract, unless the Owner is given thirty (30) days written notice to the contrary. Upon renewal of each of the Contractor's insurance coverage's, the Owner shall be provided with a new certificate of insurance showing such renewal. Certificates and written notices shall be directed to the Office of Facilities Contracts. The Contractor shall furnish the Owner with a certified copy of each policy including any and all exclusions to such policy.

E. If at any time any of the above required insurance policies should be cancelled, terminated or modified so that insurance is not in effect as above required, then, if the Owner shall so direct, the Contractor shall suspend performance of the work covered in the Contract. If the said work is so suspended, no extension of time shall be due on account thereof. The Owner may, at its option, obtain insurance affording coverage equal to that above required, at the Contractor's expense.

Section 10.07 - Liability Insurance of the Owner

A. The Owner, at its own cost and expense, shall procure and maintain such liability insurance as will, in its opinion, protect the Owner from its contingent liability to others for damages because of bodily injury, including death, and property damage which may arise from operations under this Contract.

Section 10.08 - Owner's and Contractor's Responsibilities for Fire and Extended Coverage Insurance Hazards

A. The Contractor shall purchase and maintain in force a builders risk insurance policy on the entire work. Such insurance shall be written on a completed value form and in an amount equal to the initial contract sum and modified by any subsequent modifications to the contract sum. The insurance shall name Cornell University and the State of New York, all subcontractors and sub- subcontractors. The insurance policy shall contain a provision that the insurance will not be cancelled or allowed to expire until the Contractor has given at least thirty (30) days prior written notice to Cornell University. The insurance shall cover the entire work at the site, including reasonable compensation for Architect's services and expenses made necessary by an insured loss. Insured property shall include portions of the work located away from the site and in transit to the site. The policy shall cover the cost of removing debris and demolition as may be legally necessary. The policy shall cover any boiler or machinery loss which may be suffered during installation and until final acceptance. The insurance required shall be written to cover "all risk" of physical loss including a loss due to collapse. Any deductible shall be the responsibility of the Contractor but in no case shall the deductible be more than $10,000 unless Cornell University has agreed to a higher deductible. The Contractor shall provide to Cornell University a certificate of insurance and a summary of coverage's including all endorsements and exclusions prior to commencement of the work. Once the policy is received, the Contractor shall provide a copy of such policy to Cornell University. There shall be a mutual waiver of recovery between Cornell University, the Contractor and all other parties to the extent such losses are covered by the builders risk policy. If Cornell University wishes to occupy the building prior to final acceptance and if the policy contains a provision which limits coverage for such partial occupancy, the parties agree work together to obtain consent of the insurance company for such partial occupancy or use under mutually acceptable terms.

B. Losses, if any, under such insurance shall be payable to the Owner.

C. The Contractor shall be responsible for any and all loss of materials connected with the construction due to unexplainable disappearance, theft or misappropriation of any kind or nature.

D. The foregoing provisions shall not operate to relieve the Contractor and subcontractors of responsibility for any loss or damage to their own or rented property or property of their employees, of whatever kind or nature, or on account of labor performed under the Contract incidental to the repair, replacement, salvage, or restoration of such items, including but not limited to tools, equipment, forms, scaffolding, and temporary structures, including their contents, regardless of ownership of such contents, except for such contents as are to be included in and remain a part of the permanent construction. The Owner shall in no event be liable for any loss or damage to any of the aforementioned items, or any other property of the Contractor, subcontractors and the Architect, or employees, agents, or servants of same, which is not to be included in and remain a part of the permanent construction. The Contractor and subcontractors severally waive any rights of recovery they may have against the Owner and the Architect for damage or destruction of their own or rented property, or property of their employees of whatever kind or nature.

Section 10.09 - Effect of Procurement of Insurance

A. Neither the procurement nor the maintenance of any type of insurance by the Owner or the Contractor shall in any way be construed or be deemed to limit, discharge, waive or release the Contractor from any of the obligations and risks imposed upon the Contractor by the Contract or to be a limitation on the nature or extent of such obligations and risks.

Section 10.10 - No Third Party Rights

A. Nothing in the Contract shall create or give to third parties; any claim or right of action against the Contractor, the Architect, and the Owner beyond such as may legally exist irrespective of the Contract.

Section 10.11 – Assumption of Risk

Vendors/Consultants/Contractors/Subcontractors are required to bring to jobsite all tools, equipment, and applicable personal safety devices required or needed to perform and complete the relevant scope of Work. Use of Cornell equipment or tools, with or without permission, involves inherent risk of injury to User(s). Any use of Cornell equipment is conditioned upon the assumption of all risks attendant to the use of any tools or equipment – including personal injury, death or permanent disability – arising from the Use of Cornell equipment or tools. These risks also include but are not limited to: accidents, collisions, falling, as well as unforeseen risks resulting in injuries to User and/or bystanders. Participation in a walk-through or similar activity constitutes acceptance of risk assumption.

Section 10.12 - Health And Safety Plan Requisites for Construction Activity Applicable To High Impact Respiratory Pathogen Pandemics And Contagions

Contractor agrees it shall follow all applicable safety requirements to a prospective health and safety event, emergency, epidemic or pandemic. Contractor is required to protect the health and safety of employees as required by applicable law, rule, regulation, and/or protocols based upon then current information, requirements, recommendations, and guidelines from civil authorities including, but not limited to, federal or New York State Executive Orders, CDC, OSHA and New York State Department of Health surrounding health and safety measures designed to eliminate or reduce the transmission of the high impact respiratory pathogen pandemics (HIRPP), or other emergent public health and safety events, epidemics, pandemics and conditions.

ARTICLE 11 -- USE OR OCCUPANCY PRIOR TO ACCEPTANCE BY OWNER

Section 11.01 – Substantial Completion

A. The term "substantial completion" means the completion of the Work to the extent that Cornell University may have uninterrupted occupancy or use of the facility or specified portion thereof for the purpose for which intended. The Contractor shall obtain all certificates of occupancy required prior to occupancy, and any electrical, mechanical and plumbing certificates, or other certificates or required approvals and acceptances by City, County, and State governments or other authority having jurisdiction.

Section 11.02 - Occupancy Prior to Acceptance

A. If, before Final Acceptance, the Owner desires Beneficial Occupancy of the Work, or any part thereof, which is completed or partly completed, or to place or install therein equipment and furnishings, the Owner shall have the right to do so, and the Contractor shall in no way interfere with or object to said Beneficial Occupancy by the Owner.

B. Said Beneficial Occupancy (1) shall not constitute acceptance of space, systems, materials or elements of the Work, nor shall said Beneficial Occupancy affect the start of any guarantee period, and (2) shall not affect the obligations of the Contractor for Work which is not in accordance with the requirements of the Contract or other obligations of the Contractor under the Contract.

C. The Contractor shall continue the performance of the Work in a manner which shall not unreasonably interfere with said use, occupancy and operation by the Owner.

ARTICLE 12 -- PAYMENT

Section 12.01 - Provision for Payment

A. The Owner agrees to pay the Contract Price to the Contractor for the performance of this Contract and the fulfillment of all the Contractor's obligations. The Contract Price means all costs reimbursable under the Contract Documents.

B. The final certificate of the Architect shall certify that the Contract has been completed within the stipulated time, and shall not be issued until all drawings and specifications have been returned to the Owner. The issuance of said certificates, however, or any payments made thereon shall not lessen the total responsibility of the Contractor to complete the work to the satisfaction of the Owner in accordance with the Contract.

C. Payments on the Contract Price shall be made each month as the work progresses in accord with the following procedure:

1. The Contractor's schedule of values, including quantities, aggregating the total Contract Price, divided so as to facilitate payments to subcontractors as specified herein, shall be the basis for monthly progress payments. This schedule, as shown in the electronic project management system Schedule of Values Process, when approved by the Owner shall be used as a basis for progress payments. In applying for payments, the Contractor shall submit a statement based upon this approved schedule.

2. (a) On a date agreed upon by the Owner, Architect, and Contractor, a meeting shall be held by the Owner to review the work completed and materials on hand. This meeting shall review each item to be submitted by the Contractor in the requisition for payment.

(b) On the first day of each month, or as soon thereafter as practicable, the Contractor shall submit via the electronic project management system Payment Application Process, a statement and all applicable documentation setting forth in detail the cost of the work done and materials delivered to the job site up to and including the last day of the previous month and shall make application for payment of ninety percent (95%) of the amount of said statement, less the aggregate of all previous payments made by the Owner against the Contract Price.

(c) Each statement and application shall be accompanied by an affidavit, executed by the Contractor, certifying that the statement is true and correct, and that all bills for labor, and materials incorporated in or delivered to the job, due and payable at the time of the preceding progress payment, have been paid. The Contractor shall attach a single .pdf file of certified payrolls for all employees on the project as indicated in the electronic project management system Payment Application Process. Before final payment is made, the Contractor shall submit evidence that all payrolls, material bills and other indebtedness incurred in connection with the Contract have been paid, including final waivers of any liens.

3. Each such application for payment shall be subject to the review and approval of the Architect. If the Architect finds that the affidavit and application for payment are acceptable and that all the above requirements in connection therewith have been complied with, the Architect shall, within seven (7) calendar days after receiving such application for payment, certify to the Owner that the payment applied for is due and payable to the Contractor.

4. The issuance of a Certificate for Payment constitutes a representation by the Architect to the Owner, based on the date of the Application for Payment, that the work has progressed to the point indicated, that, to the best of their knowledge, information, and belief, the quality of the work is in accordance with the Contract Documents and that the Contractor is entitled to payment in the amount certified.

The Owner shall make payment in the manner provided in the Agreement within thirty (30) calendar days of receipt of the approved Certificate in the Electronic project management system.

Approval of the Payment Application by the Architect shall not be deemed to represent that the Architect has made exhaustive or continuous on-site inspections to check the quality or quantity of the work or that the Architect has reviewed the construction means, methods, techniques, sequences, or proceedings or that the Architect has made any examination to ascertain how or for what purpose the Contractor has used the monies previously paid on account of the Contract Sum.

Section 12.02 – Stored Materials & Equipment

A. The Contractor may submit, no more than thirty (30) calendar days after contract approval and prior to the first application for payment, a written request to Cornell University for permission to invoice for critical materials and equipment ready, but not yet incorporated into the work. For the purpose of this paragraph, "critical materials and equipment" eligible for payment are defined as those items affecting project schedule or budget as determined by Cornell University's evaluation of the project schedule. This includes finished goods normally shipped to the job site in a condition ready for incorporation into the work that require significant time for delivery. Raw materials or work-in-process at a manufacturer's plant location shall not be eligible for such consideration unless the Contractor can demonstrate that Cornell University can save money by purchasing material in bulk quantities at the beginning of the project.

B. Cornell University will be under no obligation to accept such requests.

C. Payment authorized by Cornell University for such "long-lead" critical materials and equipment not yet incorporated in the work will be made provided the Contractor submits Exhibit F and complies with the following:

1. Items shall be listed in the “Total Materials Presently Stored” column on the Application for Payment.

2. Transfer of Title shall be executed and included in the Application for Payment.

3. The method used to store off-site items shall be described in the Contractor's request to invoice for such materials and equipment. Cornell University shall give prior approval of the location of off-site storage. Items requiring special environmental conditions to protect their integrity (temperature, humidity, etc.) shall be continuously stored in such an environment.

4. Items in storage shall be identified as property of Cornell University, and a description of the identification method used shall be submitted in the Application for Payment. Contractor shall maintain all necessary insurance on items in storage.

5. A written and photographic inventory of items and method used to verify such inventory, including Contractor's certification that all quantities have been received in good condition at the job site or other location acceptable to Cornell University shall be submitted with the Application for Payment.

6. A copy of the vendor's invoice is included with the Contractor's invoice. Packing lists will not be accepted.

D. Cornell University retains the right to verify storage by physical inspection prior to payment approval and at any time thereafter. Such payment shall not relieve the Contractor of the responsibility for protecting, safeguarding, and properly installing the equipment or materials. The Warranty and Guarantee period shall not commence until installation and final acceptance of the completed work by Cornell University. The Contractor shall bear the cost of transporting materials stored off-site to the site

E. Each subsequent invoice will restate the prior months' materials and equipment not incorporated in the Work and current month additions and deletions for materials and equipment incorporated into the Work.

F. Upon the making of partial payment by Cornell University, all work, materials, and equipment covered thereby shall become the sole property of Cornell University. Partial payments, however, shall not constitute acceptance of the Contractor's work by Cornell University, nor be construed as a waiver of any right or claim by Cornell University.

Section 12.03 – Retention

A. Retention in the amount of five percent (5%) of the value of the Work done and materials furnished and installed under this Agreement shall be retained by the Owner as part security for the faithful performance of the Contractor's work within the time specified, and shall be paid as indicated in Section 12.06.

B. Cornell University in its sole discretion may, upon the Contractor's application thereof, release retention applicable to a subcontractor, provided that there are no outstanding claims associated with the subcontractor's work and the subcontractor and Contractor submit an acceptable partial or final release when submitting the payment application process. If the project is bonded, a Consent of Surety to the reduction must be attached as well.

Section 12.04 - Withholding Payments

A. The Owner may, on account of contemporaneous or subsequently discovered evidence, withhold or nullify the whole or a part of any Certificate to such extent as may be necessary to protect the Owner from loss on account of:

1. Defective work not remedied.

2. To assure payment of just claims of any persons supplying labor or materials for the work and to discharge any lien filed against the Owner's property.

3. A reasonable doubt that the Contract can be completed for the balance of the Contract Price then unpaid.

4. Damage to another Contractor.

5. Unsatisfactory prosecution of the work by the Contractor.

6. Failure to provide and maintain an acceptable Critical Path Method Network Schedule.

Section 12.05 – Documents and Conditions Precedent to Final Payment

A. As-Built Documentation

1. Prior to acceptance by the Owner of all work covered by the Contract, the Contractor shall furnish to the Owner through the Architect one (1) set of current reproducible full-size Contract Drawings on which the Contractor has recorded in a neat and workmanlike manner all instances where actual field construction differs from work as indicated on the Contract Drawings.

B. Final Documentation:

1. Prior to final payment, and before the issuance of a final certificate for payment in accordance with the provisions of these General Conditions, file the following documents with the Owner.

a. Warranties, Bonds, Service & Maintenance Contracts and any other extended guarantees stated in the technical sections of the Specifications.

b. Release or Waiver of Lien for the Contractor and Sub-Contractors in accordance with Exhibit B, attached hereto.

c. Project Record Documents as defined in General Requirements Section 01 78 39.

d. Notification that Final Punch List work has been completed.

e. Manufacturers Instruction and Maintenance Manuals as defined in General Requirements Section 01 78 23.

f. Fixed Equipment Inventory as defined in General Requirements Section 01 78 22.

2. The Contractor shall also provide a CD containing scanned .pdf format and/or Word Documents of all documentation.

Section 12.06 - Final Payment and Release

A. When the Contractor determines that the work or a designated portion thereof is substantially complete, the Contractor shall prepare for submission to the Owner a list of items to be completed or corrected. This list, prepared by the Contractor, shall constitute a complete detailed list of defects and deficiencies which, when remedied, will complete all Contract requirements. The submittal shall be accompanied by a statement to that effect.

B. The failure to include any items on such list does not alter the responsibility of the Contractor to complete all work in accordance with the Contract Documents. When the Architect, on the basis of an inspection, determines that the work is substantially complete, the Architect will then prepare a Certificate of Substantial Completion.

C. Upon receipt of written notice that the work is ready for final inspection and acceptance, the Architect will promptly make such inspection and, when the Architect finds the work acceptable under the provisions of the Contract Documents, and the Contract fully performed, and if bonds have been required, the written Consent of the Surety to the payment of the balance due, and a satisfactory Release of Lien, attached hereto as Exhibit "B" and made a part of the Contract Documents, has been submitted by the Contractor, each subcontractor and sub-subcontractor, the Contractor will promptly issue a final Certificate for Payment, stating that to the best of their knowledge, information, and belief, and on the basis of their observations and inspections the work has been completed in accordance with the terms and conditions of the Contract Documents, and that the entire balance is due and payable.

D. All prior certificates upon which progress payments may have been made, being estimates, shall be subject to correction to the final certificate.

E. The acceptance by the Contractor of the final payment aforesaid shall constitute a general release of the Owner and its agents or representatives from all claims and liability to the Contractor.

ARTICLE 13 -- TAX EXEMPTION

Section 13.01 - Tax Exemption

A. The Owner is exempt from payment of Federal, State and local taxes, including sales and compensating use taxes on all materials and supplies incorporated into the completed Work. These taxes are not to be included in bids. This exemption does not apply to tools, machinery, equipment or other property leased by or to the Contractor or a Subcontractor, or to supplies and materials which, even though they are consumed, are not incorporated into the completed Work, and the Contractor and Subcontractors shall be responsible for and pay any and all applicable taxes, including sales and compensating use taxes, on said leased tools, machinery, equipment or other property and upon all said unincorporated supplies and materials.

B. The Contractor and Subcontractor shall obtain any and all necessary certificates or other documentation from the appropriate governmental agency or agencies, and use said certificates or other documentation as required by law, rule or regulation.

ARTICLE 14 -- GUARANTEE

Section 14.01 - Guarantee

A. The Contractor, at the convenience of the Owner, shall remove, replace and/or repair at their own costs and expense any defects in workmanship, materials, ratings, capacities or characteristics occurring in or to the work covered by Contract for the period of one (1) year or within such longer period as may otherwise be provided in the Contract, the period of such guarantee to commence with the Owner's final acceptance of all work covered under the Contract, and the Contractor, upon demand, shall pay for all damage to all other work resulting from such defects and all expenses necessary to remove, replace and/or repair such work which may be damaged in removing, replacing or repairing the said defects. Acceptance means final acceptance of the entire work, early partial occupancy notwithstanding

B. In some instances the nature of the work may require the Owner to accept various components, equipment, spaces or phase of the project. In such cases the Contractor shall submit a separate guarantee for the Owner's acceptance on the form attached hereto as Exhibit "C". Upon completion of the project, the Contractor shall submit to the Owner a guarantee for the project on the form attached hereto as Exhibit "C".

ARTICLE 15 -- STANDARD PROVISIONS

Section 15.01 - Provisions Required by Law Deemed Inserted

Each and every provision of law or clause required by law to be inserted in the Contract and made a part hereof, shall be deemed to be inserted herein and, in the event any such provision is not inserted or is not correctly inserted, then upon the application of either party, this Contract shall forthwith be physically amended to make such insertion or correction.

Section 15.02 - Laws Governing the Contract

The Contract shall be governed by the laws of the State of New York, without reference to conflict of law principles. Any and all proceedings relating to the subject matter hereof shall be maintained in New York State Supreme Court, Tompkins County or the federal district court for the Northern District of New York, which courts shall have exclusive jurisdiction for such purposes.

Section 15.03 - Assignments

The Contractor shall not assign the Contract in whole or in part without prior written consent of the Owner.

Section 15.04 - No Third Party Rights

Nothing in the Contract shall create or shall give to third parties any claim or right of action against the Owner, beyond such rights as may legally exist irrespective of the Contract.

Section 15.05 - Waiver of Rights of Owner

A. None of the provisions of the Contract will be considered waived by the Owner except when such waiver is given in writing.

Section 15.06 - Limitation on Actions

No action or proceeding shall be filed or shall be maintained by the Contractor against the Owner unless said action shall be commenced within six (6) months after receipt by the Owner of the Contractor's final requisition or, if the Contract is terminated by the Owner, unless said action is commenced within six (6) months after the date of said termination.

Section 15.07 - Owner's Representative

The Owner shall designate a representative authorized to act in its behalf with respect to the Project. The Owner or its representative shall examine documents and shall render approvals and decisions pertaining thereto promptly, to avoid unreasonable delay in the progress of the Contractor's work. Only directives from Cornell University's designated representative (David Vanderpoorten) shall be recognized by the Contractor.

Section 15.08 - Cost Escalation / De-escalation

A. The Contract Pricing for all materials, supplies and services will remain firm for the duration of the Contract. Only properly documented and timely advanced notice requests for an actual cost increase in excess of 10% for the subject materials due to a tariff tax imposed that result in significant and actual cost impacts after the date of Bid Proposal will be entertained.

B. A proper request for a cost escalation will:

1. only be considered for advanced, timely noticed, and properly documented materials escalation due to tariffs or natural disasters through no fault of the Contractor; and

2. must be submitted within thirty (30) days of actual tariff related cost escalation exceeding a total cost increase of 10% or more of the commodity's documented bid pricing; and

3. must be approved by the Owner and allowed only on a shared impact at actual pass-through cost basis, absent any mark-ups.

C. Approval of a cost escalation request will be at the sole discretion of the Owner on a shared cost basis. Retroactive cost increase adjustments will not be considered, nor will increases unrelated to tariff taxes. Adjustments to pricing shall be the result of increases at the manufacturer's level pricing incurred after the Contract commencement date that:

1. will not yield a higher profit margin than that reflected in the costs awarded in the original proposal; and

2. clearly identifies the items impacted by the increase; and

3. is accompanied by sufficient documentation, acceptable to the Owner, and subject to audit requirements below.

D. Contractor will be required to provide sufficient documentation to justify the requested cost escalations(s), and Owner will determine the acceptability of documentation and sources. Documentation will include a cost proposal in sufficient detail for the Owner to perform a cost/price analysis upon which the original proposal was made. An evaluation and/or audit will be performed on the cost proposal, as well as other submitted documentation in order to determine if the requested cost increase is a fair and reasonable reflection of the actual material cost increase(s).

E. In addition to the General Conditions Article 17 surrounding Accounting, Inspection and Audit requirements, the Contractor agrees to maintain and retain books and records showing all relevant and original costs included in Contractor bids surrounding the materials and pricing in the asserted cost escalation, as well records satisfactorily demonstrating the actual cost(s) incurred for the subject materials that are asserted to be the result of tariff impacts. Each Sub-Contractor shall be similarly obligated to maintain, for inspection and audit by the Owner, books and records respecting the relevant materials and their original pricing, as well as the subsequent actual cost(s). If requested by the Owner, the Contractor shall furnish copies of any and all relevant documents, subcontracts, purchase orders and/or requisitions of any nature associated with the project and the impacts due to tariffs. The absence of sufficient documentation shall be grounds to deny any claimed escalation in pricing due to tariffs.

F. If the Owner does not find the documentation sufficient to support a cost escalation request on a pass-through basis the Owner reserves the option to counter-offer. When agreed upon by both Parties, the contract cost changes shall be binding on the Contractor. This escalation/de-escalation provision shall apply equally to cost decreases as well as increases. Cost decreases may be considered and implemented at any time during the term of the Contract.

G. All cost escalations/de-escalations shall be processed via a Change Order to the Contract.

ARTICLE 16 – MINORITY AND WOMEN BUSINESS ENTERPRISES

Section 16.01 – Definitions

The terms "Minority-owned business enterprise" ("MBE") or “Women-owned business enterprise” (“WBE”) or “minority group member” shall have the same meaning as under Section 310 of the New York State Executive Law, as the same may be from time to time amended.

Section 16.02 – Participation by Minority and Women Business Enterprises

A. The Contractor shall, in addition to any other nondiscrimination provision of the Contract and at no additional cost to Owner, fully comply and cooperate with the Owner in the implementation of MBE and WBE programs. These requirements include equal employment opportunities for minority group members and women (“EEO”) and contracting opportunities for certified minority and women-owned business enterprises (“MWBEs”). The Contractor’s demonstration of “good faith efforts” shall be a part of these requirements. These provisions shall be deemed supplementary to, and not in lieu of, the nondiscrimination provisions required by New York State or other applicable federal, state or local laws.

B. The Contractor shall include the provisions of this Article in each and every Agreement and/or Contract in such a manner that the provisions of this Article will be binding upon each subcontractor and supplier as to work in connection with and related to this Agreement.

C. For purposes of this procurement:

With respect to the procurement of goods and services and university contracting, Cornell University shall comply with all applicable state and federal laws, and refrain from discriminating against or considering the following in hiring or contracting: race, sex, sexual orientation, color, national origin, religion, or disability. Cornell's obligations surrounding state programs (MWBE utilization) and federal law regarding non-discrimination obligations continue to be the rule of law.

Section 16.03 – Reports and Records

A. The following forms, attached hereto as Exhibit "D" and made a part of the Contract Documents, are to be used in submitting MBE/WBE Utilization Reports when requested by the Owner.

1. MWBE Utilization Report
2. Workforce Report

B. The Contractor shall provide a single monthly report, or as requested by the Owner, inclusive of all subcontractor information for the project labor and such report must document the use of MWBE businesses in the Contract.

ARTICLE 17 -- ACCOUNTINGS, INSPECTION AND AUDIT

The Contractor agrees to keep books and records showing the actual costs incurred for the Work. Such books and records (including, without limitation, any electronic data processing files used by the Contractor in analyzing and recording the Work) shall be open for inspection and audit by the Owner and its authorized representatives at reasonable hours at the Contractor's local office or at the Owner's office, if necessary, and shall be retained by the Contractor for a period of seven years after the Work has been completed, except that if any litigation, claim or audit is started before the expiration date of the seven year period, the records shall be retained until all litigation, claims or audit findings involving the records have been resolved.. Each Sub-Contractor shall be similarly obligated to maintain, for inspection and audit by the Owner, books and records respecting the Work. If requested by the Owner, the Contractor shall furnish copies of any and all subcontracts, purchase orders and/or requisitions of any nature associated with the project.

ARTICLE 18 – CONTRACTOR PERFORMANCE EVALUATION

At project completion the Owner shall schedule a meeting to review with the Contractor their performance for the project unless performance warrants additional reviews. The Owner may schedule a meeting at fifty percent (50% completion) based on project complexity and/or duration. The Owner shall present its review based on the attached "Contractor Performance Evaluation", Exhibit G. The Contractor shall be given the opportunity to provide input as to the findings of the evaluation after completion by the Owner.

ARTICLE 19 -- ROYALTIES AND PATENTS

The Contractor shall pay all royalties and license fees and shall defend all suits or claims for infringement of any patents, and shall save Cornell University harmless from loss on account thereof; except that Cornell University shall be responsible for all such loss when a particular process or product is specified by Cornell University unless the Contractor shall have reason to believe that the particular process or product infringes a patent, in which event it shall be responsible for loss on account thereof unless it promptly provides such information to Cornell University.

ARTICLE 20 -- CONFIDENTIALITY AND USE OF OWNER'S NAME

Section 20.01 - Release of Information

The Contractor shall not divulge information concerning the Work (including news releases, social media, internal house organizations, applications for permits, etc.) to anyone without Cornell University's prior written approval, except to subcontractors and suppliers to the extent that they need such information to perform their work. The Contractor shall require a similar agreement from each such subcontractor and supplier, requiring their compliance with the foregoing. Cornell University reserves the right to release all information, as well as to time its release and specify its form and content. The Contractor may obtain Cornell University's approval to release information by submitting such request to the Cornell University Project Manager.

Section 20.02 - Confidential Information

The term "Confidential Information" means all unpublished information obtained or received from Cornell University during the term of this Contract which relates to Cornell University's research, development, manufacturing and business affairs. The Contractor shall not disclose confidential information to any person, except to its employees and subcontractors to the extent that they require it in the performance of their Work, during the term of this Contract and until authorized by Cornell University in writing. The Contractor and its subcontractors shall hold all confidential information in trust and confidence for Cornell University, and shall use confidential information only for the purpose of this Contract. The Contractor and its subcontractors shall require all of their employees to whom confidential information is revealed to comply with these provisions. The Contractor shall have an agreement with each subcontractor, requiring their compliance with the foregoing. If it becomes necessary for the Contractor to defend in case of litigation related to its services rendered, permission shall be sought from Cornell University, who shall not unreasonably withhold such permission, before any disclosures are made. This Section does not apply to information which (1) is or becomes known in public domain or (2) is learned by the Contractor from third parties.

Section 20.03 - Use of Owner's Name on Non-Work Related Content

The Contractor shall not use or permit on the job site, in its external, advertising, marketing program, social media, or other promotional efforts, any date, pictures, or other content unrelated to the Contracted Work, or any representation of the Owner except on the specific written authorization in advance of the Owner's Representative.

ARTICLE 21 -- CORNELL UNIVERSITY STANDARDS OF ETHICAL CONDUCT

Cornell University expects all executive officers, trustees, faculty, staff, student employees, and others, when acting on behalf of the university, to maintain the highest standard of ethical conduct as per Cornell University's Policy 4.6 - Standards of Ethical Conduct, a copy of which is available at https://policy.cornell.edu/policy-library/standards-ethical-conduct. This includes treating equally all persons and firms currently doing business with or seeking to do business with or for Cornell University, whether as contractors, subcontractors, or suppliers. Such persons and firms are respectfully reminded that Cornell University employees and their families may not personally benefit from Cornell University's business relationships by the acceptance of gifts or gratuities, defined as a gift in excess of $75.00 given to a Cornell employee for personal use. Items not considered gifts/gratuities include occasional business meals, items of an advertising nature, and items that are generally distributed to all potential customers. In addition, it is expected that the Contractor's officers and employees shall conduct all business related to this Contract within the highest ethical standards, observing applicable policies, practices, regulations, law, and professional standards. All parties are expected to report violations of this policy to appropriate university personnel. You may file a report to on the web https://secure.ethicspoint.com/domain/en/report_custom.asp?clientid=6357 or contact Cornell University through EthicsPoint by dialing toll-free 1-866-293-3077.

Section 21.01 Private Job Site

Cornell University, its campuses and construction job sites, are private property, owned and operated by a private university. Cornell requires its Contractors, their employees and subcontractors, to conduct job sites under their project control in a professional manner free of discrimination, harassment, and intimidation.

As a private university, Cornell University job sites are neither a public nor quasi-public forums. The Contractor, subcontractors, and their respective employees and visitors to the job sites have no expectation to rights of free expression while working on a Cornell job site, surrounding campus property, or its buildings and grounds. This practice is a content neutral, non-discriminatory, and represents time, place, and manner restrictions of a private employer. A Cornell construction job site is not an appropriate venue for the exercise of personal speech or expression, political or apolitical, offensive or inoffensive, or whether made on an individual’s own time. Actions involving flags, posters, shirts, emblems, symbols, protests, messaging and the like are not permitted on the job site and the Contractor controlling the job site shall ensure its subcontractors, all workers, suppliers and visitors to the job site comply with the foregoing. Violations may result in removal from the job site for those responsible.

CORNELL UNIVERSITY

Construction Contract Change Order Forms
Instructions to Change Order Documentation

Cornell University has several standard forms related to Changes in the Work. These forms have been prepared to comply with contract requirements related to Changes in the Work. The standard Construction Contract Change Order Request and Change Order Summary Forms shall be used to facilitate preparation of change order requests in conformity with construction contract requirements.

These forms shall be used by the Contractor and by all Subcontractors in preparing their respective cost estimates for services associated with the Changed Work for the Owner's consideration and shall include all associated back-up documentation supporting the request.

Direct Cost of the Work:

1. Direct Labor – Include the "wages paid" hourly direct labor and/or foreman necessary to perform the required change. "Wages paid" is the burdened labor rate documented in accordance with Section 2.14 – Project Labor Rates of the General Conditions. "Assigned Personnel or Work Crews" should be stated by trade or type of work performed not by name of person or company title. For example carpenter, mason, backhoe operator, etc. Supervisory personnel in district or home office shall not be included. Supervisory personnel on the job-site, but with broad supervisory responsibility and paid as salaried personnel, shall not be included as Direct Labor

2. Direct Material – Include the acquisition cost of all materials directly required to perform the required change. Examples of "Unit of Measure" include square feet, cubic yards, linear feet, days, gallons, etc.

3. Equipment – Include the rental cost of equipment items necessary to perform the change. For company-owned equipment items, include documentation of internal rental rates. Charges for small tools, and craft specific tools are not allowed.

Bond Premiums

The Contractor's actual documented bond premium rate as entered into the electronic project management Bid Portal Response Form – Step 3 – Additional Required Information Custom Fields at time of bid shall be added to all direct and indirect costs of the proposed change.

Overhead & Profit

The Contractor's overhead & profit rate shall be added to all direct and indirect costs of the proposed change in accordance with the Contract.

EXHIBIT "A"

CONSTRUCTION CONTRACT CHANGE ORDER REQUEST

DATE: _____ COR # _____

PROJECT TITLE: CONTRACT NO. _____

❑ Name of Contractor/Subcontractor performing Work: _____

DESCRIPTION OF WORK: _____

_____

_____

A. DIRECT COST OF WORK:

1 LABOR (Attach Supporting Documentation)

ASSIGNED PERSONNEL OR WORK CREW	HOURLY WAGE RATE PAID	HOURS WORKED	TOTAL COST
			$0
			$0
			$0
			$0
		LABOR TOTAL	$0

2 MATERIAL (Attach Supporting Documentation)

MATERIAL REQUIRED FOR CHANGE	UNIT PRICE	UNIT OF MEASURE	REQUIRED UNITS	TOTAL COST
				$0
				$0
				$0
				$0
			MATERIAL TOTAL	$0

3 EQUIPMENT (Attach Supporting Documentation)

EQUIPMENT REQUIRED FOR CHANGE	UNIT PRICE	UNIT OF MEASURE	REQUIRED UNITS	TOTAL COST
				$0
				$0
				$0
				$0
				$0
			EQUIPMENT TOTAL	$0

4	DIRECT COST (SUM 1, 2, 3)	$0
5	OH&P Rate _____	$0

6 SUBCONTRACTOR (Attach Supporting Documentation)

SUB-SUBCONTRACTOR REQD FOR CHANGE	SUB-SUB COST OF WORK	SUB-SUB MARK UP %	TOTAL COST
			$0
			$0
			$0
		SUB-SUBCONTRACTOR TOTAL	$0

7	OVERHEAD AND PROFIT — OH&P Rate _____	$0
	TOTAL COST PLUS OH&P (SUM 4, 5, 6, 7)	$0
8	BOND PREMIUM (If applicable) — Bond Premium Rate _____	$0
	TOTAL COR COST	$0
	TOTAL CONTRACT DAYS ADDED/DELETED FROM PROJECT SCHEDULE	0

EXHIBIT "A"

CONSTRUCTION CONTRACT CHANGE ORDER SUMMARY

DATE: _____

PCO # _____

PROJECT TITLE: _____ **CONTRACT NO.** _____

CONTRACTOR: _____

DETAILED DESCRIPTION OF WORK: _____

1 **DIRECT COST OF WORK:**

NAME OF CONTRACTOR/SUBCONTRACTORS PERFORMING WORK	**TOTAL COST**

TOTAL COST OF PROPOSED CHANGE ORDER ITEM $0

TOTAL CONTRACT DAYS ADDED/DELETED FROM PROJECT SCHEDULE

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FINAL RELEASE

EXHIBIT "B"

FINAL WAIVER OF CLAIMS AND LIENS AND RELEASE OF RIGHTS

Date	_____	Contract Date	_____
Project	_____	Contract Price	_____
Address	_____	Net Extras and Deductions	_____
City	_____	Adjusted Contract Price	_____
County	_____	Amount Previously Paid	_____
State	_____	Balance Due - Final Payment	_____

The undersigned hereby acknowledges that the above Balance Due when paid represents payment in full for all labor, materials, etc., furnished by the below named Contractor or Supplier in connection with its work on the above Project in accordance with the Contract.

In consideration of the amounts and sums previously received, and the payment of $_____ being the full and Final Payment amount due, the below named Contractor or Supplier does hereby waive and release the Owner from any and all claims and liens and rights of liens upon the premises described above, and upon improvements now or hereafter thereon, and upon the monies or other considerations due or to become due from the Owner or from any other person, firm or corporation, said claims, liens and rights of liens being on account of labor, services, materials, fixtures or apparatus heretofore furnished by the below named Contractor or Supplier to the Project. The premises as to which said claims and liens are hereby released are identified as follows:_____ _____.

The undersigned further represents and warrants that he/she is duly authorized and empowered to sign and execute this waiver on his/her own behalf and on behalf of the company or business for which he/she is signing; that it has properly performed all work and furnished all materials of the specified quality per plans and specifications and in a good and workmanlike manner, fully and completely; that it has paid for all the labor, materials, equipment and services that it has used or supplied, that it has no other outstanding and unpaid applications, invoices, retentions, holdbacks, expenses employed in the prosecution of work, chargebacks or unbilled work or materials against the Owner as of the date of the aforementioned last and final payment application; and that any materials which have been supplied or incorporated into the above premises were either taken from its fully-paid or open stock or were fully paid for and supplied on the last and final payment application or invoice.

The undersigned further agrees to defend, indemnify and hold harmless the Owner for any losses or expenses (including without limitation reasonable attorneys' fees) should any such claim, lien or right of lien be asserted by the below named Contractor or Supplier or by any of its or their laborers, material persons or subcontractors.

In addition, for and in consideration of the amounts and sums received, the below named Contractor or Supplier hereby waives, releases and relinquishes any and all claims, rights or causes of action in equity or law whatsoever arising out of through or under the above mentioned Contract and the performance of work pursuant thereto.

The below named Contractor or Supplier further guarantees that all portions of the work furnished and installed are in accordance with the Contract and that the terms of the Contract with respect to this guarantee will remain in effect for the period specified in said Contract.

Sworn to before me this

_____ Day of _____ 20__

_____

_____
Corporation or Business Name

By: _____

Title: _____

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EXHIBIT "C"

GUARANTEE

Date: _____

In accordance with plans and specifications and the terms and conditions of our contract with Cornell University dated _____, we hereby guarantee the _____ as found in the specifications for _____, Ithaca, New York to be free
(Project Title)
from defects in materials and workmanship for the period of _____ year(s) from _____, the date of acceptance by the Owner.
(Date)

_____
(COMPANY)

By: _____

Title: _____

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MWBE Utilization Report

PART I – PROJECT INFORMATION

ePM Project No.	Project Name:	Contract Value:
Contractor Name and Address:	Primary Contact Name, Phone Number, Email:	Bid Date:
Contractor's MWBE Contact Name, Phone Number, Email:		

PART II – MWBE LIST (*Update as MWBE firms come under contract, sign and date, resubmit)*

Subcontractor Name, Address, Contact, Email, MBE or WBE *(List your firm if also MBE or WBE)*	Federal ID Number	Dollar Value of Contract or Purchase Order	Description of Work or Supplies	Subcontractor or Supplier Start and End Dates

(Update totals as MWBE firms are added/subtracted to above list)

Print Name of Principal or Officer:	Title:
Signature:	Date:

MWBE Utilization Report

PART III – Quarterly Utilization Report *(Subcontractors & Sub-subcontractors fill this out and submit to General Contractor to compile into a single form.)* Double click on table to edit.

Month/Year:

General Contractor, Subcontractor, Sub-Subcontractor, or Vendor	Trade	Dollar Value of SubContract or Purchase Order	MBE, WBE, or N/A	% of Total Contract

SUMMARY OF BID ACTIVITY WITH MBE AND WBE SUBCONTRACTORS AND VENDORS

Please print or type all information, except where a signature is required.

PROJECT: _____

Name of Prime Contract Bidder:

_____

Address (Street, City, State and Zip Code):

_____

Contact Person (Name, Title and Telephone Number):

_____

MBE and WBE Subcontractor/Vendor (Indicate which)	Item/ Trade	Bid Submitted: Date	Bid Submitted: Amount	Award Status Date	Award Status Amount	Date of Elimination

EXPLANATION OF ELIMINATION: Include meetings held for negotiation, etc.
(Use additional sheet if necessary)

OFFICER OF FIRM:

Name and Title: Date:

_____ _____

Signature:

_____

EXHIBIT "D" - FORM III

CORNELL UNIVERSITY

Please print or type all information.

PROJECT

PRIME CONTRACTOR

WORKFORCE REPORT

For the period of _____ (Month/Year)

Prime Contractor, Subcontractor and Sub-Subcontractor's Name	Craft and/or Trade	Total of All Employee Hours By Trade	Non-Hispanic / Caucasian		Black		Hispanic		Asian / Pacific Islander		American Indian / Alaskan Native		Minority Employee Hours as a Percentage of Total Employee Hours	Total Number of Employees		Total Number of Minority Employees	
			Hours Male	Hours Female	Hours Male	Hours Female	Hours Male	Hours Female	Hours Male	Hours Female	Hours Male	Hours Female		Male	Female	Male	Female
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NOTE: The Prime Contractor shall provide a single monthly report inclusive of all subcontractor information for the project.

EXHIBIT "E"

LABOR RATE BREAKDOWN

PROJECT TITLE: _____ **CONTRACT NO.** _____

CONTRACTOR: _____ **TRADE:** _____

EFFECTIVE DATE: _____
EXPIRATION DATE: _____

Base Hourly Rate: $ _____

Payroll Taxes and Insurance	**% per Hour**
F.I.C.A.	
Federal Unemployment *(Base on 1500 hours of work)*	
State Unemployment *(Base on 1500 hours of work)*	
* Worker's Compensation	
* Bodity Injury & Property Damage	
Disability	
TOTAL	%

Payroll Taxes and Insurance Rates: Base Rate (x) Total % = $ _____

* Rates are net Contractor cost after premium discounts and experience modifications have been applied against manual rate.

Supplemental Benefits	**$ per Hour**
Vacation	
Health & Welfare	
Pension	
Annuity	
Education / Training	
Industry	

Total Hourly Fringe Benefits $ _____

Hourly Labor Rate: Base Rate, Taxes/Insurance and Fringe Benefits $ _____

Adjustment for a composite rate which includes apprentices: $ _____

CONTRACTOR'S CERTIFICATION

I certify that the labor rates, insurance enumerations, labor fringe enumerations and expenses are correct and in accordance with actual and true cost incurred.

Signature of Authorized Representative:

_____

Print Name: _____

Print Title: _____

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STORED MATERIALS INVOICING DOCUMENTATION

PROJECT TITLE:

CONTRACT NO.

CONTRACTOR: **SUBCONTRACTOR:**

REASON FOR REQUEST:

APPLICATION FOR PAYMENT NO. _____ **DATE:**

1 **Material Identification**

Description:

Quantity:

Provide Specific Location of Materials Stored:

2 **Material Value**

☐ Attach an Invoice or Quantified Statement of Value. $

3 **Certificate of Insurance**

☐ Attach a Certificate of Insurance for the above specified materials. Certificate shall name "Cornell University" as a loss payee with respect to the specified materials.

4 **Transfer of Title**

The Contractor hereby agrees to transfer complete ownership of all listed materials to Cornell University at the time payment is made to Contractor for the above referenced Application for Payment. The Contractor remains responsible for all contractual requirements for the above listed materials including complete installation and providing of all warranties.

Signed:

Date:

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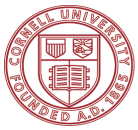
EXHIBIT "G"



Cornell University

Contractor Performance Evaluation

Project Information

Project Name:_____ Date Of Evaluation_____

Project Number_____ Evaluators;

Project Team_____

Campus_____

Project Start Date_____ Substantial Completion_____

Contractor_____ Prequalification Status_____

Original Contract Amount_____ Total Change Order Amount_____

Contractor Project Manager_____ Initial Evaluation_____

Contractor Superintendent_____ Final Evaluation_____

Type Of Contract

Prime Contractor___ Subcontractor___ Construction Manager___

Project Comments/Description

Performance Evaluation

Please give one rating for each category. Add comments as required to justify your rating.

Fails to Achieve Expectation	Needs Improvement	Fully Achieve Expectation	Freq Exceeds Expectation	Cons Exceed Expectation
1	2	3	4	5

1 Quality of Workmanship

Rate this contractor's performance in regards to quality of work

- **a.** Compliance with project drawings and specifications
- **b.** Workmanship quality and accuracy
- **c.** Tools- quality and sufficient quantity
- **d.** Equipment - sufficient quantity and operating condition
- **e.** Quality of jobsite craft personnel

Comments:

2 Scheduling/Productivity

Rate this contractor's performance with regard to producing and meeting contract schedules and milestones

- **a.** Project schedule quality and completeness
- **b.** Controlling of project schedule
- **c.** Manpower allocation for maintaining schedule
- **d.** Material deliveries to support project schedule
- **e.** Ability to meet substantial completion date and project milestones
- **f.** Productivity of work force
- **g**. Ability to deal with added work and unforeseen issues.

Comments:

3 Subcontractor Management

Rate this contractor's ability, effort and success in managing and coordinating subcontractors ***(if no subcontractors rate overall management performance)***

Comments:

3A Major subcontractor performance(score not added in final Contractor Evaluation

For contractor information only

- **a.** Plumbing Contractor overall Performance
  Comments:
- **b.** HVAC Contractor overall Performance
  Comments:
- **c.** Electrical Contractor overall Performance

Comments:

Fails to Achieve Expectation	Needs Improvement	Fully Achieve Expectation	Freq Exceeds Expectation	Cons Exceed Expectation
1	2	3	4	5

4 **MBE/WBE Participation**

Rate this contractor's MBE/WBE solicitation effort and participation for this project for, Project Team, Subcontractors, Material Vendors

Comments:

5 **Safety**

Rate this contractor's performance in regards to project safety

- **a.** Timely submission of site specific safety program
- **b.** Knowledge of OSHA standards
- **c.** Implementation of safety rules and regulations
- **d.** Promotion and creation of safety awareness
- **e.** Daily overall housekeeping
- **f.** Safety record
- **g.** Response to safety concerns
- **h.** Awareness of public safety

Comments:

6 **Contract Administration**

Rate this contractor's performance in regards to contract administration as per criteria below

- **a.** Timely submission of complet and correct documentation required for insurance and bond
- **b.** Change order processing
- **c.** Timely submission of RFI's, Shop Drawings, and change orders
- **d.** Subcontractor payments made promptly
- **e.** Timely submission of complete and correct payment applications
- **f.** Quality of paperwork

Comments:

7 **Working Relationships**

Rate this contractor's working relationships with other parties (Cornell, Design Team, subcontractors,ect.)

Comments:

Fails to Achieve Expectation	Needs Improvement	Fully Achieve Expectation	Freq Exceeds Expectation	Cons Exceed Expectation
1	2	3	4	5

8 Supervisory Personnel Rating

Rate the overall performance of this contractor's on site supervisory personnel and project management staff

Comments:

9 Contract Close-Out

Rate this contractor's overall ability to efficiently close out the project

a. Timely completion of all punchlist items
b. Timely resolution of all outstanding change orders
c. Timely submission of all close out documents(O&M's, As-Builts, warranties, final releases and consent of surety)
d. Quality of close out documentation and timely completion of any outstanding audit questions

Comments:

Summary Sheet

Project:_____
Contractor:_____

	Performance Categories	Rating Per Category	Weight %	Scoring
1	Quality of Workmanship	0	15.00%	0
2	Scheduling	0	10.00%	0
3	Subcontractor Management	0	10.00%	0
4	MBE/WBE Participation	0	10.00%	0
5	Safety	0	10.00%	0
6	Contract Administration	0	10.00%	0
7	Working Relationships	0	10.00%	0
8	On Site Supervisory Personnel Rating	0	18.00%	0
9	Contract Close Out	0	7.00%	0

Over All Rating 0

Rating Reference	
Fails to achieve expectation	1
Needs improvement	2
Fully achieves expectation	3
Frequently exceeds expectation	4
Consistently exceeds expectatio	5

OWNER COMMENTS:

OWNER COMMENTS on 3A Ratings:

CONTRACTOR COMMENTS:
(To be completed by Contractor prior to Owner/Contractor discussion meeting)

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GENERAL REQUIREMENTS

FOR

RHODES HALL B50 LAB RENOVATION

CORNELL UNIVERSITY
ITHACA, NEW YORK

JUNE 15, 2026

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SECTION 01 11 00 SUMMARY OF WORK

1.0 GENERAL

1.1 DESCRIPTION

A. Work to be Done

1. The Work of this Section includes all labor, materials, equipment and services necessary to complete the Work shown on the drawings and/or specified herein. The project includes the interior renovation of Rhodes Hall B50 Laboratory located in the Rhodes Hall basement. There is work outside of the areas described above, to support the Work. The scope includes all construction required to accomplish the Work, as shown on the Drawings, including but not limited to the following:

2. Provide temporary partitions at work areas. Maintain proper egress at all times. Protect existing finishes to remain.

3. Demolish, remove, or salvage select existing construction. Demolish existing finishes and existing mechanical and electrical systems as indicated on the Drawings.

4. Provide new finishes, including flooring and wall paint. Provide new non-rated gate and framed support. Provide speed rails for motion capture support. Provide a net curtain and track.

5. Provide limited mechanical work which includes, but is not limited to, new mechanical diffusers and piping.

6. Provide new or adjust electrical systems in the project area required for complete installation. This includes but is not limited to adjustments to power distribution. Relocate the transformer.

7. Refer to the Alternates section for cable trays, associated supports, and the fixed net above the curtain track.

B. The Scope of the Work

1. The scope of the Work in all SECTIONS of this Specification shall consist of the furnishing of all labor, materials, equipment and appliances and the performance of the Work required by the Contract Documents and/or by the conditions at the site, joining all parts of this Work with itself and the Work of others to form a complete, functioning entity.

2. Items not specifically mentioned in the Specifications or shown on the drawings, but which are inherently necessary to make a complete working installation, shall be included.

3. It is the intent and purpose of the Contract Documents to cover and include under each item all materials, machinery, apparatus, and labor necessary to properly install materials and equipment, adjust and put into perfect operation the respective portions of the installation specified and to so interconnect the various items or sections of the Work as to form a complete and operating whole. Any equipment, apparatus, machinery, material and small items not mentioned in detail, and labor not hereinafter specifically mentioned, which may be found necessary to complete or perfect any portion of the installation in a substantial manner, and in compliance with the requirements stated, implied, or intended in the Contract Documents, shall be furnished without extra cost to the Owner. The Contractor shall provide the greatest quantity, highest quality, highest degree of safety, and most stringent material, equipment or work. Should the Drawings or the Specifications disagree in themselves or with each other, the Contractor shall provide the better quality or greater quantity of work and/or materials unless otherwise directed by written addendum to the Contract.

1.2 WORK UNDER OTHER CONTRACTS

A. The Contractor shall cooperate with other contracts performing related work, including providing labor, materials and other costs necessary to satisfactorily coordinate the Contract Work with work performed under others contracts.

B. New York State Electric & Gas (NYSEG):

1. Contractor shall be responsible for the project management of NYSEG work including coordinating any scheduling associated with the Project.

2. The Owner shall be responsible for the cost associated with the work to be performed by NYSEG. No NYSEG costs shall be carried in the Contractor's bid.

2.0 PRODUCTS – NOT USED

3.0 EXECUTION – NOT USED

*****END OF SECTION 01 11 00*****

SECTION 01 14 00 WORK RESTRICTIONS

1.0 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 1 Specification Sections, apply to this Section.

1.2 CONTRACTOR USE OF PREMISES

A. All traffic and pedestrian control measures shall be compliant with the **National Manual on Uniform Traffic Control Devices for Streets and Highways** (MUTCD) and **17 NYCRR Chapter V** (New York Supplement), (https://www.dot.ny.gov/mutcd) and all other local laws and regulations.

B. The Contractor shall carry on the Work in the manner which will cause the least interruption to pedestrian and vehicular traffic and permit access of emergency vehicles at all times.

C. The Work shall be scheduled and performed in such a manner that at least one lane of traffic will be maintained on all public streets. Two flag persons, equipped with adequate means of communication, must be provided for any activity blocking a traffic lane. One lane of traffic must be maintained at all times. Where traffic must cross open trenches, the Contractor shall provide suitable bridges and railings; including pedestrian bridges.

D. The Contractor shall maintain 20’ minimum fire lane access to all facilities in the area, unless pre-approved by the University Fire Marshall office and local fire official.

E. The Contractor shall post and maintain flag persons and suitable signs indicating that construction operations are under way and other warning signs as may be required.

F. The Contractor shall safeguard the use by the public and Owner of all adjacent highways, roadways and footpaths, outside the Contract Limit Lines (work area), and shall conform to all laws and regulations concerning the use thereof, especially limitations on traffic and the movement of heavy equipment. Access to the site for delivery of construction materials and/or equipment shall be made only at the locations shown in the Contract Documents or approved by the Owner’s Representative.

G. The Contractor shall make every effort to keep dirt and debris from making its way to roadways. The Contractor shall immediately remove dirt and debris which may collect on permanent roadways due to the Work.

H. The Contractor shall limit the extent of its activities to that area of the site defined on the Contract Drawings as being within the Contract Limit Lines.

I. For that portion of the Work required under this Contract which must be performed in other than the defined areas both on-site and off, including operations involving delivery and removal of materials, the Contractor shall schedule and coordinate its activities through the Owner's Representative, to meet the approval of the Owner and minimize disruption of the normal scheduled activities of the occupants of adjacent spaces.

J. It is the Owner's expectation that the Contractor will take protective measures to minimize damage caused by construction activities including, but not limited to, the use of personnel lifts, material handling equipment, on-site material storage, etc. All portions of the site, including the staging area and those areas affected by the Work, shall be returned to their original condition after completion of Work. Such repair work shall include lawn restoration and reseeding, if required, and shall be included in the Contractor's Guarantee of Work.

K. Routes to and from the location of the Work shall be as indicated in the Contract or as directed by the Owner's Representative. Temporary roadways shall be closed only with prior approval of the Owner's Representative.

1.3 UNIVERSITY CLOSURES

A. In the event of University closure, the Contractor should use their judgement, follow their internal guidance on continuity of operations, and the direction of law enforcement, as to whether or not they will maintain operations on construction sites on campus. They should make this decision with the awareness that Cornell response to any project needs (shutdowns, emergencies) will not possible and the maintenance of roads and walks will not be to normal operating standards.

B. With your safety as a top priority, the Cornell University Police allows you the ability to take advantage of our Emergency Mass Notification System that enables your cellphone to become a personal safety device for you. Contractor's wishing to participate may text the following: CornellAlert to **67283** and you will be set up to receive alert messages. Be advised that you may stop receiving messages at any time by sending "stop" to CornellAlert. There will also be a system generated "stop" every year on August 1st at which point you will need to send the text CornellAlert to re-enlist.

1.4 WATER USE RESTRICTION

A. The Contractor shall adhere to any University issued Water Use Restrictions in place at the time of construction.

1.5 PARKING

A. The Owner may designate an area for parking of essential Contractor vehicles on the project site.

B. The Contractor shall make all arrangements, and bear the cost, for transportation of all trade persons from the designated parking area to the construction site as necessary.

C. It should be noted that there is a fee for all parking on the Cornell University campus. The Contractor is responsible for the payment for all parking costs imposed by the Owner. The Contractor should contact the Project Manager (David Vanderpoorten) for additional information. The Contractor will be required to complete a "New Construction Employee Form" for each permit requested. This form may be found at https://fcs.cornell.edu/forms-templates.

D. Contractor shall cooperate with Transportation Services and/or other authorities having jurisdiction, as follows:

1. Ensure parking by all employees of the Contractor, Subcontractors, material suppliers, and others connected with this project only within construction fence or the designated parking area.

2. Prohibit employees from parking in any other areas, roads, streets, grounds, etc.

3. Discharge any employee refusing to comply with these requirements.

4. Ensure proper transportation of personnel between the designated parking area and the construction site.

E. The Contractor shall remove from the parking area and staging area all temporary trailers, rubbish, unused materials, and other materials belonging to the Contractor or used under the Contractor's direction during construction or impairing the use or appearance of the property and shall restore such areas affected by the Work to their original condition, and, in the event of its failure to do so, the same shall be removed by the Owner at the expense of the Contractor, and the Contractor shall be liable therefore.

1.6 CHANGEOVERS AND CONTINUITY OF SERVICES

A. Make all changeovers, tie-ins and removals, etc., of any part of the Work that would affect the continuity of operation of the adjacent services at approved times that will not interfere with the Owner's operations. Secure approval of Owner before proceeding.

B. Make all necessary temporary connections required to permit operation of the building services and/or equipment. Remove the connections after need has ceased.

C. The Contractor may be permitted to make changeovers during normal working hours at the Owner's discretion. Should the Contractor perform this Work outside of normal working hours, no extra payment will be made for resulting overtime expenses.

D. When connecting new facilities do not shut off any existing Mechanical/Electrical facilities or services without prior written approval of Owner's Representative.

E. The Contractor shall not, except in an emergency condition, shutdown any utility without the express permission of the Owner's Representative. Major shutdowns of utilities, affecting life safety or outside contract limit lines, will be performed by Cornell University to enable Contractor to perform required Work. Major shutdowns shall be defined as those affecting life safety or which are outside the project site limits.

F. Maintain domestic water and firewater in service at all times. No service may be out for more than twenty-four (24) hours. Maintain firewater flow capability (hose, if necessary) to all buildings and coordinate with Cornell Utilities, Cornell Environment, Health and Safety (EHS), and Authority Having Jurisdiction (AHJ).

G. All shutdowns to be scheduled a minimum of seven (7) calendar days in advance and requests shall be submitted via ePM system to the Owner's Representative.

H. IN THE EVENT OF AN EMERGENCY WHERE THE OWNER'S REPRESENTATIVE IS NOT AVAILABLE, THE CONTRACTOR SHALL DIAL 911 IMMEDIATELY.

1.7 OBSTACLES, INTERFERENCE AND COORDINATION

A. General

1. Plans show general design arrangement. Install Work substantially as indicated and verify exact location and elevations; DO NOT SCALE PLANS.

2. Due to small scale of Drawings, it is not possible to indicate all offsets, fittings, changes in elevations, interferences, etc. Make necessary changes in the Work, equipment locations, etc., after notification to the Owner's Representative and Architect. Obtain approval from same, as part of Contract, to accommodate work to obstacles and interferences encountered.

3. Obtain written approval for all major changes before installing. If requested, submit drawings, detailing all such deviations or changes.

4. Exposed to view mechanical units, ductwork, conduit, pipes or other building equipment are essential parts of the artistic effect of the building design and shall be installed in locations as shown on the drawings. Conformance to given dimensions and alignments with the structural system, walls, openings, indicated centerlines are a requirement of the Contract and the Contractor shall familiarize himself with the critical nature of proper placement of these items. The Contractor shall notify the Architect of conflicts which would cause such equipment to be installed in locations other than as indicated on the Drawings. The Contractor shall not proceed with the installation of exposed to view mechanical units, ductwork, conduit, pipes, etc. until all conflicts have been identified by the Contractor and resolutions to conflicts approved by the Architect.

B. Interference

1. Install Work so that all items are operable and serviceable and avoid interfering with removal of rails, filters, belt guards and/or operation of doors, etc. Provide easy and safe access to valves, controllers, motor starters and other equipment requiring frequent attention.

1.8 EQUIPMENT ARRANGEMENTS

A. Since all equipment of equal capacity is not necessarily of same arrangement, size of construction, these Plans are prepared on basis of one manufacturer as "basis-of-design equipment", even though other manufacturers' names are mentioned.

B. If Contractor elects to use specified equipment other than "design equipment" which differs in arrangement, size, etc., the Contractor does so subject to following conditions:

1. Submit detailed drawings indicating proposed installations of equipment and showing maintenance and service space required.

2. If revised arrangement meets approval, make all required changes in the work of all trades, including but not limited to louvers, panels, structural supports, pads, etc. at no increase in Contract. Provide larger motors and any additional control devices, valves, fittings and other miscellaneous equipment required for proper operation of revised layout, and assumes responsibility for proper location of roughing in and connections by other trades.

3. If revised arrangement does not meet approval because of increase in pressure loss, possibility of increase in noise, lack of space or headroom, insufficient clearance for removal of parts, or for any other reason, provide equipment which conforms to Contract Drawings and Specifications.

1.9 EXISTING EQUIPMENT, MATERIALS, FIXTURES, ETC.

A. Where existing equipment, piping, fittings, etc. are to be removed, Contractor shall submit complete list to Owner. All items that Owner wishes to retain shall be carefully removed and salvaged and delivered to building storage where directed by Owner. Items that Owner does not wish to retain shall be removed from the site and legally disposed.

1.10 EXAMINATION OF PREMISES, DRAWINGS, ETC.

A. Before Submitting Proposal

1. Examine all Drawings and Specifications relating to work of all trades to determine scope and relation to other work.

2. Examine all existing conditions affecting compliance with Plans and Specifications, by visiting site and/or building.

3. Ascertain access to site, available storage and delivery facilities.

B. Before Commencing Work on Any Phase or in any Area

1. Verify all governing dimensions at site and/or building.

2. Inspect all adjacent work.

C. Tender of Proposal Confirms Agreement

1. All items and conditions referred to herein and/or indicated on accompanying Drawings.

2. No consideration, additional monies or time extensions will be granted for alleged misunderstanding.

D. Existing or Archived Drawings

1. Existing or Archived drawings of impacted buildings are appended in electronic format only for reference and informational purposes. These historic drawings are not to be considered contract drawings and are provided "FOR INFORMATION ONLY". The Owner makes no representation as to the accuracy of the drawings as representing current conditions.

1.11 STAND DOWN DATES

A. Strict and effective enforcement by Contractor's management and supervision of the following dates and hours is required.

1. **Courses Study Time & Final Exams:**

Study days: December 8 – December 10, 2026

Final Exams: December 11 – December 19, 2026

1.12 WORKING HOURS

A. Normal work hours are 7AM-dusk Monday-Saturday except during above noted restrictions. This means that Contractor shall not permit any noise generating activities that could disturb campus occupants or residents to take place outside of these hours. Should any conditions necessitate work to extend beyond these hours – Contractor may submit a detailed request with reasonable advance notice to Cornell. Cornell (at its sole discretion) may issue a written relaxation of the above but Contractor is advised never to assume that it will be granted.

B. During Construction periods, no work shall take place prior to 9AM in a Residence Hall, Fraternity, Co-Op, Sorority, or any type of Housing Unit. Residence Halls require 72 hours notification to the Student & Academic Services representative prior to entering a Residence Hall or Student Room. This does not apply to Fraternity, Co-Op or Sorority House which require 24 hours notification to the Facilities Manager.

2.0 PRODUCTS – NOT USED

3.0 EXECUTION – NOT USED

*****END OF SECTION 01 14 00*****

SECTION 01 23 00 ALTERNATES

1.0 GENERAL

1.1 RELATED DOCUMENTS

A. This Section describes the changes to be made under each Alternative.

B. The Specification Section containing the pertinent requirements of materials and methods to achieve the Work described herein.

1.2 DESCRIPTION OF REQUIREMENTS

A. Definition: An alternate is an amount proposed by Bidders and stated on the Bid Proposal Submission Form and in the electronic Bid Module for certain items that may be added to or deducted from the Base Bid amount if the Owner decides to accept a corresponding change in either the amount of construction to be completed, or in the product, materials, equipment, systems or installation methods described in the Contract Documents. Alternates shall include all overhead, profit and other expenses, including bond costs, in connection therewith.

B. Coordination: Coordinate related Work and modify or adjust adjacent Work as necessary to ensure that Work affected by each accepted alternate is complete and fully integrated into the Project.

C. Notification: Immediately following Contract award, prepare and distribute to each party involved, notification of the status of each alternate. Indicate whether alternates have been accepted, rejected or deferred for consideration at a later date. Include a complete description of negotiated modifications to alternates.

D. Schedule: A "Schedule of Alternates" is included at the end of this Section. Include as part of each alternate, miscellaneous devices, accessory objects or similar items incidental to or required for a complete installation whether or not mentioned as part of the alternate.

2.0 PRODUCTS – NOT USED

3.0 EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. ALTERNATE NO. 1 (listed as #5 in the Drawings):

In Lieu of attaching cables to the speed rails with zip ties, provide cable trays within the drone flying area per Drawings A-100, A-201, A-401, A-402, and E-100.

B. ALTERNATE NO. 2 (listed as #6 in the Drawings):

In lieu of not providing the fixed net above the retractable curtain, provide the fixed net as indicated in Drawings A-201 and A-401.

*****END OF SECTION 01 23 00*****

SECTION 01 25 00 SUBSTITUTIONS AND PRODUCT OPTIONS

1.0 GENERAL

1.1 DESCRIPTION

A. The Contractor shall furnish and install the products specified, under the options and conditions for substitutions stated in this Section.

1.2 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions that are beyond the Contractor's control, such as unavailability of product, or regulatory changes.

a. Products that are not available from Contractor's preferred suppliers does not constitute unavailability of product.

2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

B. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.

2. New Products: Items that have not previously been incorporated into another project or facility. Items salvaged from other projects are not considered new products. Items that are manufactured or fabricated to include recycled content materials are considered new products, unless indicated otherwise.

3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

C. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.3 ACTION SUBMITTALS

A. Substitution Requests: Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. In addition to submission of Substitution Request Form, substitutions shall be listed on the Bid Proposal Submission Form with description, specification references, and corresponding change in base bid

1.4 PRODUCTS LIST

A. Within thirty (30) days after the award of Contract, submit to the Architect a complete list of products which are proposed for installation.

B. Tabulate the products by listing under each specification section title and number.

C. For products specified only by reference standards, list for each such product:

1. Name and address of the manufacturer.

2. Trade name.

3. Model or catalog designation.

4. Manufacturer's data:

a. Reference standards.

b. Performance test data.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

B. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1. Contractor is responsible for providing products and construction methods compatible with other products and construction methods.

2. If a dispute or compatibility issue arises over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 PROCEDURES

A. Coordination: Modify or adjust affected Work as necessary to integrate Work of accepted substitutions and approved comparable products.

1.7 EQUIVALENTS – APPROVED EQUAL

A. Equivalents or Approvals - General

1. The words “similar and equal to”, or “or equal”, “equivalent” and such other words of similar content and meaning shall for the purposes of this Contract be deemed to mean similar or equivalent to one of the named products. For the purposes of Paragraph A and B of this Section 1.4 and for the purposes of Bidding Documents, the word “products” shall be deemed to include the words “articles”, “materials”, “items”, “equipment” and “methods”. Whenever in the Contract documents one or more products are specified, the words “similar and equal to” shall be deemed inserted.

2. Whenever any product is specified in the Contract documents by a reference to the name, trade name, make or catalog number of any manufacturer or supplier, the intent is not to limit competition, but to establish a standard of quality which the Architect has determined is necessary for the Project. The Contractor may at its option use any product other than that specified in the Contract Documents provided the same is approved by the Architect in accordance with the procedures set forth in Paragraph B of this Section 1.4. In all cases the Architect shall be the sole judge as to whether a proposed product is to be approved and the Contractor shall have the burden of proving, at its own cost and expense, to the satisfaction of the Architect, that the proposed product is similar and equal to the named product. In making such determination the Architect may establish such objective and appearance criteria as it may deem proper that the proposed product must meet in order for it to be approved.

3. Nothing in the Contract Documents shall be construed as representing, expressly or implied, that the named product is available or that there is or there is not a product similar and equal to any of the named products and the Contractor shall have and make no claim by reason of the availability or lack of availability of the named product or of a product similar and equal to any named product.

4. The Contractor shall have and make no claim for an extension of time or for damages by reason of the time taken by the Architect or by reason of the failure of the Architect to approve a product proposed by the Contractor.

5. Request for approval of proposed equivalents will be received by the Architect only from the Contractor.

B. Equivalents or Approvals After Bidding

1. Request for approval of proposed equivalents will be considered by the Architect after bidding only in the following cases: (a) the named product cannot be obtained by the Contractor because of strikes, lockouts, bankruptcies or discontinuance of manufacturer and the Contractor makes a written request to the Architect for consideration of the proposed equivalent within ten (10) calendar days of the date it ascertains it cannot obtain the named product; or (b) the proposed equivalent is superior, in the opinion of the Architect, to the named product; or (c) the proposed equivalent, in the opinion of the Architect, is equal to the named product and its use is to the advantage of the Owner, e.g., the Owner receives an equitable credit, acceptable to it, as a result of the estimated cost savings to the Contractor from the use of the proposed equivalent or the Owner determines that the Contractor has not failed to act diligently in placing the necessary purchase orders and a savings in the time required for the completion of the construction of the Project should result from the use of the proposed equivalent; or (d) the proposed equivalent, in the opinion of the Architect, is equal to the named product and less than ninety (90) calendar days have elapsed since the Notice of Award of the Contract.

2. Where the Architect pursuant to the provisions of this Section 1.4 approves a product proposed by the Contractor and such proposed product requires a revision or redesign of any part of the Work covered by this Contract, all such revision and redesign and all new Drawings and details required therefore shall be subject to approval of the Architect and shall be provided by the Contractor at its own cost and expense.

3. Where the Architect pursuant to the provisions of this Section approves a product proposed by the Contractor and such proposed product requires a different quantity and/or arrangement of ductwork, piping, wiring, conduit or any other part of the Work from that specified, detailed or indicated in the Contract Documents, the contractor shall provide the same at its own cost and expense.

1.8 CONTRACTOR'S OPTIONS

A. For products specified only by reference standard, select any product meeting that standard, by any manufacturer.

B. For products specified by naming several products or manufacturers, select any one of products and manufacturers named.

1. Products:

a. Restricted List (Products): Where Specifications include paragraphs or subparagraphs titled “Products” or that include the phrase “provide one of the following”, and include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products for Contractor's convenience will not be considered.

- Substitutions may be considered, unless otherwise indicated.

b. Non-restricted List (Available Products): Where Specifications include paragraphs or subparagraphs titled “Available Products” or that include the phrase “include, but are not limited to, the following”, and include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.

2. Manufacturers:

   a. Restricted List (Manufacturers): Where Specifications include paragraphs or subparagraphs titled “Manufacturers” or that include the phrase “provide products by one of the following”, and include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products for Contractor's convenience will not be considered.

      - Substitutions may be considered, unless otherwise indicated.

   b. Non-restricted List (Available Manufacturers): Where Specifications include paragraphs or subparagraphs titled “Available Manufacturers” or that include the phrase “include, but are not limited to, the following”, and include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.

3. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Contractors shall be responsible for accommodating differences in dimensions, connection locations, and other information in order to effect a complete functioning system should a component other than basis of design be submitted.

   a. Restricted List (List of Manufacturers): Where Specifications include paragraphs or subparagraphs titled “Basis-of-Design Product”, and include a list of other manufacturers' names, provide the specified or indicated product or a comparable product by one of the other named manufacturers that complies with requirements.

      - Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

      - Substitutions may be considered, unless otherwise indicated.

b. Non-restricted List (No List of Manufacturers): Where Specifications include paragraphs or subparagraphs titled “Basis-of-Design Product”, and do not include a list of other manufacturers’ names, provide the specified or indicated product or a comparable product by another manufacturer that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.

C. For products specified by naming one or more products or manufacturers and stating "or equal", the Contractor shall submit a request as for substitutions, for any product or manufacturer not specifically named. Such substitution shall have been listed on Bid Proposal Submission Form as required in Instructions to Bidders. If not so listed, no substitution will be allowed.

D. For products specified by naming only one product and manufacturer, no option and no substitution will be considered unless listed on the Bid Proposal Submission Form as provided in the Instructions to Bidders. Base Bid must include the specified product or manufacturer. Substitutions will be at the sole discretion of the Owner.

1.9 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 21 days prior to time required for preparation and review of related submittals.

B. Substitutions for Convenience: Submit requests for substitution within thirty (30) days of contract award.

C. Submit a separate request for each substitution. Support each request with:

1. Completed "Request for Substitution" form in the ePM system. A request for substitution of a product, material, or process for that specified in the Contract Documents must be formally submitted as such accompanied by evidence that the proposed substitution {1} is equal in quality and serviceability to the specified item; {2} will not entail changes in detail and construction of other work; {3} will be acceptable to the Architect and Owner's Design Consultant's in achieving design and artistic intent; and {4} will not result in a cost and/or schedule disadvantage.

2. Complete data substantiating compliance of the proposed substitution with requirements stated in Contract Documents:

   a. Product identification, including manufacturer's name and address.

   b. Manufacturer's literature; identify:

      - Product description.

      - Reference standards.

      - Performance and test data.

   c. Samples, as applicable.

d. Name and address of similar projects on which product has been used, and the date of each installation.

3. An itemized comparison of the proposed substitution with the product specified listing any variations.

4. Data relating to any changes in the construction schedule.

5. The effect of the substitution on each separate contract of the Project.

6. List any changes required in other work or projects.

7. Designate any required license fees or royalties.

8. Designate availability of maintenance services, and source of replacement materials.

D. Substitutions shall not result in additions to the Contract Sum.

E. Substitutions will not be considered as having been accepted when:

1. They are indicated or implied on shop drawings or product data submittals without a formal request from the Contractor.

2. They are requested by a Subcontractor or supplier.

3. The acceptance will require substantial revision of Contract Documents.

F. Substitute products shall not be ordered or installed without written acceptance of the Owner.

G. The Owner and the Architect shall be the sole judges of the acceptability of a proposed substitution.

1.10 COMPARABLE PRODUCTS

A. Conditions for Consideration: Contractor's request for approval of comparable product will be considered when the following conditions are satisfied. If the following conditions are not satisfied, Architect may reject or return requests without action, except to record noncompliance with these requirements. Where products or manufacturers are specified by name, submit the following, in addition to other required submittals, to obtain approval of an unnamed product or manufacturer:

1. Evidence that the proposed product does not require revisions to the Contract Documents that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.

2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the product specified.

3. Evidence that proposed product provides specified warranty.

4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.

5. Samples, if requested.

1.11 CONTRACTOR'S REPRESENTATION

A. In making a formal request for a substitution the Contractor represents that:

1. By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor thereby represents that he has determined and verified all dimensions, quantities, field dimensions, relations to existing work, coordination with work to be installed later, coordination with information on previous Shop Drawings, Product Data, or Samples and compliance with all the requirements of the Contract Documents. The accuracy of all such information is the responsibility of the Contractor.

2. The Contractor has personally investigated the proposed product and has determined that it is equal to or superior in all respects to that specified.

3. The Contractor will provide the same warranties or bonds for the substitution as for the product specified.

4. The Contractor will coordinate the installation of an accepted substitution into the Work, and will make such changes as may be required for the Work to be complete in all respects.

5. The Contractor waives all claims for additional costs related to the substitution which may subsequently become apparent.

1.12 ARCHITECT'S DUTIES

A. Review Contractor's requests for substitutions with reasonable promptness.

B. Transmit evaluations and recommendations to the Owner, so that the Owner can notify the Contractor of the decision for acceptance or rejection of the request for substitution.

2.0 PRODUCTS – NOT USED

3.0 EXECUTION – NOT USED

*****END OF SECTION 01 25 00*****

SECTION 01 31 19 PROJECT MEETINGS

1.0 GENERAL

1.1 DESCRIPTION

A. The Owner will schedule and administer pre-construction meeting, periodic progress meetings, and specially called meetings throughout the progress of the Work.

1. Prepare agenda for meetings.
2. Distribute notice of each meeting no less than four calendar days in advance
3. Make physical arrangements for meetings.
4. Preside at meetings.
5. Record the minutes; include all significant proceedings and decisions.
6. Upload copies of minutes after each meeting to all participants in the meeting.

B. Representatives of Contractor, Subcontractors and suppliers attending the meetings shall be qualified and authorized to act on behalf of the entity each represents.

1.2 PRE-CONSTRUCTION MEETING

A. Schedule at least fifteen (15) days after date of Notice to Proceed.

B. Location: A central site, convenient for all parties.

C. Attendance:

1. Owner's Representative(s)
2. Contractor(s)
3. Architect and its professional consultants
4. Major Subcontractors
5. Major suppliers
6. Safety Representatives for the Owner and Contractor
7. Commissioning Agent

D. Minimum Agenda:

1. Distribution and discussion of:

a. List of major Subcontractors and suppliers

b. Projected Construction Schedules

2. Critical work sequencing

a. Identification of major shutdowns and approximate schedule

3. Major equipment deliveries and priorities

4. Project Coordination

a. Designation of responsible personnel

5. Procedures and processing of:

a. Field decisions

b. Proposal requests

c. Submittals

d. Change Orders

e. Applications for Payment

f. Requests for Information

g. Daily Reports

6. Adequacy of distribution of Contract Documents

7. Procedures for maintaining Record Documents

8. Use of premises:

a. Office, work and storage areas

b. Owner's requirements

c. Job site personnel conduct

d. Building access and security

9. Temporary facilities, controls and construction aids

10. Temporary utilities

11. Safety and first-aid procedures

a. Contractor’s Project Site Specific Plan

b. Plan as applicable to high impact respiratory pathogen pandemics and contagions (HIRPP)

12. Security procedures

13. Housekeeping procedures

1.3 PROGRESS MEETINGS

A. Schedule regular periodic meetings on the site, not less than once every two weeks throughout the Construction period.

B. Attendance:

1. Architect

2. Architect's professional consultants when, in the opinion of the Owner, needed

3. General Contractor, including Site Superintendent

4. Owner's Representatives

5. Commissioning Agent, as appropriate to agenda

6. Subcontractors as appropriate to the agenda

7. Suppliers as appropriate to the agenda

8. Safety Representative

C. Minimum Agenda:

1. Review, approval of minutes of previous meeting

2. Review percentage of work to be in place by next meeting by individual trades

3. Review of work progress since previous meeting

4. Field observations, problems, and conflicts

5. Problems which impede Construction Schedule

6. Review of off-site fabrication, delivery schedules

7. Corrective measures and procedures to regain projected schedule

8. Revisions to Construction Schedule

9. Planned progress and schedule, during succeeding work period

10. Coordination of schedules

11. Review submittal schedules; expedite as required

12. Maintenance of quality standards

13. Review status of all issued proposal requests and change orders

14. Review proposed changes for:

    a. Effect on Construction Schedule and on completion date

    b. Effect on other contracts of the Project

15. Other business

D. All decisions, instructions, and interpretations given by the Architect/Engineer or its representative at these meetings shall be binding and conclusive on the Contractor.

1.4 PRE-INSTALLATION MEETING(S)

A. The Contractor to hold pre-installation meetings where required by individual specification sections or others at the discretion of the Owner. Minimum attendees would be Architect and/or their specific sub-consultant, Owner, Contractor, Subcontractor, key Suppliers, testing & inspection firm, Facilities Engineering subject matter expert, etc. Minimum agenda would include review of key submittals, RFI's, safety, logistics, material procurement, quality control, etc. Contractor to assemble and distribute the Agenda minimum 48 hours prior to meeting as well as distribute meeting minutes a minimum of seven (7) calendar days after the meeting.

B. Submit a list of pre-installation meetings with preliminary dates within fifteen (15) days of issuance of the Notice to Proceed.

2.0 PRODUCTS – NOT USED

3.0 EXECUTION – NOT USED

******END OF SECTION 01 31 19******

SECTION 01 31 50 ELECTRONIC PROJECT MANAGEMENT

1.0 GENERAL

1.1 SUMMARY

A. Owner Provided System: The Contractor will utilize the Owner's electronic Project Management (ePM) system on this project.

1. The Owner shall manage the day to day use of the Owner provided ePM system and organize the training, support and maintenance of the ePM Website System for the entire project team for the period of its use on the Project.

B. There are no fees to utilize this system.

1.2 RELATED SECTIONS

A. General Conditions Article 9 – Coordination and Cooperation.

B. Section 01 33 00 – Submittal Procedures

1.3 DEFINITIONS

A. ePM: defined as an internet-based information and project communication system that allows the entire project team to collaborate in a centralized and secured repository. All project-specific correspondence, workflow processes, and documentation will be stored and routed within the ePM system.

1.4 PROCEDURES

A. Users will be provided a username and password. The Contractor shall log into the ePM system to enter the Project Documentation listed in section 2.0. All correspondence should be communicated through the e-PM system.

B. Training

1. The Owner will hold training sessions to familiarize team members with the system, and all Contractor staff are expected to attend one of these sessions or otherwise receive proper training on the system's use. All cost for personnel time and travel to attend the training as needed shall be included in the Contractor's proposal

C. The Contractor shall provide on-site personnel with personal computer(s) and personal computer equipment that will allow the Contractor's personnel to access and use the ePM Website System in a timely and efficient manner. At a minimum the Contractor is to provide the following equipment and software:

1. Web Browser: with high-speed connection, up/downloading capability

2. Device that is able to scan documents and take photographs

3. Portable Document Format (PDF) Reader/writer software

D. Contractor shall log on to the ePM Website System on a daily basis, and as necessary to be kept fully appraised of the project developments, correspondence, assigned tasks and other matters that occur on the site. These may include but are not limited to RFI's, action items, meeting minutes, discussion threads, schedule updates, submittals, submittal log, punch list items, daily reports, site photos and/or videos and pre-construction surveys.

1.5 PROCESS OVERVIEW

A. The Contractor is required to timely and accurately post, review, respond, and collaborate with other team members using the following features and/or workflow processes within the ePM system.

B. Project Team Directory – Contractor shall provide an updated directory of contact information for all companies, Subcontractors and project team members who are engaged on this project.

C. Request for Information (RFI): All project RFI's will be submitted using the ePM Website System. The submission of a Request for Information (RFI) is the Contractor's exclusive means of requesting information from the Owner and/or Architect. Attachments to RFI's (which may include sketches, photographs, documentation, and the like, will be uploaded to the ePM Website System and attached to the RFI electronically.

D. Meeting Minutes: Contractor and/or Owner shall enter meeting agendas, records and minutes in the ePM system for all applicable meetings as designated by the Owner.

E. General Communications, memorandums and Letters (Project Correspondence): Shall be created in or posted to the ePM Website System in PDF format electronically linked to action items. These action items shall include names of party (ies) required to respond, time frame within which action is to be taken and any solutions the Contractor recommends.

F. Drawings and Specifications: The Contract Documents will be posted to the ePM Website System as directed by the Owner. The Owner shall retain the right to assign download rights to active CAD or model files. CAD or model files, in any format, posted to the ePM Website System are for viewing and printing only and cannot be edited.

G. Submittals: All submittals shall be fully electronic. Reference Section 01 33 00.

H. Submittal Schedule and Log: Contractor shall post and/or update on a daily basis.

I. Field Reporting: The Contractor shall post and/or update on a daily basis all reports required by other specification sections. These reports include, but are not limited to, daily construction reports, material location reports, unusual event reports, safety and accident reports.

J. Project Photographs: Contractor shall upload project photographs to the ePM system, field by date and type including but not limited to:

1. General Progress Photographs

2. RFI Issues

3. Non-Conforming Work

4. Special Events

5. As required by individual Specification Sections

K. Project Schedule: The contractor shall post, distribute, review, and/or respond to the project schedule, monthly updates, and any other schedule submittals onto the ePM in both native and PDF formats.

L. Permits & Approvals: Contractor shall upload and maintain current copies of all permits and agency approvals that relate to the project.

M. Issue Tracking: Contractor to log and respond to issues that are related and affect other stakeholders within the project team.

N. Quality Assurance: The Owner and/or Architect will issue reports on conforming items in the ePM system. The Contractor is required to review and respond with corrective actions in the system.

O. Change Management – Cost Events and Change Orders will be managed by the e-PM system and the Contractor shall be responsible for reporting potential changes and logging Requests for Change Orders in the system. The Contractor shall also upload and manage all documentation supporting Requested Change Orders.

P. Pay Applications Requests (Invoices) – The Contractor shall create and submit invoices for review by the Owner. Once the invoices are agreed to by the Owner then the invoices should be submitted electronically per the instructions for the ePM system.

Q. Budget and Cost Management – Contractor to provide estimates and Work Breakdown Structure (WBS) to provide Owner with accurate budget/cost analysis.

1.6 ADDITIONAL INFORMATION

A. The Owner may change the standards for distribution and process prescribed above as required to suit the project.

B. The Owner shall retain ownership of all data entered into either system and shall administrate and distribute all information contained therein.

C. The Contractor shall make certain that all Subcontractors performing significant Work on the Project shall actively participate in the ePM system. Requirements for participation in the ePM system shall be made part of each bid document and final contract.

2.0 PRODUCTS – NOT USED

3.0 EXECUTION – NOT USED

******END OF SECTION 01 31 50*****

SECTION 01 32 16 CONSTRUCTION SCHEDULE

1.0 GENERAL

1.1 SUMMARY

A. The Contractor shall, within fourteen (14) calendar days of Notice to Proceed, prepare and submit to the Owner estimated construction progress schedules for the entire Work, with sub-schedules of related activities which are essential to the progress of the Work.

B. Meetings will be held with the Architect, Owner and Contractor at the start of the project to agree mutually on a progress schedule which must be diligently followed.

C. Submit revised progress schedules periodically and when requested to do so by Owner.

D. Submit to Owner and Architect a cash flow projection in accordance with Schedule of Values.

E. Submit electronic versions of all schedules, including updates, as well as all back-up to the submitted schedules.

1.2 FORM OF SCHEDULES

A. Prepare Network Analysis system, or prepare schedules in the form of a horizontal bar chart.

1. Provide separate horizontal bar for each trade or operation.

2. Horizontal time scale: Identify the first day of work of each week.

3. Scale and spacing: To allow space for notations and future revisions.

B. Format of listings: The chronological order of the start of each item of work.

C. Identification of listings: By specification section numbers.

1.3 CONTENT OF SCHEDULES

A. Construction Progress Schedule:

1. Show the complete sequence of construction by activity.

2. Show the dates for the beginning, and completion of, each major element of construction. Specifically list:

a. Subcontractor work

b. Equipment installations

c. Finishes

d. Pre-Installation meetings

3. Show projected percentages of completion for each item, as of the first day of each month.

4. Show estimated dates for the beginning and completion of work which must be completed by or coordinated with the Owner such as hazardous materials abatement, moving, training and other such items as they are identified.

B. Submittals Schedule for Shop Drawings, Product Data and Samples: Confer with the Architect and agree on all elements of the Submittals Schedule. The schedule will be based on the understanding that minimum turn-around time in the Architect's office is ten (10) working days. Some submittals or groups of submittals may take longer to review. Submittals which do not conform to the agreed schedule may be subject to delays in processing. Show:

1. The dates for Contractor's submittals.

2. The dates reviewed submittals will be required from the Architect.

3. Confirmed lead time for manufacturing, production, fabrication and shipment to the project site of all materials which have an impact on the critical path of the Project's construction schedule.

1.4 PROGRESS REVISIONS

A. Indicate progress of each activity to date of submission.

B. Show changes occurring since previous submission of schedule:

1. Major changes in scope

2. Activities modified since previous submission

3. Revised projections of progress and completion

4. Other identifiable changes

C. Provide a narrative report as needed to define:

1. Problem areas, anticipated delays, and the impact on the schedule.

2. Corrective action recommended, and its effect.

3. The effect of changes on schedules of other prime contractors.

1.5 SUBMISSIONS

A. Submit initial Construction Progress Schedules within fourteen (14) calendar days after award of Contract.

1. Owner will review schedules and return review copy within ten (10) calendar days after receipt.

2. If required, resubmit within seven (7) calendar days after return of review copy.

B. Submit progress revision schedules to accompany each application for payment.

C. Submit Submittals Schedule within thirty (30) calendar days after date of commencement of work.

2.0 PRODUCTS - NOT USED

3.0 EXECUTION

3.1 DISTRIBUTION

A. Upload copies of the reviewed schedules to the ePM system and distribute to other applicable project participants.

B. Instruct recipients to report to the Contractor, in writing, any problems anticipated by the projections of the schedule.

*****END OF SECTION 01 32 16*****

SECTION 01 32 33 PHOTOGRAPHIC DOCUMENTATION

1.0 GENERAL

1.1 DESCRIPTION

A. The Contractor shall provide existing condition photographs taken before commencement of Work, progress photographs taken periodically during progress of the Work, and final photographs upon completion and full occupancy of the building.

1.2 SUBMITTALS

A. Progress Submittals

1. Key Plan: Submit key plan of Project area and building with notation of vantage points marked for location and direction of each photograph.

2. Upload digital photograph electronic files, organizationally filed by week, to the ePM system within five (5) days of taking photographs.

3. Each photograph shall be identified with project title, date, and a description of the view.

2.0 PRODUCTS – NOT USED

3.0 EXECUTION

3.1 EXISTING CONDITION PHOTOGRAPHS

A. Before commencement of selective demolition, take photographs of Project area and surrounding areas, including existing items to remain during construction.

3.2 PROGRESS PHOTOGRAPHS

A. Photographs shall be taken weekly in a manner which completely documents the Work.

B. The photographs shall be submitted to the Owner at the end of the first week for review.

C. Provide photographs of any wall, ceiling or floor assembly containing MEP, A/V or any infrastructure that will thereafter become concealed-prior to closure. Note location on Key Plan.

3.3 FINAL COMPLETION PHOTOGRAPHS

A. Photographs shall be taken in a manner which completely documents the completed Work, for submission as project record documents.

*****END OF SECTION 01 32 33*****

SECTION 01 33 00 SUBMITTAL PROCEDURES

1.0 GENERAL

1.1 DESCRIPTION

A. Section includes administrative and procedural requirements for submittals, including the following:

1. Shop Drawings
2. Product Data
3. Samples and Mock-ups
4. Quality Assurance and Quality Control Submittals
5. Coordination Drawings
6. Certification of Asbestos free products

B. Designate in the construction schedule, and/or in a separate Submittals Schedule, the dates for submission and the dates reviewed Shop Drawings, Product Data and Samples will be needed.

C. With the exception of physical samples and color charts, or as otherwise approved by the Owner, all submittals shall be electronic images in PDF format created electronically (saved with commenting allowed) which shall be submitted for review and approval via the ePM web site. PDFs shall be created directly from the native file format electronically. Scanning of paper to PDF shall be used minimally. Any non-electronic submittals shall be approved on a case by case basis and logged into the electronic management system as directed by a Cornell representative.

1.2 SUBMITTAL REGISTRY AND SCHEDULE

A. The Architect shall provide a draft submittal registry in the template needed to import into the ePM system. It will be part of the contract documents and turned over to the Contractor in native format for their use. The Contractor shall be responsible for review and completion of the registry including addition of dates identified below and other information as deemed necessary by the Owner.

B. The submittal registry and schedule shall list all submittals required by the specifications, listed in order by the specification section in which they are required. Coordinate the Submittal Schedule with the Contractor's Critical Path Method Construction Schedule and other related documents.

C. The Submittal Registry shall include the following information:

1. Title (*by Architect for Contractor review*)

2. Related specification section and paragraph numbers (*by Architect for Contractor review*)

3. Subsection (*by Architect for Contractor review*)

4. Category of Submittal (Certification, Mock-Up, Operations/Maintenance Manual, Product Data, Sample, Shop Drawing, Test Report, As Built, etc.) (*by Architect for Contractor review*)

5. Submittal Description including description of the part of the Work covered by the submittal (*by Architect for Contractor review*)

6. Name of Subcontractor, if applicable (*Contractor provided, optional*)

7. Date due from Subcontractor (*Contractor provided, optional*)

8. Date due to be submitted for review (*Contractor provided, **required***)

9. Date due for submittal review to be completed (*Contractor provided, **required***)

10. Date for transmittal to Subcontractor (*Contractor provided, optional*)

11. Date for material or product delivery to project (*Contractor provided, **required***)

12. Priority. Low, normal or high (*Contractor provided, **required***)

D. Schedule a resubmittal for each major submittal. Except where specified otherwise in the contract documents, provide review times for submittals in accordance with Submittal Procedures and Architect's Duties below.

E. Distribution: Initially submit the Submittal Schedule to the Owner for review via the ePM system. A submittal schedule compliant with the requirements of this section showing all submittals for the preliminary schedule submission duration shall be submitted with the Contractor's preliminary schedule submittal described in Section 01 32 16. The schedule shall also enumerate all submittals to be processed after the initial preliminary schedule submission duration period, although the date for these submittals does not have to be indicated. A final baseline submittal schedule showing all submittals for the entire project shall be included in the baseline schedule submittal described in section 01 32 16.

F. Updating: The Submittal Schedule shall be kept up-to-date by the Contractor until all submittals are approved. Failure to provide the requested information, or delay in submitting required submittals may result in the payment request being returned to the Contractor until the required schedule or submittals are received.

1.3 SHOP DRAWINGS

A. Drawings shall be newly prepared information drawn accurately to scale by skilled draftsperson and presented in a clear and thorough manner.

1. Highlight, encircle, or otherwise indicate deviations from Contract Documents.

2. Do not reproduce Contract Documents or copy standard information as basis of Shop Drawings.

3. Standard information prepared without specific reference to Project is not Shop Drawing.

B. Shop Drawings include fabrication and installation Drawings, setting diagrams, schedules, patterns, templates and similar Drawings. Include the following information:

1. Dimensions.

2. Identification of products and materials included by sheet and detail number.

3. Compliance with specified standards.

4. Notation of coordination requirements.

5. Notation of dimensions established by field measurements.

6. Submittal:

a. For electronic transmittal, submittals shall be distributed electronically via the ePM system and will be reviewed and returned electronically marked with action taken.

b. Maintain returned document as a “Record Document”.

1.4 PRODUCT DATA

A. Product Data includes brochures, diagrams, standard schedules, performance charts, and instructions that illustrate physical size, appearance and other characteristics of materials and equipment. All submittals shall identify all products as asbestos free, see Section 01 35 29.

B. Collect Product Data into a single submittal for each element of construction or system.

1. Clearly mark each copy to show applicable choices and options. Failure to do so will result in rejection of the submission.

2. Show performance characteristics and capacities.

3. Show dimensions and clearances required.

4. Show wiring or piping diagrams and controls.

5. Where Product Data includes information on products that are not required, eliminate or mark through information that does not apply.

6. Supplement standard information to provide information specifically applicable to the Work.

7. Preliminary Submittal: Submit single copy of Product Data where selection of options by Architect is required.

8. Submittals:

a. For electronic transmittal, submittals shall be distributed electronically via the ePM system and will be reviewed and returned electronically marked with action taken.

1.5 SAMPLES AND MOCK-UPS

A. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture, and pattern.

B. Office samples shall be of sufficient size and quantity to clearly illustrate:

1. Functional characteristics of the product, with integrally related parts and attachment devices.

2. Full range of color, texture and pattern.

C. Field samples and mock-ups:

1. Contractor shall erect, at the Project site, at a location acceptable to the Architect.

2. Size or area: that specified in the respective specification section.

3. Fabricate each sample and mock-up complete and finished.

4. Remove mock-ups and turn over to the Owner when directed by the Architect/Owner.

5. Perform necessary work to bring any area disturbed by mock-ups to the areas original condition.

D. Submit fully fabricated Samples cured and finished as specified and physically identical with material or product proposed.

1. Mount or display Samples in manner to facilitate review of qualities indicated.

2. Identify Samples with generic description, product name, and name of manufacturer.

3. Submit Samples for review and verification of size, kind, color, pattern, and texture.

4. Where variation in color, pattern, texture, or similar characteristics is inherent in material or product represented, submit at least three (3) multiple units that show approximate limits of variations.

5. Preliminary Submittals: Submit one (1) full set of choices where Samples are submitted for Architect's selection of color, pattern, texture, or similar characteristics from a range of standard choices.

6. Submittals:

a. Submit electronic transmittal, photograph sample and its label and attached to the submittal item electronically via the ePM system. For physical samples, submit four (4) sets for Architect's review. Architect will return at least one (1) set marked with action taken. Maintain sets of Samples, as returned, at Project Site, for quality comparisons throughout course of construction.

1.6 QUALITY ASSURANCE AND QUALITY CONTROL SUBMITTALS

A. Quality assurance and quality control submittals include design data, test reports, certifications, manufacturer's instructions, and manufacturer's field reports.

B. Professional design services or certifications: Where Contract Documents require professional design services or certifications by a design professional, Contractor shall cause such services or certifications to be provided by a qualified design professional, whose registration seal shall appear on drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Architect shall be entitled to rely upon adequacy, accuracy, and completeness of services, certifications, or approvals performed by such design professionals.

C. Inspection and Test Reports: Requirements for submittal of inspection and test reports from independent testing agencies as specified in the Contract Documents.

D. Manufacturer's instruction: Preprinted instructions concerning proper application or installation of system or product.

E. Manufacturer's field reports: Reports documenting testing and verification by manufacturer's field representative to verify compliance with manufacturer's standards or instructions.

F. Submittals:

1. For electronic transmittal, submittals shall be distributed electronically via the ePM system and will be reviewed and returned electronically marked with action taken.

1.7 CONTRACTOR RESPONSIBILITIES

A. Review submittals for compliance with Contract Documents and approve submittals prior to transmitting to the Architect.

B. Specifically record deviations from Contract Document requirements, including minor variations and limitation. Comply with requirements of Section 01 25 00 Substitutions and Product Options.

C. Contractor's approval of submittals shall indicate that the Contractor has determined and verified materials, field measurements and field construction criteria, and has checked and coordinated information within each submittal with requirement of the Work and Contact Documents. Field conflicts which arise from the contractor's failure to fully review and approve submittals before ordering equipment, will result in the contractor being burdened with all costs to remediate the situation.

D. Contractor shall be responsible for:

1. Compliance with the Contract Documents

2. Confirming and correlating quantities and dimensions

3. Selecting fabrication processes and techniques of construction.

4. Coordination of the work represented by each submittal with other trades.

5. Performing the Work in a safe and satisfactory manner.

6. Compliance with the approved Construction Schedule.

7. All other provisions of the agreements.

E. It is understood that the Architect's notation on the submittals is not to be construed as an authorization for additional work or additional cost.

F. If any notations represent a change to the Contract Sum, submit a cost proposal for the change in accordance with procedures specified before proceeding with the Work.

G. It is understood that the Architect's notation on the submittal is not to be construed as approval of colors. Make all color-related submittals at one time.

H. Notify the Architect by letter of any notations made by the Architect which the Contractor finds unacceptable. Resolve such issues prior to proceeding with the Work.

I. Begin no fabrication of work until all specified submittal procedures have been fulfilled.

J. Do not submit shop drawings, product data or samples representing work for which such submittals are not specified. The Architect shall not be responsible for consequences of inadvertent review of unspecified submittals.

K. The review of shop drawings shall not relieve the Contractor of the responsibility for proper construction and the furnishing of materials and labor required even though the same may not be indicated on the review shop drawings.

L. Survey and report to designated Owner Representatives that only asbestos free material is used in the execution of Work. Reference Sections 01 35 29.

1.8 SUBMITTAL PROCEDURES

A. Coordination

1. Coordinate submittals with performance of construction activities in accordance with the Submittal Schedule approved by the Architect and Owner.

2. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.

3. Prepare and transmit each submittal in accordance with the Submittals Schedule, agreed to by all entities involved.

4. Prepare, review, approve and transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.

5. Architect's Review: Allow ten (10) working days for Architect's initial processing of each submittal requiring the Architect’s review and response, except for longer periods required as noted below, and where processing must be delayed for coordination with subsequent submittals. The Architect will advise the Contractor promptly when it is determined that a submittal being processed must be delayed for coordination. Allow ten (10) working days for Architect's reprocessing of each submittal. Notify the Architect when processing time for a submittal is critical to the progress of the Work, and the work would be expedited if its processing time could be shortened.

   An additional five (5) working days will be required for items specified in Divisions 2, 3, 5, 23 and 26, and for Architectural Woodwork, Hollow Metal Work and Hardware Schedules.

6. Allow time for delivery in addition to review.

7. Allow time for reprocessing each submittal.

8. No extension of Contract Time will be authorized because of failure to prepare submittals sufficiently in advance of Work to permit processing.

9. Submittals made which do not conform to the schedule are subject to delays in processing by the Architect.

10. Refer to Section 01 32 16 Construction Schedules for requirements of the Submittals Schedule.

11. Failure of the Contractor to obtain approval of Shop Drawings shall render all work thereafter performed to be at Contractor's sole risk, cost and expense.

B. Submittal Preparation

1. Place permanent label or title block on each submittal for identification.

2. Indicate name of entity that prepared each submittal on label or title block.

3. Provide space on label or beside title block on Shop Drawings to record Contractor's stamp, initialed or signed, certifying to review of submittal, action taken, verification of products, field measurements and field construction criteria, and coordination of the information within the submittal with requirements of the Work and of Contract Documents.

4. Complete all fields on submittal item details in ePM system including meaningful description.

5. Include the following information on submittal documentation:

a. Drawing, detail or specification references, including section number, as appropriate to clearly identify intended use of product.

b. Field dimensions, clearly identified as such.

c. Relation to adjacent or critical features of the work or materials.

d. Applicable standards, such as ASTM or Federal Specification numbers.

e. Provide a blank space for the Architect's stamps

f. On transmittal, record relevant information including deviations from Contract Document requirements, including minor variations and limitations.

6. Identification of revisions on re-submittals, other than those noted by the Architect on previous submittals.

7. Shop drawings with the comment "by others" are not acceptable. All such work must specifically identify the related responsible Subcontractor.

C. Submittal Transmittal:

1. Transmit submittals via the ePM system to Architect unless otherwise noted or directed.

2. Prepare and generate transmittal in ePM system for submission of samples. Package sample and other each submittal appropriately for transmittal and handling.

1.9 RECORD SUBMITTALS

A. Provide a record copy of the submittal (electronic format) for the O&M Manual.

1.10 RESUBMISSION REQUIREMENTS

A. Make any corrections or changes noted on previous submittals.

B. Shop Drawings and Product Data:

1. Revise initial drawings or data, and resubmit as specified for the initial submittal.

2. Indicate any changes which have been made other than those noted by the Architect.

C. Samples: Submit new samples as required for initial submittal.

1.11 ARCHITECT'S DUTIES

A. Review submittals with reasonable promptness as identified in 1.9, paragraph 5 of this Section.

B. Notations on the Submittal Review Stamp or ePM file mean the following:

1. "Approved (APP)" indicates that no deviations from the design concept have been found and Work may proceed.

2. "Approved as Noted (AAN)" indicates that deviations from the design concept which have been found are noted, and the Contractor may proceed accordingly.

3. "Revise and Resubmit (RAR)" indicates that Work covered by submittal, including purchasing, fabrication, delivery, or other activity may not proceed. Revise or prepare new submittal according to Architect's notations; resubmit without delay. Repeat if necessary to obtain different action mark.

4. "Rejected (REJ)" indicates that Work covered by submittal, including purchasing, fabrication, delivery, or other activity may not proceed. Revise or prepare new submittal according to Architect's notations; resubmit without delay. Repeat if necessary to obtain different action mark.

5. "On Hold (ONH)" is used in a very limited capacity and means that the Contractor should not take action until the reason for hold has been cleared and may be required to revise and resubmit.

6. "Not Reviewed (NRV)" is used for submittals that were submitted in error, duplicate, or other reason that does not require review by the Architect but need to be closed by the Contractor upon return to them.

7. "For Record Only (FRO)": Submittals for information or record purposes, including Quality Assurance and Quality Control Submittals, and Material Safety Data Sheets (MSDS), will not require responsive action by the Architect.

a. Architect will forward informational submittals without action.

b. Architect will reject and return informational submittals not in compliance with Contract Documents.

C. Incomplete Submittals: Architect will return incomplete submittals without action.

D. Unsolicited Submittals: Architect will return unsolicited submittals to sender without action.

E. Return submittals to Contractor for distribution, or for resubmission.

1.12 DISTRIBUTION

A. Distribute reviewed Shop Drawings and copies of Product Data when possible via the ePM system to:

1. Job site file
2. Record Documents file
3. Subcontractors
4. Installers
5. Suppliers
6. Manufacturers
7. Fabricators
8. Architect
9. Owner

B. Do not permit use of unmarked copies or rejected copies of submittals in connection with construction at Project Site or elsewhere where Work is in progress.

2.0 PRODUCTS – NOT USED

3.0 EXECUTION – NOT USED

*****END OF SECTION 01 33 00*****

SECTION 01 35 29 GENERAL HEALTH & SAFETY

1.0 GENERAL

1.1 DESCRIPTION

A. This Section provides requirements for general health and safety during the project. The requirements of this Section shall apply to both Contractor and all tiers of Subcontractors involved in the project.

1. General Emergency Information – It is recommended that both Contractor and all sub-tiers:

   a. Sign up for Cornell Emergency Alerts. The instructions can be found at (use the visitors section): https://emergency.cornell.edu/alert/

   b. Signup for Tompkins County Emergency alerts at: https://www2.tompkinscountyny.gov/doer/swift911alerts

   c. Cornell EHS has brief guidance on some emergency scenarios at: https://emergency.cornell.edu/eag/

B. In addition to the requirements of this Section, all laws and regulations by applicable local, state, and federal agencies shall apply to the Work of this contract. In some cases, the requirements of these Specifications may by intention exceed such legal requirements, but in no case shall this Specification be interpreted or understood to reduce or eliminate such requirements.

1.2 CONTRACTOR'S PROJECT SITE SPECIFIC PLAN

A. Contractors are required to submit a Project Site Specific Plan (PSSP) for review by Cornell University representatives before commencement of work on the site. The PSSP should address site specific information, controls and or requirements as it relates to the entire scope of work for the Project. All contractors shall use the Project Site Specific Plan Template below to develop their Project's PSSP. The template may be downloaded at:

https://ehs.cornell.edu/campus-health-safety/occupational-safety/contractor-safety

1. Within the PSSP template are example(s) to use as reference. The provided examples demonstrate Cornell University's expectations for providing detailed site-specific information, controls and requirements.

2. Project Site Specific Plan's that inadequately address site specific operations will be returned with comments for resubmission. Failure to submit a PSSP may result in delay of project and/or denial of the payment.

3. All projects must have the PSSP submitted via ePM for review and comment.

B. PSSP submittal should be submitted a minimum of ten (10) days prior to the commencement of work on site. The Contractor may opt to submit their PSSP in phases. The Contractor must submit a phase submission plan using the PSSP Submission table included in the PSSP template for approval by Owner's Representative with initial submission. Submit remaining phases no later than ten (10) days prior to the start of a new, predetermined project phase or milestone.

1. Projects having less than a ten (10) day turn-around shall coordinate their submittal with the Owner's Representative, who should coordinate with Occupational Health, Safety and Injury Prevention (OHSIP), the University Fire Marshall's Office (UFMO), applicable Authority Having Jurisdiction (AHJ) and Contract College's Codes Enforcement Official, if applicable.

C. The Contractor is responsible for its employees and its Subcontractors. Subcontractors are required to submit their PSSP to the General Contractor. The General Contractor is responsible to ensure all Subcontractor(s) PSSP's are adequate per their scope of work.

D. The General Contractor is required to ensure their project's PSSP is accurately maintained throughout the duration of the contract. Resubmission is required for any new scope elements not previously addressed by the Contractor's original PSSP.

E. Definitions:

1. Project Site Specific Plan (PSSP): A structured document that details the scope of the Contract Work and related site-specific controls, requirements and information for University and Contractor personnel. This document is not intended to be all inclusive of all applicable local, state and federal laws and regulations for which the General Contractor and its Subcontractor(s) are expected to comply.

2. Authority Having Jurisdiction (AHJ):

- The organization, office or individual responsible for approving equipment, an installation or a procedure (NYS Fire Code).

- The local government, county government or state agency responsible for the administration and enforcement of an applicable regulation or law (NYS Building Code-§202.2).

3. Occupational Health, Safety and Injury Prevention (OHSIP): A division of Cornell University's Environment, Health and Safety Department. The OHSIP division can be contacted at (607)-255-8200 or by email at askEHS@cornell.edu

4. SME: The University's subject matter expert.

1.3 AERIAL WORK PLATFORMS

A. The preferred method for Aerial Work Platforms (AWPs) boom storage is fully retracted and fully lowered to the ground.

B. In some circumstances booms may need to be stored in the air because of vandalism concerns, minimal size of storage location, etc.

1. If this is case, the area under the elevated boom must be blocked or arranged such that prevents people from walking, standing, working or parking vehicles underneath.

2. When booms are stored in the air consult the extended weather forecast. Booms should not be stored in the air during predicted high winds, or severe storms. AWPs become unstable at winds or gusts greater than 25 mph and must be fully lowered to prevent a tip-over.

1.4 ASBESTOS

A. All building materials and products provided for use in construction at Cornell University are to be free of asbestos. Materials must be surveyed by a certified environmental consultant and analyzed by an accredited laboratory either prior to installation or post installation. The results of the survey are to be reported to Cornell University Facilities Management Asbestos Coordinator. The Contractor must attach applicable Safety Data Sheets / Material Safety Data Sheets for each product documenting a 100% asbestos free status. The University may provide random testing of products for asbestos content. Any Contractor installed building materials or products found to contain asbestos shall be classified as defective work. Defective work shall be corrected by the Contractor as specified in the General Conditions.

B. Attached for the Contractor's information are asbestos reports which represent samples taken within the building.

C. Based on the above, disposal of asbestos containing material is not anticipated.

1.5 LEAD

A. Building may contain lead-based paint. The Contractor shall protect workers in accordance with OSHA regulations. The Contractor selects the means and/or methods to address the presence of lead-based paint, and must concurrently protect its workers based on the Contractor's means and/or methods. The Contractor is required to submit a lead plan that is site specific, indicating that the protective measures the Contractor proposes meet the OSHA standard 1926.62 "Lead in Construction Standards". This site-specific plan should address the particular methods the Contractor intends to protect its workers, the building occupants and the building structure based on its selection of addressing the presence of lead-based paint. The site-specific plan should be attached or written into the Lead Work Plan section of the Contractor's Project Site Specific Plan.

1.6 SITE VISITS

A. The undertaking of periodic Site Visits by Architects, Engineers or the Owner shall not be construed as supervision of actual construction, or make them responsible for the safety of any persons; or make them responsible for means, methods, techniques, sequences or procedures of construction selected by the Contractor or its Subcontractors; or make them responsible for safety programs and precautions incident to the Work, or for the safe access, visit, use, work, travel or occupancy of any person.

1.7 CONFINED SPACE

A. The Contractor shall be responsible for the identification of confined space in accordance with OSHA requirements. It is the Contractor's responsibility to engage the Project Manager who will collaborate with Environment, Health and Safety regarding questions or concerns on the confined space.

2.0 PRODUCTS – NOT USED

3.0 EXECUTION – NOT USED

*****END OF SECTION 01 35 29*****

DELTA
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March 12, 2026

Ms. Natalia E. Valencia, Associated AIA, LEED AP
Richard McElhiney Architects LLC
450 Seventh Street, Suite 2701
New York, NY 10123

Re: Cornell University Rhodes Hall B50 Lab Renovation Project
Pre-Renovation Asbestos Inspection Report
Delta Project No.: 2017.286.014

Dear Ms. Valencia:

The following information is associated with the Rhodes Hall B50 Lab Renovation Project. On March 4th, 2026 Delta Asbestos Inspector Thomas Ferro was onsite to perform an inspection / bulk sampling of suspect materials with the potential to be impacted by the Project. Based on a review of the provided Schematic Design Phase Drawings, a review of existing sample information for the building, and a visual inspection of the affected areas / associated accessible suspect materials, no asbestos bulk sampling was performed as a part of this Inspection. This is based on the fact that the existing materials with the potential to be impacted were either previously sampled or considered non-suspect, and included the following:

- The ceiling is open to the metal deck above with spray-on fireproofing applied to both the deck and structural steel, which was previously sampled and reported as “No Asbestos Detected”.
- The flooring system is 12” x 12” Black with White Spec Floor Tile / associated mastic, which were both previously sampled and reported as “No Asbestos Detected”.
- The cove base is non-suspect vinyl, with its associated mastic previously sampled and reported as “No Asbestos Detected”.
- The wall system is non-suspect CMU.
- All pipe insulations were observed to be non-suspect foam and fiberglass, with the associated end-sealant previously sampled and reported as “No Asbestos Detected”.
- All ductwork was observed to be either uninsulated or covered with non-suspect fiberglass, with the associated grey seam sealant previously sampled and reported as “No Asbestos Detected”. Ductwork vibration dampening cloth / gaskets were observed to be non-suspect neoprene.
- The core material for all doors was observed to be non-suspect fiberglass.
- All accessible wiring was observed to be non-suspect vinyl-coated.
- The white sink coating present was previously sampled and reported as “No Asbestos Detected”.

Based on the above, No Asbestos Containing Materials are anticipated to be impacted as a part of the Rhodes Hall B50 Lab Renovation Project.

I have attached Delta Company and Personnel Licenses/ Certifications. If you have any questions, or require any other information, please feel free to contact me at your convenience.

Respectfully,
DELTA ENGINEERS, ARCHITECTS, LAND SURVEYORS, & LANDSCAPE ARCHITECTS, DPC

Stephen Prislupsky
Project Manager
Att: Project Paperwork

Attachment A

Licenses and Certifications

WE ARE YOUR DOL

NEW YORK STATE | Department of Labor

DIVISION OF SAFETY & HEALTH LICENSE AND CERTIFICATE UNIT, STATE OFFICE CAMPUS, BLDG. 12, ALBANY, NY 12226

ASBESTOS HANDLING LICENSE

Delta Engineers, Architects, Land Surveyors, & Landscape, Architects, D.P.C.
860 Hooper Road, Endwell, NY, 13760

License Number: 29322
License Class: RESTRICTED
Date of Issue: 10/21/2025
Expiration Date: 10/31/2026
Duly Authorized Representative: William Johnson

This license has been issued in accordance with applicable provisions of Article 30 of the Labor Law of New York State and of the New York State Codes, Rules and Regulations (12 NYCRR Part 56). It is subject to suspension or revocation for a (1) serious violation of state, federal or local laws with regard to the conduct of an asbestos project, or (2) demonstrated lack of responsibility in the conduct of any job involving asbestos or asbestos material.

This license is valid only for the contractor named above and this license or a photocopy must be prominently displayed at the asbestos project worksite. This license verifies that all persons employed by the licensee on an asbestos project in New York State have been issued an Asbestos Certificate, appropriate for the type of work they perform, by the New York State Department of Labor.

Amy Phillips, Director
For the Commissioner of Labor

STATE OF NEW YORK - DEPARTMENT OF LABOR
ASBESTOS CERTIFICATE

N.Y.S

THOMAS P FERRO
CLASS(EXPIRES)
C ATEC (12/25) D INSP (12/25)
H PM (12/25)

CERT# 25-6IU5N-SHAB
DMV# 404844888

MUST BE CARRIED ON ASBESTOS PROJECTS

IF FOUND, RETURN TO:
NYSDOL - L&C UNIT
ROOM 161A BUILDING 12
STATE OFFICE CAMPUS
ALBANY NY 12226

01213 00742535 79

SECTION 01 35 43 GENERAL ENVIRONMENTAL REQUIREMENTS

1.0 GENERAL

1.1 DESCRIPTION

A. This Section and the listed Related Sections provides minimum requirements for the protection of the environment during the project. The requirements of this Section shall apply to both Contractor and all tiers of Subcontractors involved in the project.

B. In addition to the requirements of this Section and the listed Related Sections, all laws and regulations by applicable local, state, and federal agencies shall apply to the Work of this Contract. In some cases the requirements of these Specifications may by intention exceed such legal requirements, but in no case shall this Specification be interpreted or understood to reduce or eliminate such requirements.

C. Prior to bidding, review the entire Bidding Documents and report in writing to the Owner's Representative any error, inconsistency, or omission that may have environmental impacts.

1.2 RELATED SECTIONS

A. Section 01 35 44 – Spill Control

1.3 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 – Submittals:

1. Contractor's Waste Material Disposal Plan.

1.4 JOB SITE ADMINISTRATION

A. In accordance with Article 2 of the General Conditions, provide a competent supervisory representative with full authority to act for the Contractor at the site.

B. If at any time operations under the representative's supervision do not comply with this Section, or the representative is otherwise unsatisfactory to the Owner, replace, if requested by the Owner, said representative with another representative satisfactory to the Owner. There shall be no change in superintendent without the Owner's approval.

C. Remove from the Work any employee of the Contractor or any Subcontractor when so directed by the Owner. The Owner may request the removal of any employee who does not comply with these specifications.

1.5 NOISE AND VIBRATION

A. Limit and control the nature and extent of activities at all times to minimize the effects of noise and vibrations. Take adequate measures for keeping noise levels, as produced by construction related equipment, to safe and tolerable limits as set forth by the Occupational Safety and Health Administration (OSHA), the New York State Industrial Code Guidelines and Ordinances and all City, Town and Local ordinances. Equip all construction equipment presenting a potential noise nuisance with noise-muffling devices adequate to meet these requirements

1.6 DUST CONTROL

A. Take adequate measures for controlling dust produced by drilling, excavation, backfilling, loading, saw cutting or other means. The use of calcium chloride or petroleum-based materials for dust control is prohibited. Dust control measures are required throughout the duration of construction.

B. If, in the opinion of the Owner's Representative, the Contractor is not adequately controlling dust, the Owner will first notify the Contractor. If the Contractor does not take adequate actions necessary, the Owner may, at the Contractor's expense, employ alternative means to control dust.

C. Erect, maintain, and remove when appropriate barriers or other devices, including mechanical ventilation systems, as required by the conditions of the Work for the protection of users of the project area, the protection of the work being done, or the containment of dust and debris. All such barriers or devices shall be provided in conformance with all applicable codes, laws, and regulations including OSHA.

1.7 PROTECTION OF THE ENVIRONMENT

A. Construction procedures observed by the Contractor, its Subcontractors and other employees shall include protection of the environment, in accordance with all pertinent Cornell standards, policies, local laws, executive orders, ordinances, and federal and state regulations. Construction procedures that are prohibited in the undertaking of work associated with this Contract include, but are not limited to:

1. Dumping of spoil material or any liquid or solid pollutant into any storm or sanitary sewer, drainage way, stream sewer, any wetlands (as defined by federal and state regulations), any surface waters, or at unspecified locations.

2. Indiscriminate, arbitrary, or capricious operation of equipment in any stream corridors, any wetlands, or any surface waters.

3. Pumping of any silt-laden water from trenches or other excavations into any storm sewers, sanitary sewers, drainage ways, wetlands, or surface waters.

4. Damaging vegetation beyond the extent necessary for construction of the facilities.

5. Disposal of trees, brush, and other debris in any location on University property, unless such areas are specifically identified on the drawing or in the specifications or specifically approved by the Owner's site representative.

6. Permanent or unspecified alteration of the flow line of a stream.

7. Burning trash, project debris, or waste materials.

B. Take all necessary precautions to prevent silt or waste of any kind from entering any drainage or waterways or downstream properties as a result of the Work.

C. Runoff of potable water used for concrete curing or concrete truck or chute cleaning operations shall not be allowed to reach the storm water system or open water due to the levels of residual chlorine (New York State water quality standards, 6 NYCRR Part 703.5) and other potential contaminants. If necessary, obtain permission from the local sewer authority and collect and pump the runoff to the sanitary sewer.

D. Limit the nature and extent of any activities that could result in the release or discharge of pollutants. Report any such release or discharge immediately to the Owner's Representative and clean up spills immediately, as detailed in Section 01 35 44 – Spill Control Procedures.

1.8 TEMPORARY RE-ROUTING OF PIPING AND DUCTWORK

A. Obtain approval from the Owner's Representative prior to any temporary re-routing of piping and exhaust ductwork necessary for the completion of the Work. Submit re-routing plans to the Owner's Representative in writing.

The following shall require approval of the Owner:

1. Temporary storm, sanitary or water line connections.

2. Temporary exhaust ductwork connections where such connections may impact air emissions.

B. Instruct all personnel to observe extreme caution when working in the vicinity of mechanical equipment and piping. Personnel shall not operate or tamper with any existing valves, switches, or other devices or equipment without prior approval by the Owner's Representative.

1.9 HAZARDOUS OR TOXIC MATERIALS

A. Inform officers, employees, agents, contractors, subcontractors at every tier, and any other party which may come into contact with any hazardous or toxic materials as a result of its performance hereunder of the nature of such materials, and any health and safety or environmental risks associated therewith.

B. Do not use hazardous or toxic materials in a manner that will violate Cornell University Policies or any state, federal, or municipal environmental health and safety regulations. In situations where the risks are unclear consult with Environment, Health and Safety (EHS) for guidance.

C. Provide complete care and treatment for any injury sustained by any parties coming into contact with any hazardous or toxic materials as a result of Contractor's performance or failure to perform hereunder.

D. At the completion of project Contractor shall remove all unused chemical products and hazardous materials from campus. Transportation of these materials shall be in accordance with all federal, state, and local regulations. Request and receive written approval from EHS prior to disposal of any on-site disposal.

1.10 DISPOSAL OF WASTE MATERIAL AND TITLE

A. Prior to start of work and first payment, Contractor shall prepare and submit "Contractor Waste Material Disposal Plan" to the Owner's Representative. The plan shall identify the waste transportation and treatment, storage or disposal (TSD) companies which will manage all waste material and any site(s) for disposal of the waste material. Contractor must use this form to document waste disposal methods and locations.

B. The "Contractor Waste Material Disposal Plan" form, together with definitions associated with the form waste descriptions. Forms may be downloaded at:

https://ehs.cornell.edu/environmental-compliance/solid-waste/construction-demolition-waste

https://ehs.cornell.edu/sites/default/files/FRM-CWMDP-Contractor-Waste-Material-Disposal-Plan-IPDF.pdf

C. Contractor shall be responsible for the proper cleanup, containment, storage and disposal of any hazardous material/chemical spill occurring during its work. For Cornell University owned hazardous waste EHS will oversee, approve or effect the proper disposal. Title, risk of loss, and all other incidents of ownership to the Waste Material, shall vest in Contractor at the time Contractor or any transporter acting on its behalf takes physical possession of Waste Material. Complete and maintain full records of the chain of custody and control, including certificates of disposal or destruction, of all Waste Materials loaded, transported and/or disposed of. Deliver all such records to the Owner in accordance with applicable laws and regulations and any instructions from the Owner in a timely manner and in any event prior to final payment(s) under this Contract.

2.0 PRODUCTS – NOT USED

3.0 EXECUTION – NOT USED

*****END OF SECTION 01 35 43*****

SECTION 01 35 44 SPILL CONTROL

1.0 GENERAL

1.1 SPILL PREVENTION

A. In order to minimize the potential for discharge to the environment of oil, petroleum, or hazardous substances on site, the following requirements shall apply to all projects:

1. All oil, petroleum, or hazardous materials stored or relocated temporarily on site during the construction process shall be stored in such a manner as to provide protection from vehicular damage and to provide containment of leaks or spills. Horizontal diked oil storage tanks, temporary berms or barriers, or similar methods of providing secondary/spill containment shall be employed as appropriate at each site.

2. Any on-site filling or dispensing activities shall occur within an area in which a temporary berm, boom, or similar containment barrier has been placed to prevent the inadvertent discharge to the environment of harmful quantities of any products.

3. All oil, petroleum, or hazardous materials stored on site shall be located in such a manner as to minimize the potential of damage from construction operations or vehicles, away from drainage ways and environmentally sensitive areas, and in accordance with all fire and life safety codes and standards.

B. Remove immediately from the site any storage, dispensing, or operating equipment that is leaking oil or hazardous substances or is in anyway unsuitable for the safe storage of such materials.

1.2 SPILL CONTROL PROCEDURES

All Contractor personnel working at the project site shall be knowledgeable of the potential health and safety concerns associated with petroleum and other hazardous substances that could potentially be released at the project site. Following are a list of activities that should be conducted by the Contractor in the event of an oil/petroleum spill or the release of any other hazardous substance. In the event of a large quantity spill that would require cleanup procedures that are beyond the means of the Contractor, an emergency spill cleanup contractor shall be hired by the Contractor. In the event the Contractor has the personnel necessary to clean up the spill, the following procedures shall be followed:

A. Personnel discovering/responding to a spill shall:

1. Identify and locate the source of the spill. If unsafe conditions exist, leave the area, inform nearby personnel, notify the site supervisor, and initiate spill reporting (Section 1. 3).

2. Limit the discharge of product, if safely possible, by: (1) diverting discharge to a containment area; (2) creating temporary dikes with soils or other available materials; and (3) utilizing sorbent materials. If secondary containment is present, verify that valves and drains are closed prior to diverting the product to this area.

3. The individual discovering a spill shall initiate containment procedures to prevent material from reaching a potential migratory route, through implementation of the following actions, or any other methods necessary. Methods employed shall not compromise worker safety.

    a. Stop the spill at once (if possible).

    b. Extinguish sources of ignition (e.g., flames, sparks, hot surfaces, cigarettes, etc.).

    c. Clear personnel from the spill location and cordon off the area.

    d. Utilize available spill control equipment in an effort to ensure that fires, explosions, and releases do not occur, recur, or spread.

    e. Use sorbent materials to control the spill at the source.

    f. Construct a temporary containment dike of sorbent materials, cinder blocks, bricks, or other suitable materials to help contain the spill.

    g. Attempt to identify the character, exact source, amount, and area of the released materials. Identification of the spilled material should be made as soon as possible so that the appropriate cleanup procedure can be identified.

    h. Assess possible hazards to human health or the environment as a result of the release, fire, or explosion.

    i. If spill response measures involve the temporary cessation of any operations, the Contractor shall monitor the affected equipment for: (1) leaks; (2) pressure buildup; (3) gas generation; or (4) ruptures in valves, pipes, or other equipment.

B. Spill Cleanup:

1. Following containment of the spill, the following spill cleanup procedures shall be initiated.

    a. Use proper waste containers.

    b. Remove bulk liquid and place material in properly labeled waste container. Be sure not to collect incompatible or reactive substances in the same container.

    c. Cleanup materials not reclaimed on-site shall be disposed of in accordance with all applicable state and federal regulations.

d. Apply sorbent materials to pick up remaining liquid after bulk liquid has been removed. The Contractor shall not walk over spilled material. Absorbed material shall be collected and placed in a separate waste container, and shall not be mixed with bulk liquid.

e. Clean spill control equipment and containers. Replace equipment in its proper location. Restock or reorder any supplies used to clean up the spill.

f. Carefully wash spilled product from skin and clothing using soap. Change clothes, if necessary, to avoid further contact with product.

g. Disposal of all spilled product and waste generated by spill response activities shall be made off-site, and shall be arranged through the Contractor.

h. A Spill Report shall be completed, including a description of the event. A sample Spill Documentation Form is available at: https://ehs.cornell.edu/campus-health-safety/emergency-services/fire-medical-spill-response/spill-cleanup-procedure

C. Fire or Explosion:

1. In the event of a fire or explosion at the site, the Contractor shall:

a. Verify that the local fire department and the appropriate emergency response services (e.g., ambulance, police) have been notified. Confirm contact information for these services at Project Kick-off Meeting.

- For projects on the Cornell Campus call Cornell Police at (607) 255-1111 who will notify the appropriate emergency response agencies

b. Report to the scene, if safe to do so, and evaluate the situation (e.g., spill character, source, etc.). Coordinate, as necessary, with other appropriate site and emergency personnel.

c. Ensure that people are cleared from the area and all accounted.

d. Ensure that fires are safely extinguished (if possible), valves closed, and other immediate actions necessary to mitigate the emergency are addressed, if safe to do so.

e. Initiate responsible measures necessary to prevent subsequent fires, explosions, or releases from occurring or spreading to other areas of the site. These measures include stopping processes or operations, collecting, and containing released oil, or removing and isolating containers.

f. Take appropriate action to monitor for: (1) leaks; (2) pressure build-ups; (3) gas generation; or (4) ruptures in pipes, valves, or other equipment.

1.3 SPILL REPORTING AND DOCUMENTATION

In the event of a spill CALL CORNELL POLICE AT 607-255-1111 who will notify the appropriate departments within the university and coordinate with the contractor for external reporting, if required.

The contractor shall be responsible for the initiation of spill reporting and documentation procedures. All petroleum spills must be reported to **NYSDEC Spill Hotline at 1-800- 457-7362**, less than two hours following discovery. Notification must be made to Cornell Environment, Health and Safety (EHS), 607-255-8200, within 24 hours of reporting the release. The Contractor will be expected to provide EHS with the DEC issued spill number. Any petroleum spill must be reported to NYSDEC unless **ALL** of the following criteria apply:

TABLE 1
CRITERIA TO EXEMPT SPILL REPORTING

CRITERIA	DESCRIPTION
Quantity	The spill must be known to be less than 5 gallons.
Containment	The spill must be contained on an impervious surface or within an impervious structure, such that it cannot enter the environment.
Control	The spill must be under control and not reach a drain or leave the impervious surface.
Cleanup	The spill must be cleaned-up within two hours of occurrence.
Environment	The spill must not have already entered into environmental media such as soil, surface water (including storm water conveyances), sanitary sewers, or ground water.

A release of a "reportable quantity" or unknown amount of a hazardous substance must also be immediately reported to NYSDEC Spill Hotline. Spills of reportable quantities of chemicals or "harmful quantities"2 of oil to navigable waters must be reported to the federal **National Response Center, 1-800-424-8802**. Additional regulatory agency spill reporting requirements may apply depending on the material released and the media to which it is released to.

Spill Reporting Information: When making a telephone report, the caller should be prepared to provide the following information, if possible:

1. The date and time of the spill or release.

2. The identity or chemical name of the material released or spilled, including an indication of whether the material is defined as an extremely hazardous substance.

3. An estimate of the quantity of material released or spilled into the environment and the approximate duration of the event.

4. The exact location of the spill, including the name(s) of the waters involved or threatened, and/or other medium or media affected by the release or spill.

5. The source of the release or spill.

6. The name, address, and telephone number of the party in charge of, or responsible for, the facility or activity associated with the release or spill.

7. The extent of the actual and potential water pollution.

8. The name and telephone number of the person in charge of operations at the spill site.

9. The steps being taken or proposed to contain and cleanup the released or spilled material and any precautions taken to minimize impacts, including evacuation.

10. The extent of injuries, if any.

11. Any known or anticipated acute or chronic health risks associated with the emergency, and information regarding necessary medical attention for exposed individuals.

12. Assistance required, if any.

If the release of a hazardous substance or oil occurs in an amount which exceeds a reportable quantity (RQ) as defined in 40 CFR Part 110, 40 CFR Part 117, 40 CFR Part 302, or 6 NYCRR Part 597, then the Contractor shall do the following:

1. Call to the National Response Center shall be made by the person in charge of the site. The applicable phone numbers are 1-800-424-8802.

2. Within 14 days of the release, submit a written description of the release. The description should include: (1) a description of the release, (2) the type of material released, (3) estimated amount of the spill; (4) the date of the release, (5) an explanation of why the release occurred; and (6) a description of the measures to be implemented to prevent and control future releases.

[(1)]*Reportable Quantity*: A Reportable Quantity is the quantity of a hazardous substance or oil that triggers reporting requirements under the Comprehensive Emergency Response, Compensation, and Liability Act (CERCLA) (USEPA, September 1992). While the Contractor is legally responsible for knowing the risks of materials that are part of construction, members of the owner's spill response team have access to information that may help identify these quantities with you.

[(2)]*Harmful Quantity*: A Harmful Quantity of oil includes discharges that violate applicable water quality standards; cause a film, sheen, or discoloration on a water surface or adjoining shoreline; or cause a sludge or emulsion to be deposited beneath the water surface or shoreline (40 CFR 110.3).

2.0 PRODUCTS – NOT USED

3.0 EXECUTION – NOT USED

*****END OF SECTION 01 35 44*****

SECTION 01 41 00 REGULATORY REQUIREMENTS

1.0 GENERAL

1.1 PERMITS AND LICENSES

A. The Contractor shall obtain, maintain and pay for all permits and licenses necessary for the execution of the Work and for the use of such work when completed. Such permits shall include but are not limited to building, electrical, plumbing, backflow prevention, dig safe, fill, street use, pavement cuts and repairs, and building demolition.

1. City of Ithaca building permit applications shall be presented for review at the regularly scheduled Owner's meeting with the Authority Having Jurisdiction (AHJ).

B. For any projects which include demolition of a structure or load-bearing elements of a structure, the Contractor is required to complete a "Notification of Demolition and Renovation" and provide this notification to the United States Environmental Protection Agency (EPA) in advance of the work as specified in 40 CFR 61.145. The Contractor shall also provide a copy of this notification to the Owner's Representative prior to any demolition.

C. All Construction / Building / Hot Work and Occupancy permits shall be issued and maintained through the City of Ithaca.

D. Ithaca Fire Department Permitting:

1. A permit is required from the Ithaca Fire Department to install or substantially repair a fire suppression, fire detection, or fire alarm system as such as defined under the Uniform Code of New York State.

2. If the scope of work is classified under the Existing Building Code of NYS as Alteration –Level 1; Alteration – Level 2; Alteration – Level 3; or Addition; a permit from the Ithaca Fire Department is required for all work affecting the fire suppression, fire detection, or fire alarm system for that building. A building permit is also required for this type of work.

3. Work classified as a 'Repair' under the Existing Building Code of NYS does not require a permit from the Ithaca Fire Department.

1.2 INSPECTIONS

A. Apply for and obtain all required inspections, pay all fees and charges for same, include all service charges and other associated costs.

1.3 COMPLIANCE

A. The Contractor shall give all notices, pay all fees and comply with all laws, rules and regulations applicable to the Work.

1. Any additional associated fees for permitting and regulatory fees due to changes in the Work shall be reconciled upon project completion per General Conditions Article 4 – Changes In Work.

1.4 OWNER'S REQUIREMENTS

A. The Contractor, Subcontractors, and employees of the Contractor and Subcontractors shall comply with all regulations governing conduct, access to the premises, operation of equipment and systems, and conduct while in or near the premises and shall perform the Work in such a manner as not to unreasonably interrupt or interfere with the conduct of business of the Owner.

B. Upon completion of the project, the Contractor agrees to provide the Owner with a summary of municipal permit fees paid. This shall include the name of the permits secured, the permit fees paid by the Contractor and a copy of the permit. If no permit fees were required, the Contractor shall so state, in writing, upon completion of the project.

2.0 PRODUCTS – NOT USED

3.0 EXECUTION – NOT USED

*****END OF SECTION 01 41 00*****

SECTION 01 42 00 REFERENCES

1.0 GENERAL

1.1 INTENT OF CONTRACT DOCUMENTS

A. Notes or instructions shown on any one Drawing, apply where applicable, to all other Drawings.

B. All references to codes, specifications and standards referred to in the Specification Sections and on the Drawings shall mean, and are intended to be, the latest edition, amendment and/or revision of such reference standard in effect as of the date of these Contract Documents.

C. Install All Work in Compliance with:

1. NYS Uniform Code
    a. International Building Code
    b. International Residential Code
    c. International Existing Building Code
    d. International Fire Code
    e. International Plumbing Code
    f. International Mechanical Code
    g. International Fuel Gas Code
    h. International Property Maintenance Code
    i. Uniform Code Supplement
2. NYS Energy Code
    a. International Energy Conservation Code
    b. ASHRAE 90.1
    c. Energy Code Supplement
3. National Electric Code
4. Occupational Safety and Health Administration (OSHA).
5. Life Safety Code NFPA 101.
6. All local ordinances

7. Plans and Specifications in excess of code requirements and not contrary to same.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and other Division 1 Specification Sections, apply to this Section.

1.3 DEFINITIONS

A. "General": Basic Contract definitions are included in the Conditions of the Contract.

B. "Contract Documents": The Contract Documents consist of the Agreement between Owner and Contractor, General Conditions, General Requirements, Drawings, Specifications, addenda issued before execution of the Agreement, other documents listed in the Agreement, and modifications issued after execution of the Agreement.

C. "The Contract": The Contract Documents form the Contract for construction and represent the entire integrated Agreement between the Owner and Contractor.

D. "The Work": The work comprises the completed construction required by the Contract Documents and includes all labor necessary to produce such construction and all materials and equipment incorporated in such construction.

E. "Owner": Cornell University a New York corporation.

F. "Architect/Engineer": The Architect or Engineer is the person lawfully licensed to practice architecture and/or engineering in the state of New York, identified as such in the Owner Contractor Agreement, and is referred to throughout the Contract Documents as if singular in number. The terms Architect and/or Engineer mean the Architect and/or his authorized representative.

G. "Contractor": The Contractor, person, firm, or corporation with whom the Construction Agreement contract is made by Owner.

H. "Subcontractor": A person, firm, or corporation, supplying labor and/or materials for work at site of the project for and under separate contract or agreement with Contractor.

I. "Delegated Design" describes a collaboration between a design professional and contractor (or subcontractor) where the contractor assumes allocated responsibility for an element or portion of the Project's design. Delegated design allocation and assignment may occur in any project delivery method and will involve a licensed professional to perform the design. The Contractor or Subcontractor allocated an element or portion of the Project's design, will submit its engineered, stamped plans to the primary design team, who will check for any conflicts with any other aspect of the Work and make new documents to be included in the Project's design record. Contractor or Subcontractor allocated a delegated design element of the Project shall provide professional liability insurance for the design work in such amounts and as is required by Owner.

J. "As Approved" or "Approved": Architect's or Owner's approval.

K. "As Directed": Owner's direction or instruction. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

L. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

M. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

N. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

O. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

P. "Reinstall". To place back into a former position.

Q. "Replace". Provide a substitute for.

R. "Provide": Furnish and install, complete and ready for the intended use.

S. "Concealed': Work installed in pipe shafts, chases or recesses, behind furred walls, above ceilings, either permanent or removable.

T. "Exposed": All capital Work not identified as concealed.

U. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

V. "As-Built Documents": Drawings and other records that are maintained by the Contractor to record all conditions which exist when the building construction is completed. This includes both the elements of the project itself and existing elements that are encountered during the course of project construction.

W. "Record Drawings": Shows construction changes in the project and the final location of all services, lines, outlets, and connections including underground and concealed items. The "record" drawings shall be compiled by the Architect based on the working as-built drawings and revised in accordance with the marked up drawings submitted by the Contractor.

X. "Shop Drawings": Drawings, diagrams, illustrations, charts, brochures, and other data that are prepared by Contractor or any Subcontractor, manufacturer, supplier or distributor, for some portion of the Work.

Y. "Samples": Physical examples furnished to illustrate materials, equipment or workmanship, and to establish standards by which the work will be judged.

Z. "General Conditions": The standardized contractual provisions describing the responsibilities, rights and relationships of the Owner and Contractor under the construction contract.

AA. "Contract Limit Lines": A limit line or perimeter line established on the drawings or elsewhere in the contract documents defining the boundaries of the site available to the contractor for construction purposes.

BB. "to do", "provide", "furnish", "install", etc., in these Specifications or on Drawings are directions given to the Contractor;

1.4 OWNER AGREEMENTS

A. Cornell University and the Tompkins-Cortland Counties Building Trades Council, Maintenance Division have entered into an agreement. The local unions which are members of the Tompkins-Cortland Counties Building Trades Council, Maintenance Division are as follows:

Local #241 - International Brotherhood of Electrical Workers
Local #267 - United Association of Plumbers and Steamfitters
Local #281 - United Brotherhood of Carpenters
Local #3NY - International Union of Bricklayers and Allied Craftworkers
Local #178 - International Union of Painters and Allied Trades
Local #112 - International Brotherhood of Sheetmetal Workers
Local #785 - Laborers International Union of North America

The definition of craft maintenance as applied to this agreement shall be as follows:

All work associated with the demolition, repair, replacement, improvement to or construction of equipment, buildings, structures, utilities, and/or system or components thereof. Craft maintenance for trades assistants shall be limited to work assigned to individuals employed as building trade laborers and which directly assists the craft work performed by other employees covered by this agreement; the Employer is free to assign such work; provided, however, such assignment does not fall within the craft performed by other employees covered by this agreement.

1.5 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

D. Abbreviations and Acronyms for Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the organizations responsible for the standards and regulations in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ADAAG	Americans with Disabilities Act (ADA) Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities Available from Access Board www.access-board.gov	(800) 872-2253 (202) 272-0080
CFR	Code of Federal Regulations Available from Government Printing Office www.gpoaccess.gov/cfr/index.html	(866) 512-1800 (202) 512-1800
FS	Federal Specification Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil	(215) 697-6257
	Available from Defense Standardization Program www.dps.dla.mil	
	Available from General Services Administration www.gsa.gov	(202) 619-8925
	Available from National Institute of Building Sciences www.nibs.org	(202) 289-7800
UFAS	Uniform Federal Accessibility Standards Available from Access Board www.access-board.gov	(800) 872-2253 (202) 272-0080

1.6 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

AA	Aluminum Association, Inc. (The) www.aluminum.org	(703) 358-2960
AAADM	American Association of Automatic Door Manufacturers www.aaadm.com	(216) 241-7333
AABC	Associated Air Balance Council www.aabchq.com	(202) 737-0202

AAMA	American Architectural Manufacturers Association www.aamanet.org	(847) 303-5664
AASHTO	American Association of State Highway and Transportation Officials www.transportation.org	(202) 624-5800
AATCC	American Association of Textile Chemists and Colorists (The) www.aatcc.org	(919) 549-8141
ABAA	Air Barrier Association of America www.airbarrier.org	(866) 956-5888
ABMA	American Bearing Manufacturers Association www.abma-dc.org	(202) 367-1155
ACI	ACI International (American Concrete Institute) www.aci-int.org	(248) 848-3700
ACPA	American Concrete Pipe Association www.concrete-pipe.org	(972) 506-7216
AEIC	Association of Edison Illuminating Companies, Inc. (The) www.aeic.org	(205) 257-2530
AF&PA	American Forest & Paper Association www.afandpa.org	(800) 878-8878 (202) 463-2700
AGA	American Gas Association www.aga.org	(202) 824-7000
AGC	Associated General Contractors of America (The) www.agc.org	(703) 548-3118
AHAM	Association of Home Appliance Manufacturers www.aham.org	(202) 872-5955
AI	Asphalt Institute www.asphaltinstitute.org	(859) 288-4960
AIA	American Institute of Architects (The) www.aia.org	(800) 242-3837 (202) 626-7300
AISC	American Institute of Steel Construction www.aisc.org	(800) 644-2400 (312) 670-2400
AISI	American Iron and Steel Institute www.steel.org	(202) 452-7100
AITC	American Institute of Timber Construction www.aitc-glulam.org	(303) 792-9559

ALCA	Associated Landscape Contractors of America (Now PLANET - Professional Landcare Network)	
ALSC	American Lumber Standard Committee, Incorporated www.alsc.org	(301) 972-1700
AMCA	Air Movement and Control Association International, Inc. www.amca.org	(847) 394-0150
ANSI	American National Standards Institute www.ansi.org	(202) 293-8020
AOSA	Association of Official Seed Analysts, Inc. www.aosaseed.com	(505) 522-1437
APA	APA - The Engineered Wood Association www.apawood.org	(253) 565-6600
APA	Architectural Precast Association www.archprecast.org	(239) 454-6989
API	American Petroleum Institute www.api.org	(202) 682-8000
ARI	Air-Conditioning & Refrigeration Institute www.ari.org	(703) 524-8800
ARMA	Asphalt Roofing Manufacturers Association www.asphaltroofing.org	(202) 207-0917
ASCE	American Society of Civil Engineers www.asce.org	(800) 548-2723 (703) 295-6300
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers www.ashrae.org	(800) 527-4723 (404) 636-8400
ASME	ASME International (The American Society of Mechanical Engineers International) www.asme.org	(800) 843-2763 (973) 882-1170
ASSE	American Society of Sanitary Engineering www.asse-plumbing.org	(440) 835-3040
ASTM	ASTM International (American Society for Testing and Materials International) www.astm.org	(610) 832-9585
AWI	Architectural Woodwork Institute www.awinet.org	(800) 449-8811 (703) 733-0600

AWPA	American Wood-Preservers' Association www.awpa.com	(334) 874-9800
AWS	American Welding Society www.aws.org	(800) 443-9353 (305) 443-9353
AWWA	American Water Works Association www.awwa.org	(800) 926-7337 (303) 794-7711
BHMA	Builders Hardware Manufacturers Association www.buildershardware.com	(212) 297-2122
BIA	Brick Industry Association (The) www.bia.org	(703) 620-0010
BICSI	BICSI www.bicsi.org	(800) 242-7405 (813) 979-1991
BISSC	Baking Industry Sanitation Standards Committee www.bissc.org	(866) 342-4772
CCC	Carpet Cushion Council www.carpetcushion.org	(203) 637-1312
CDA	Copper Development Association www.copper.org	(800) 232-3282 (212) 251-7200
CGA	Compressed Gas Association www.cganet.com	(703) 788-2700
CIMA	Cellulose Insulation Manufacturers Association www.cellulose.org	(888) 881-2462 (937) 222-2462
CISCA	Ceilings & Interior Systems Construction Association www.cisca.org	(630) 584-1919
CISPI	Cast Iron Soil Pipe Institute www.cispi.org	(423) 892-0137
CLFMI	Chain Link Fence Manufacturers Institute www.chainlinkinfo.org	(301) 596-2583
CPA	Composite Panel Association www.pbmdf.com	(301) 670-0604
CPPA	Corrugated Polyethylene Pipe Association www.cppa-info.org	(800) 510-2772 (202) 462-9607
CRI	Carpet & Rug Institute (The) www.carpet-rug.com	(800) 882-8846 (706) 278-3176

CRSI	Concrete Reinforcing Steel Institute www.crsi.org	(847) 517-1200
CSI	Cast Stone Institute www.caststone.org	(770) 972-3011
CSI	Construction Specifications Institute (The) www.csinet.org	(800) 689-2900 (703) 684-0300
CSSB	Cedar Shake & Shingle Bureau www.cedarbureau.org	(604) 820-7700
CTI	Cooling Technology Institute www.cti.org	(281) 583-4087
DHI	Door and Hardware Institute www.dhi.org	(703) 222-2010
EIA	Electronic Industries Alliance www.eia.org	(703) 907-7500
EIMA	EIFS Industry Members Association www.eima.com	(800) 294-3462 (770) 968-7945
EJCDC	Engineers Joint Contract Documents Committee www.ejdc.org	(703) 295-5000
EJMA	Expansion Joint Manufacturers Association, Inc. www.ejma.org	(914) 332-0040
ESD	ESD Association www.esda.org	(315) 339-6937
FMG	FM Global www.fmglobal.com	(401) 275-3000
FSA	Fluid Sealing Association www.fluidsealing.com	(610) 971-4850
FSC	Forest Stewardship Council www.fsc.org	49 228 367 66 0
GA	Gypsum Association www.gypsum.org	(202) 289-5440
GANA	Glass Association of North America www.glasswebsite.com	(785) 271-0208
GS	Green Seal www.greenseal.org	(202) 872-6400

GSI	Geosynthetic Institute www.geosynthetic-institute.org	(610) 522-8440
HI	Hydraulic Institute www.pumps.org	(888) 786-7744 (973) 267-9700
HI	Hydronics Institute www.gamanet.org	(908) 464-8200
HPVA	Hardwood Plywood & Veneer Association www.hpva.org	(703) 435-2900
HPW	H. P. White Laboratory, Inc. www.hpwhite.com	(410) 838-6550
IBR	Institute of Boiler & Radiation Manufacturers	
ICEA	Insulated Cable Engineers Association, Inc. www.icea.net	(770) 830-0369
ICRI	International Concrete Repair Institute, Inc. www.icri.org	(847) 827-0830
IEC	International Electrotechnical Commission www.iec.ch	41 22 919 02 11
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The) www.ieee.org	(212) 419-7900
IESNA	Illuminating Engineering Society of North America www.iesna.org	(212) 248-5000
IEST	Institute of Environmental Sciences and Technology www.iest.org	(847) 255-1561
IGCC	Insulating Glass Certification Council www.igcc.org	(315) 646-2234
IGMA	Insulating Glass Manufacturers Alliance www.igmaonline.org	(613) 233-1510
ILI	Indiana Limestone Institute of America, Inc. www.iliai.com	(812) 275-4426
ISO	International Organization for Standardization www.iso.ch	41 22 749 01 11
	Available from ANSI www.ansi.org	(202) 293-8020

ISSFA	International Solid Surface Fabricators Association www.issfa.net	(877) 464-7732 (702) 567-8150
ITS	Intertek www.intertek.com	(800) 345-3851 (713) 407-3500
ITU	International Telecommunication Union www.itu.int/home	41 22 730 51 11
KCMA	Kitchen Cabinet Manufacturers Association www.kcma.org	(703) 264-1690
LMA	Laminating Materials Association (Now part of CPA)	
LPI	Lightning Protection Institute www.lightning.org	(800) 488-6864 (804) 314-8955
MBMA	Metal Building Manufacturers Association www.mbma.com	(216) 241-7333
MFMA	Maple Flooring Manufacturers Association, Inc. www.maplefloor.org	(847) 480-9138
MFMA	Metal Framing Manufacturers Association www.metalframingmfg.org	(312) 644-6610
MHIA	Material Handling Industry of America www.mhia.org	(800) 345-1815 (704) 676-1190
MIA	Marble Institute of America www.marble-institute.com	(440) 250-9222
MPI	Master Painters Institute www.paintinfo.com	(888) 674-8937
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc. www.mss-hq.com	(703) 281-6613
NAAMM	National Association of Architectural Metal Manufacturers www.naamm.org	(312) 332-0405
NACE	NACE International (National Association of Corrosion Engineers International) www.nace.org	(800) 797-6623 (281) 228-6200
NADCA	National Air Duct Cleaners Association www.nadca.com	(202) 737-2926

NAIMA	North American Insulation Manufacturers Association www.naima.org	(703) 684-0084
NBGQA	National Building Granite Quarries Association, Inc. www.nbgqa.com	(800) 557-2848
NCAA	National Collegiate Athletic Association (The) www.ncaa.org	(317) 917-6222
NCMA	National Concrete Masonry Association www.ncma.org	(703) 713-1900
NCPI	National Clay Pipe Institute www.ncpi.org	(262) 248-9094
NCTA	National Cable & Telecommunications Association www.ncta.com	(202) 775-3550
NEBB	National Environmental Balancing Bureau www.nebb.org	(301) 977-3698
NECA	National Electrical Contractors Association www.necanet.org	(301) 657-3110
NeLMA	Northeastern Lumber Manufacturers' Association www.nelma.org	(207) 829-6901
NEMA	National Electrical Manufacturers Association www.nema.org	(703) 841-3200
NETA	International Electrical Testing Association www.netaworld.org	(888) 300-6382 (303) 697-8441
NFHS	National Federation of State High School Associations www.nfhs.org	(317) 972-6900
NFPA	NFPA (National Fire Protection Association) www.nfpa.org	(800) 344-3555 (617) 770-3000
NFRC	National Fenestration Rating Council www.nfrc.org	(301) 589-1776
NGA	National Glass Association www.glass.org	(866) 342-5642 (703) 442-4890
NHLA	National Hardwood Lumber Association www.natlhardwood.org	(800) 933-0318 (901) 377-1818
NLGA	National Lumber Grades Authority www.nlga.org	(604) 524-2393

NOFMA	NOFMA: The Wood Flooring Manufacturers Association www.nofma.org	(901) 526-5016
NRCA	National Roofing Contractors Association www.nrca.net	(800) 323-9545 (847) 299-9070
NRMCA	National Ready Mixed Concrete Association www.nrmca.org	(888) 846-7622 (301) 587-1400
NSF	NSF International (National Sanitation Foundation International) www.nsf.org	(800) 673-6275 (734) 769-8010
NSSGA	National Stone, Sand & Gravel Association www.nssga.org	(800) 342-1415 (703) 525-8788
NTMA	National Terrazzo & Mosaic Association, Inc. (The) www.ntma.com	(800) 323-9736 (540) 751-0930
NYBFU	New York Board of Fire Underwriters www.nybfu.org	(212) 227-3700
PCI	Precast/Prestressed Concrete Institute www.pci.org	(312) 786-0300
PDCA	Painting & Decorating Contractors of America www.pdca.com	(800) 332-7322 (314) 514-7322
PDI	Plumbing & Drainage Institute www.pdionline.org	(800) 589-8956 (978) 557-0720
PGI	PVC Geomembrane Institute http://pgi-tp.ce.uiuc.edu	(217) 333-3929
PLANET	Professional Landcare Network www.landcarenetwork.org	(800) 395-2522
PTI	Post-Tensioning Institute www.post-tensioning.org	(602) 870-7540
RCSC	Research Council on Structural Connections www.boltcouncil.org	(800) 644-2400 (312) 670-2400
RFCI	Resilient Floor Covering Institute www.rfci.com	(301) 340-8580
RIS	Redwood Inspection Service www.calredwood.org	(888) 225-7339 (415) 382-0662

SAE	SAE International www.sae.org	(877) 606-7323 (724) 776-4841
SBI	Steel Boiler Institute	
SDI	Steel Deck Institute www.sdi.org	(847) 458-4647
SDI	Steel Door Institute www.steeldoor.org	(440) 899-0010
SEFA	Scientific Equipment and Furniture Association www.sefalabs.com	(516) 294-5424
SGCC	Safety Glazing Certification Council www.sgcc.org	(315) 646-2234
SIA	Security Industry Association www.siaonline.org	(703) 683-2075
SJI	Steel Joist Institute www.steeljoist.org	(843) 626-1995
SMA	Screen Manufacturers Association www.smacentral.org	(561) 533-0991
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association www.smacna.org	(703) 803-2980
SMPTE	Society of Motion Picture and Television Engineers www.smpte.org	(914) 761-1100
SPFA	Spray Polyurethane Foam Alliance www.sprayfoam.org	(800) 523-6154
SPIB	Southern Pine Inspection Bureau (The) www.spib.org	(850) 434-2611
SPRI	Single Ply Roofing Industry www.spri.org	(781) 647-7026
SSINA	Specialty Steel Industry of North America www.ssina.com	(800) 982-0355 (202) 342-8630
SSPC	SSPC: The Society for Protective Coatings www.sspc.org	(877) 281-7772 (412) 281-2331
STI	Steel Tank Institute www.steeltank.com	(847) 438-8265

SWI	Steel Window Institute www.steelwindows.com	(216) 241-7333
SWRI	Sealant, Waterproofing, & Restoration Institute www.swrionline.org	(816) 472-7974
TCA	Tile Council of America, Inc. www.tileusa.com	(864) 646-8453
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance www.tiaonline.org	(703) 907-7700
TMS	The Masonry Society www.masonrysociety.org	(303) 939-9700
TPI	Truss Plate Institute, Inc. www.tpinst.org	(703) 683-1010
TPI	Turfgrass Producers International www.turfgrasssod.org	(847) 649-5555
TRI	Tile Roofing Institute www.tileroofing.org	(312) 670-4177
UFPO	Underground Facilities Protective Organization www.ufpo.org	(800) 962-7962 (800) 962-7811
UL	Underwriters Laboratories Inc. www.ul.com	(877) 854-3577 (847) 272-8800
UNI	Uni-Bell PVC Pipe Association www.uni-bell.org	(972) 243-3902
USGBC	U.S. Green Building Council www.usgbc.org	(202) 828-7422
WASTEC	Waste Equipment Technology Association www.wastec.org	(800) 424-2869 (202) 244-4700
WCSC	Window Covering Safety Council www.windowcoverings.org	(800) 506-4636
WDMA	Window & Door Manufacturers Association www.wdma.com	(800) 223-2301
WI	Woodwork Institute www.wicnet.org	(916) 372-9943
WMMPA	Wood Moulding & Millwork Producers Association www.wmmpa.com	(800) 550-7889 (530) 661-9591

WSRCA	Western States Roofing Contractors Association www.wsrca.com	(800) 725-0333 (650) 570-5441
WWPA	Western Wood Products Association www.wwpa.org	(503) 224-3930

B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

IAPMO	International Association of Plumbing and Mechanical Officials www.iapmo.org	(909) 472-4100
ICC	International Code Council www.iccsafe.org	(888) 422-7233 (703) 931-4533
ICC-ES	ICC Evaluation Service, Inc. www.icc-es.org	(800) 423-6587 (562) 699-0543
NEC	National Electric Code	

C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CE	Army Corps of Engineers www.usace.army.mil	
CPSC	Consumer Product Safety Commission www.cpsc.gov	(800) 638-2772 (301) 504-7923
DOC	Department of Commerce www.commerce.gov	(202) 482-2000
DOD	Department of Defense http://.dodssp.daps.dla.mil	(215) 697-6257
DOE	Department of Energy www.energy.gov	(202) 586-9220
EPA	Environmental Protection Agency www.epa.gov	(202) 272-0167
FAA	Federal Aviation Administration www.faa.gov	(866) 835-5322

FCC	Federal Communications Commission www.fcc.gov	(888) 225-5322
FDA	Food and Drug Administration www.fda.gov	(888) 463-6332
GSA	General Services Administration www.gsa.gov	(800) 488-3111
HUD	Department of Housing and Urban Development www.hud.gov	(202) 708-1112
LBL	Lawrence Berkeley National Laboratory www.lbl.gov	(510) 486-4000
NCHRP	National Cooperative Highway Research Program (See TRB)	
NIST	National Institute of Standards and Technology www.nist.gov	(301) 975-6478
OSHA	Occupational Safety & Health Administration www.osha.gov	(800) 321-6742 (202) 693-1999
PBS	Public Building Service (See GSA)	
PHS	Office of Public Health and Science www.osophs.dhhs.gov/ophs	(202) 690-7694
RUS	Rural Utilities Service (See USDA)	(202) 720-9540
SD	State Department www.state.gov	(202) 647-4000
TRB	Transportation Research Board www.nas.edu/trb	(202) 334-2934
USDA	Department of Agriculture www.usda.gov	(202) 720-2791
USPS	Postal Service www.usps.com	(202) 268-2000

2.0 PRODUCTS - NOT USED

3.0 EXECUTION - NOT USED

*****END OF SECTION 01 42 00*****

SECTION 01 45 00 QUALITY CONTROL

1.0 GENERAL

1.1 DESCRIPTION

A. The Contractor shall provide and maintain an effective Contractor Quality Control (CQC) program and perform sufficient inspections and tests of all items of Work, including those of Subcontractors, to ensure compliance with Contract Documents. Include surveillance and tests specified in the technical sections of the Specifications. Furnish appropriate facilities, instruments, and testing devices required for performance of the quality control function. Controls must be adequate to cover construction operations and be keyed to the construction sequence. Construction shall not begin until the Owner has approved the CQC program.

1.2 CONTROL OF ON-SITE CONSTRUCTION

A. Include a control system for the following phases of inspection:

1. Pre-Installation Meeting. For all sections where pre-installations are defined, the Contractor shall arrange for a pre-installation meeting. When practical, pre-installation meetings shall be scheduled to take place on the same day as regularly schedule progress meetings. The Contractor shall make available, during this meeting, all approved submittals and products.

    a. Agenda to include the following:

        i. Appointment

        ii. Appointment of official representatives of participants in the Project.

        iii. Review of existing conditions and affected work, and testing thereof as required.

        iv. Review of installation procedures and requirements.

        v. Review of environmental and site condition requirements.

        vi. Schedule of the applicable portions of the Work.

        vii. Schedule of submission of samples, color chips, and items for Owners consideration.

        viii. Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences, Section 01 50 00.

        ix. Requirements for notification for reviews. Allow a minimum of 48 hour notice to Architect for review of the Work.

x. Requirements for inspections and tests, as applicable. Schedule and undertake inspections and tests in accordance with Section 01 41 00.

xi. Delivery schedule of specified equipment.

xii. Special safety requirements and procedures.

b. The following minimum personnel shall be at the meeting:

i. Project Manager.

ii. Project Field Supervisor

iii. Subcontractor

iv. Architect's Representative

v. Owner's Representative

vi. Commissioning Agent, when applicable

vii. Testing Agency, when applicable

2. Preparatory Inspection. Perform this inspection prior to beginning work on any definable feature of Work. Include a review of contract requirements with the supervisors directly responsible for the performance of the Work; check to assure that materials, products, and equipment have been tested, submitted, and approved; check to assure that provisions have been made for required control testing; examine the work area to ascertain that preliminary work has been completed; physically examine materials and equipment to assure that they conform to shop drawings and data and that the materials and equipment are on hand.

3. Initial Inspection. Perform this inspection as soon as work commences on a representative portion of a particular feature of workmanship review control testing for compliance with contract requirements.

4. Follow-up Inspections. Perform these inspections on a regular basis to assure continuing compliance with contract requirements until completion of that particular work.

1.3 CONTROL OF OFF-SITE OPERATIONS

A. Perform factory quality control inspections for items fabricated or assembled off-site as opposed to "off-the-shelf" items. The CQC Representative at the fabricating plant shall be responsible for release of the fabricated items for shipment to the job site. The CQC Representative at the job site shall receive the item and note any damage incurred during shipment. The Contractor shall be responsible for protecting and maintaining the item in good condition throughout the period of on-site and during erection or installation. Although any item found to be faulty may be rejected before its use, final acceptance of an item by the Owner is based on its satisfactory incorporation into the Work and acceptance of the completed Project.

1.4 TESTING

A. The Owner may engage the services of an independent testing laboratory to confirm that an installed item or element of work conforms to the Specification and workmanship requirements.

1.5 OWNER'S REPRESENTATIVE

A. The Owner shall designate a Representative to monitor the progress and execution of the Work. The Representative shall have the authority to call for test samples, to approve or to reject work performed and to stop work in progress, if, in its opinion, the work is not in conformance with the Contract Documents. The Representative shall not be authorized to make changes or interpretations of the Contract Documents.

1. The Contractor shall maintain a project Deficiency/Issues Log in the ePM system to track non-conforming materials or sub-standard workmanship identified by Owner's Representative.

2.0 PRODUCTS – NOT USED

3.0 EXECUTION – NOT USED

*****END OF SECTION 01 45 00*****

SECTION 01 50 00 TEMPORARY FACILITIES AND CONTROLS

1.0 GENERAL

1.1 DESCRIPTION

A. The Contractor shall furnish, install and maintain all temporary facilities and services of every kind, as required by the Contractor and by its Subcontractors for their performance of the Work and compliance with the Contract Documents, and shall remove such facilities and complete such services upon the completion of all other work, or as Cornell University may direct.

B. The Contractor shall obtain all required permits and approvals for and shall provide, construct, or install, as well as operate, maintain, service and remove temporary facilities and services.

1.2 REQUIREMENTS OF REGULATORY AGENCIES

A. Comply with Federal, State and local codes and safety regulations.

2.0 PRODUCTS

2.1 MATERIALS, GENERAL

A. Choice of materials, as suitable for the accomplishment of the intended purpose, is the Contractor's option.

B. Materials may be new or used, but must not violate requirements of applicable codes, standards and specifications.

2.2 TEMPORARY FIRST AID FACILITIES

A. Provide first aid equipment and supplies, with qualified personnel continuously available to render first aid at the site.

B. Provide a sign, posted at the telephone, listing the telephone numbers for emergency medical services: Physicians, ambulance services and hospitals.

2.3 TEMPORARY FIRE PROTECTION

A. Provide a fire protection and prevention program for employees and personnel at the site. Any fire watches as a result of construction operations are the responsibility of the Contractor. Comply with NFPA 241. Develop, manage, and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with Cornell University Fire Marshall Office (UFMO) and local fire code official and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

1. Impairments "Fire Code of NYS Section 901.7". Impairment; "the removal of fire alarm devices or sprinkler system coverage in a building." There are two different levels of impairments

   a. Partial Impairment. The removal of fire alarm devices or sprinkler system coverage via control valve in the immediate area of where work is to be performed.

      - Basic Impairment Notification will be sent to Local Authority Having Jurisdiction and FM Global.

      - No fire watch will be required unless the UFMO determines otherwise.

   b. Full System Impairment. The complete removal of a fire alarm "system" or sprinkler "system". Impairment of both the fire alarm system and sprinkler system at the same time is not allowed.

      - Full System Impairment Notification will be sent by the UFMO to local Authority Having Jurisdiction, FM Global, Ithaca Fire Department, Building Manager, Maintenance Manager, Customer Service, and Cornell Emergency Services.

      - Fire Watch staffing is the responsibility of the Contractor. The UFMO will require the Fire Watch person's name(s) and contact information to prepare the required Fire Watch Documentation Form.

B. Equipment:

1. Provide and maintain fire extinguishing equipment ready for instant use at all areas of the Project and at specific areas of critical fire hazard.

2. Hand extinguishers of the types and sizes recommended by the National Board of Fire Underwriters to control fires from particular hazards.

3. Construction period use of permanent fire protection system.

4. Water hoses connected to an adequate water pressure and supply system to reach each area or level of construction upon building enclosure or heating of the building.

5. Maintain existing standpipes and hoses for fire protection. Provide additional temporary hoses where required to comply with requirements. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles. Provide hoses of sufficient length to protect construction areas.

6. Maintain unobstructed access to fire extinguishers, fire hydrants, fire department connections, standpipes, temporary fire-protection facilities, stairways, and other access routes for emergency response personnel.

7. Where existing or temporary fire protection services are being replaced with new fire protection services, do not remove or impair existing or temporary services until new services are tested, accepted, placed into operation and use, and directed by the UFMO and AHJ.

8. At earliest feasible date in each area of Project, complete installation of permanent fire-protection facility and systems, including connected services, and place into operation and use. Instruct key personnel on use of facilities. Protect and maintain permanent fire protection system. Repair or replace any components damaged during construction.

C. Enforce fire-safety discipline:

1. Store combustible and volatile materials in an isolated, protected location.

2. Avoid accumulations of flammable debris and waste in or about the Project.

3. Prohibit smoking in the vicinity of hazardous conditions.

4. There is NO SMOKING allowed on construction sites located in any occupied building. Smoking is prohibited in all Cornell University buildings.

5. Closely supervise welding and torch-cutting operations in the vicinity of combustible materials and volatile conditions.

6. Supervise locations and operations of portable heating units and fuel.

D. Maintain fire extinguishing equipment in working condition, with current inspection certificate attached to each extinguisher.

E. Welding or burning operations shall be conducted under a Hot Work Permit issued in accordance with Section 01 41 00. Where such work is permitted, the Contractor shall comply with Cornell EHS's *Contractor Guidelines for Hot Work* and provide an approved fire extinguisher in good operating condition within easy reach of the operating personnel. In each instance, obtain prior approval of Cornell University Environment, Health & Safety.

Contractor Guidelines for Hot Work, https://ehs.cornell.edu/campus-health-safety/fire-and-life-safety/hot-work-and-welding-safety/general-contractor-guidelines-for-hot-work

F. Advise Cornell University Environmental Health and Safety of any items affecting Life Safety, e.g., inoperable safety devices or systems, road blockages, exit closing, etc.

2.4 CONSTRUCTION AIDS

A. Provide construction aids and equipment required to assure safety for personnel and to facilitate the execution of the Work; Scaffolds, staging, ladders, stairs, ramps, runways, platforms, railings, hoists, cranes, chutes, fall protection, harness, tie-off points, and other such equipment.

B. When permanent stair framing is in place, provide temporary treads, platforms and railings, for use by construction personnel.

C. Maintain all equipment in a safe condition.

2.5 SUPPORTS

A. The Contractor shall include cost of all materials and labor necessary to provide all supports, beams, angles, hangers, rods, bases, braces, etc. to properly support the Contract Work. All supports, etc. shall meet the approval of the Architect.

B. Any and all supports that are of "custom" fabrication or installation shall be designed by the Contractor's NYS licensed PE with stamped & signed shop drawings and calculations provided for same.

2.6 TEMPORARY ENCLOSURES

A. Provide temporary weather-tight enclosure for building exterior, maintain in-place until installation of permanent enclosures. Provide temporary weather-tight enclosure of exterior walls as work progresses for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities, and as necessary to provide acceptable working conditions, provide weather protection for interior materials, provide weather protection for occupied areas, allow for effective temporary heating, and to prevent entry of unauthorized persons.

1. Provide temporary exterior doors with self-closing hardware and padlocks or locksets.

2. Other enclosures shall be removable as necessary for work and for handling of materials.

3. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

4. Coordinate enclosure with ventilation requirements, material drying or curing requirements, and specified environmental limitations to avoid dangerous or detrimental conditions and effects.

B. Provide temporary enclosures to separate work areas from areas of the existing building occupied by Owner; to prevent penetration of dust or moisture into occupied areas, to prevent damage to existing equipment, and to protect Owner's employees and operations from construction work.

1. Temporary partition and ceiling enclosures: Framing and sheet materials which comply with structural and fire rating requirements of applicable codes and standards.

   a. Close joints between sheet materials, and seal edges and intersections with existing surfaces, to prevent penetration of dust or moisture.

   b. In locations where fire protection is required, paint both sides of partitions and ceilings with fire-retardant paint as required by local fire regulations.

2. Do not remove existing exterior enclosure systems until new exterior enclosure systems are ready for installation. Complete removal of existing exterior enclosure systems as soon as possible. Immediately after completing removal, install new exterior enclosure systems and complete installation as soon as possible.

3. Do not remove existing HVAC systems connected to louvers at existing exterior enclosure systems until new HVAC systems and louvers at exterior enclosure systems are ready for installation. Complete removal of existing HVAC systems and louvers as soon as possible. Immediately after completing removal, install new HVAC systems and new louvers and complete installation as soon as possible.

2.7 TEMPORARY WATER CONTROL

A. The Contractor shall provide, maintain and operate pumps required to keep the Work free of water at all times.

B. Dispose of all water with due care and shall not infringe on the rights of others on the Site, of adjacent property owners and of the public. All cost in connection with the removal of such water shall be paid by the Contractor.

2.8 PERSONNEL, PUBLIC AND EMPLOYEE PROTECTION

A. Provide guardrails, barricades, fences, footways, tunnels and other devices necessary to protect all personnel, employees, and the public, against hazards on, adjacent to or accessing the construction site.

1. Provide signs, warning lights, signals, flags and illumination as necessary to alert persons to hazards and to provide safe, adequate visibility in areas of hazards.

2. Closed sidewalks need to be indicated with OSHA-approved signs, as well as, proper barricades.

3. Provide flag personnel as necessary to guide vehicles, protect personnel, public and employees.

2.9 ACCESS ROADS AND PARKING AREAS

A. Provide adequate temporary roads and walks to achieve all-weather access into the site from public thoroughfares, and within and adjacent to the site as necessary to provide uninterrupted access to field offices, work and storage areas.

B. Grade and provide drainage facilities to assure runoff of rainwater and to avoid blockage of flow from adjacent areas.

C. During dry weather wet down temporary unpaved areas when necessary to prevent blowing dust.

2.10 PROJECT IDENTIFICATION AND SIGNS

A. No Contractor signs to be displayed at the project site, unless authorized by the Owner in writing.

2.11 SECURITY

A. The Contractor shall provide security services as required to protect the interests of the Owner.

B. Locks applied to construction site gates and other access entrances shall be coordinated through the Project Manager to allow keys for emergency services.

2.12 FIELD OFFICES

A. Field offices are not required.

3.0 EXECUTION

3.1 PREPARATION

A. Consult with Owner, review site conditions and factors which affect construction procedures and temporary facilities, including adjacent properties and public facilities which may be affected by execution of the Work.

1. Designate the locations and extent of temporary construction, storage, and other temporary facilities and controls required for the expeditious accomplishment of the Work.

3.2 GENERAL

A. Comply with applicable requirements specified in sections of Division 02 through 40.

B. Make work structurally, mechanically and electrically sound throughout.

C. Install work in a neat and orderly manner.

D. Maintain, clean, service and repair facilities to provide continuous usage, and to the quality specified for the original installation.

E. Relocate facilities as required by progress of construction, by storage or work requirements, and to accommodate requirements of Owner and other contractors employed at the site.

F. Keep the site, at all times during the progress of the Work, free from accumulation of waste matter or rubbish and shall confine its apparatus, materials and operations of its workers to the limits prescribed except as the latter may be extended with the approval of the Owner's Representative. Cleaning of the structure or structures must be performed daily and removal of waste matter or rubbish must be performed at least once a week.

G. Contractor shall at all times keep access road and public roads clean of mud and construction debris and maintain dust control to the satisfaction of the Owner.

3.3 REMOVAL

A. Completely remove temporary structures, materials, equipment and services:

1. When construction needs can be met by use of permanent construction.

2. At completion of the Project.

B. Repair damage caused by installation or use of temporary facilities. Clean after removal.

C. Restore existing or permanent facilities used for temporary purposes to specified, or to original condition.

1. Remove foundations and underground installations for temporary construction and utilities.

2. Grade the areas of the site affected by temporary installations to required elevations and slopes, and clean the area.

*****END OF SECTION 01 50 00*****

SECTION 01 51 00 TEMPORARY UTILITIES

1.0 GENERAL

1.1 DESCRIPTION

A. The Contractor shall furnish, install and maintain temporary utilities required by all trades for construction. Remove on completion of the Work.

B. The Contractor shall provide all labor and materials for temporary connections and distribution.

1.2 REQUIREMENTS OF REGULATORY AGENCIES

A. Comply with National Electric Code, current edition.

B. Comply with Federal, State and local codes and safety regulations and with utility company requirements.

2.0 PRODUCTS

2.1 MATERIALS, GENERAL

A. Materials may be new or used, but must be adequate in capacity for the required usage, must not create unsafe conditions, and must not violate requirements of applicable codes and standards.

2.2 TEMPORARY ELECTRICITY, LIGHTING AND WATER

A. The Contractor shall have access to the Owner's water and electric power for constructing the Work. Temporary utility connections shall be made by the Contractor as close to its operations as possible as long as such connections do not over-load the capacity of the Owner's utilities or interfere with its customary utilization thereof. Utility access points shall be determined in cooperation with and acceptable to the Owner.

B. The Contractor shall be responsible for the economic use of the Owner's Water and Power. The Owner will pay for the water and power consumed in the construction of the Work as long as economical usage of these utilities is maintained. The Owner reserves the right to meter and charge for the power and water consumed if in the opinion of the Owner the usage of these utilities is not economically conducted by the Contractor. In such an event, the Owner shall give three (3) days written notice to the Contractor of its intentions to meter and charge for temporary utilities used by the Contractor.

C. All temporary power systems including wiring shall be removed by the Contractor when no longer required.

D. The minimum temporary lighting to be provided is at the rate of fifty foot candles, is to be maintained in each room and changed as required when interior walls are being erected. The required temporary lighting must be maintained for twenty-four (24) hours a day and seven (7) days a week at all stair levels and in all corridors below ground; in any and all egress; in all other spaces temporary lighting is to be maintained only during working hours. All temporary wiring and equipment shall be in conformity with the National Electric Code.

E. The minimum temporary outdoor security lighting to be provided is as follows:

1. Along the perimeter of the site fence, consisting of vandal-resistant light fixtures with HID lamps, located 150 foot center, mounted on the inside of the construction fence.

2. Lighting for temporary pedestrian paths and roadways, to provide a minimum of 0.1 foot-candle on the path of travel.

F. Three-phase temporary power circuits shall be installed as required to operate construction equipment of the various trades and to Install and test equipment such as pumps and elevators. The Contractor shall install and maintain temporary or permanent service for the permanently installed building equipment such as sump pumps, boilers, boiler controls, fans, pumps, so that such equipment may be operated when required and so ordered by the Owner's Representative for drainage or for temporary heat.

G. Except as otherwise provided in the Contract, the Contractor shall submit to the Owner or the Owner's Representative for approval a proposed schedule of all utility shutdowns and cutovers of all types which may be required in connection with the Work. Such schedule shall provide a minimum of two (2) weeks advance notice to the Owner prior to the time of the proposed shutdown and cutover. The Contractor shall be responsible for all charges relating to shutdowns.

H. Discontinuance, Changes and Removal

The Contractor shall:

1. Discontinue all temporary services required by the Contract when so directed by the Owner or the Owner's Representative. The discontinuance of any such temporary service prior to the completion of the Work shall not render the Owner liable for any additional cost entailed thereby.

2. Remove and relocate such temporary facilities as directed by the Owner or the Owner's Representative, and shall restore the Site and the Work to a condition satisfactory to the Owner.

2.3 TEMPORARY CONTRACTOR TELEPHONE SERVICE

A. Site Superintendent or their Representative shall carry a cellular telephone at all times.

B. Provide phone number to Cornell project representatives for communication during Work.

2.4 TEMPORARY SANITARY FACILITIES

A. The Owner shall designate sanitary facilities to be utilized by the Contractor during construction. The Contractor shall maintain neat, clean and sanitary conditions. The Contractor shall be responsible for costs associated with excessive custodial services associated with such usage.

3.0 EXECUTION

3.1 REMOVAL

A. Completely remove temporary materials and equipment when their use is no longer required.

B. Clean and repair damage caused by temporary installations or use of temporary facilities.

C. Restore existing and permanent facilities used for temporary services to specified, or to original, condition.

*****END OF SECTION 01 51 00*****

SECTION 01 66 00 STORAGE AND PROTECTION

1.0 GENERAL

1.1 DESCRIPTION

A. Receive, pile, store and handle all materials, equipment and other items incorporated or to be incorporated in the Work, including items furnished by the Owner in a careful and prudent manner and shall protect them against loss or damage from every source.

B. Obscure from public view, in a manner acceptable to the Owner, staging and storage areas.

1.2 TRANSPORTATION AND HANDLING

A. Transport and handle products in accordance with manufacturer's instructions; using means and methods that will prevent damage, deterioration, and loss, including theft.

B. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction space.

C. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.

D. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installation.

E. Promptly inspect shipments to assure that products comply with requirements, quantities are correct and products are undamaged.

F. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement or damage.

1.3 ON-SITE STORAGE

A. Materials stored on the Site shall be neatly piled and protected, and shall be stored in a neat and orderly manner in locations that shall not interfere with the progress of the Work or with the daily functioning of the Institution.

B. Materials subject to weather damage shall be protected against the weather by floored weatherproof temporary storage sheds.

C. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.

D. Storage piles and sheds shall be located within the area designated as the Staging Area. The Contractor shall work to ensure that the condition of the staging area has no negative impact on the Campus, visually or otherwise; and that outside of that area. The Contractor has no impact at all on the Campus.

E. Materials stored within the building shall be distributed in such a manner as to avoid overloading of the structural frame, and never shall be concentrated in such a manner as to exceed the equivalent of 50 pounds per square foot uniformly distributed loading. Stored materials shall be moved if they interfere with the progress of the Work.

F. Should it become necessary during the course of the Work to move stored materials or equipment, the Contractor, at the direction of the Owner or the Owner's Representative, shall move such materials or equipment.

1.4 CAMPUS SITE / BOOKBANK DRIVE STORAGE

A. All property including construction materials and equipment stored at the Bookbank Drive or other Campus site, shall be stored at the Contractor's sole risk. The Contractor is solely responsible for repair or replacement of property due to any cause of loss. Due to work at the Bookbank Drive lot, staging space is limited and not guaranteed to be provided. If staging space is needed, a request should be submitted to the Project Manager.

B. The Contractor agrees to hold Cornell harmless from any accident or injury occurring at Bookbank Drive storage or other assigned Campus site associated with the Contractor's storage.

C. The Contractor understands that Cornell makes "no" warranty regarding any security at the Bookbank Drive or other assigned Campus site.

D. The Contractor agrees that it is solely responsible for any cleanup of any site contamination caused by the Contractor's storage or storage operations and the Contractor agrees to pay for cleanup of any contamination and restore the site back to the same condition it was found.

E. It shall be assumed that the Contractor is responsible for site contamination unless the Contractor has reported condition prior to moving storage materials and equipment onto the site. Each Contractor shall be responsible for their own general area whether defined formally or not but in cases where pollutants have traveled or are found in the public areas used by all contractors, the Contractor agrees as follows:

1. If it cannot be determined who is responsible for site contamination after an investigation, all contractors who could be responsible based upon location of the incident agree to share the expense of cleanup equally.

F. No storage of hazardous materials or environmental contaminants is permitted at the Bookbank Drive or any Campus site. All barrels must have labels affixed identifying contents.

G. The Contractor will be responsible for securing and maintaining any Campus site area designated to them. All contractor trailers or storage containers located on Cornell Campus Property will need to file for a building permit with the Town of Ithaca. If the trailer/container is there longer than 180 days, the trailer/container will need to meet the Building Code requirements of a permanent structure. The trailer/container will need a means of egress that can be operated from the inside and a fire extinguisher. The contractor will also need to file for a demolition permit when the trailer/container is removed

H. Unoccupied storage containers not within the project fence shall be labeled in the Cornell standard.

1.5 PROTECTION

A. The Contractor shall provide security personnel and adopt other security measures as may be necessary to adequately protect materials and equipment stored at the site. The Contractor shall be obligated to replace or pay for all materials and equipment including items furnished by the Owner which have been damaged or stolen prior to completion of the Work.

B. Protection of Utilities

1. If during the course of the Project, it is necessary to work adjacent to existing utilities, pipelines, structures and equipment, the Contractor shall take all necessary precautions to protect existing facilities from damage.

2. Locations of utilities as shown on the Contract Documents are approximate only. The Contractor shall excavate or otherwise locate to verify existing utilities in advance of its operation.

C. Protective Covering

1. All finished surfaces shall be protected by the Contractor as follows:

a. Door and windowsills and the jambs and soffits of openings used as passageways or through which material is handled, shall be cased and protected adequately against possible damage resulting from the conduct of the work of all trades.

b. All surfaces shall be clean and not marred upon delivery of the building to the Owner. The Contractor shall, without extra compensation, replace all blocks, gypsum board, plaster, paint, tile, and all other surfaces, whether or not protected, which are damaged, and shall refinish (including painting as specified) to satisfaction of Owner.

c. Tight wood sheathing shall be laid under any materials that are stored on finished concrete surfaces and planking must be laid before moving any materials over these finished areas. Wheelbarrows used over such areas shall have rubber tires on wheels.

d. Contractor has the responsibility for protection of carpeting and all finish flooring during all phases of the Work including after installation.

e. All floors exposed to view as a floor finish shall be protected by overlaying with plywood in all areas subject to construction traffic within and without the building, special care shall be taken to protect all stair finish surfaces including but not limited to flooring, wood in-fill stairs, cabinetry, counters, equipment, etc.

2. HVAC ductwork shall be protected by the Contractor as follows to prevent introduction of contaminants:

a. Ductwork shall be wrapped at the factory using plastic wrap to exclude moisture and contaminants. The wrapping shall not be removed until immediately prior to installation.

b. Ductwork shall not be exposed to moisture or contaminants at any point in the manufacturing, shipping, storage or installation process.

c. Ductwork shall not be staged or stored outside or otherwise exposed to the weather.

d. Ductwork shall be transported only inside of covered vehicles.

e. Once installed, ductwork shall be protected from contamination during the construction process.

1.6 PROTECTION AFTER INSTALLATION

A. Protect installed products, including Owner-provided products, and control traffic in immediate area to prevent damage from subsequent operations.

B. Provide protective coverings at walls, projections, corners, and jambs, sills, and soffits of openings in and adjacent to traffic areas.

C. Cover walls and floors of elevator cabins, and jambs of cab doors, when elevators are used by construction personnel.

D. Protect finish floors and stairs from dirt, wear, and damage:

1. Secure heavy sheet goods or similar protective materials in place, in areas subject to foot traffic.

2. Lay planking or similar rigid materials in place, in areas subject to movement of heavy objects.

3. Lay planking or similar rigid materials in place, in areas where storage of products will occur.

E. Protect waterproofed and roofed surfaces:

1. Restrict use of surfaces for traffic of any kind, and for storage of products.

2. When an activity is mandatory, obtain recommendations for protection of surfaces from manufacturer. Install protection and remove on completion of activity. Restrict use of adjacent unprotected areas.

F. Restrict traffic of any kind across planted lawn and landscape areas.

2.0 PRODUCTS – NOT USED

3.0 EXECUTION – NOT USED

END OF SECTION 01 66 00

SECTION 01 73 29 CUTTING, PATCHING AND REPAIRING

1.0 GENERAL

1.1 DESCRIPTION

A. The Contractor shall be responsible for all cutting, fitting and patching, including excavation and backfill, required to complete the Work or to:

1. Make sure several parts fit together properly.

2. Uncover portions of the Work to provide for installation of ill-timed work.

3. Remove and replace defective work.

4. Remove and replace work not conforming to requirements of Contract Documents.

5. Remove samples of installed work as specified for testing.

6. Repair or restore existing or new surfaces and finishes to match adjacent existing or new surfaces and finishes.

B. Upon written instructions of the Owner's Representative:

1. Uncover designated portions of Work for Architect's observation of covered work.

2. Remove samples of installed materials for testing beyond that specified.

3. Remove Work to provide for the alteration of previously incorrectly installed work.

4. Patch work uncovered or removed.

C. Do not damage or endanger any Work by cutting or altering the Work or any part thereof.

D. Do not cut or otherwise alter the Work of the Owner except with the written consent of the Owner's Representative.

E. Where cutting and patching involves adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with the original structure.

F. Openings and Chases

1. Build openings, including but not limited to channels, chases and flues as required to complete the Work as set forth in the Contract.

2. After installation and completion of any work for which openings have been provided, build in, over, and around and finish all such openings as required to complete the Work.

3. Furnish and install all sleeves, inserts, hangers and supports required for the execution of the Work.

1.2 SUBMITTALS

A. Submit a written request to the Architect prior to executing any cutting, alteration or excavation which affects the Work of the Owner, or which may affect the structural safety of any portion of the Project. Include:

1. Identification of the Project.

2. Description of the affected Work.

3. The necessity for doing the cutting, alteration or excavation.

4. The effect on the Work of the Owner's property, or on the structural integrity of the Project.

5. Description of the proposed Work:

a. The scope of cutting, patching, alteration, or excavation.

b. Contractor and trades who will execute the work.

c. Products proposed to be used.

d. The extent of refinishing to be done.

6. Alternatives to cutting, patching or excavation.

7. Designation of the responsibility for the cost of cutting and patching.

8. Written permission of any separate contractor whose work will be affected.

B. Should conditions of the Work or the schedule indicate a change of products from the original installation, submit a request for substitution as specified in Section 01 25 00 - Substitutions and Product Options.

C. Submit a written notice to the Architect and the Owner designating the date and the time the Work will be uncovered.

1.3 QUALITY ASSURANCE

A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would change their load-carrying capacity for load-deflection ratio.

1. Obtain written approval of the cutting and patching proposal before cutting and patching structural elements, including but not limited to the following:

B. Operational Limitations: Do not cut and patch operating elements or related components in a manner that would result in reducing their capacity to perform as intended. Do not cut and patch operating elements or related components in a manner that would result in increased maintenance or decreased operation life or safety.

C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in the Owner's opinion, reduce the building's aesthetic qualities. Do not cut and patch construction in a manner that would result in visual evidence of cutting and patching. Remove and replace construction which was cut and patched in a visually unsatisfactory manner at no expense to the Owner.

D. Waterproofing and Water Tightness: Do not cut or alter waterproofed walls or floors or any structural members without written permission of the Owner.

1. Waterproofing and Roofing Membranes

a. Employ qualified contractors to accomplish all required cutting, patching, or repairing of existing waterproofing and roofing membranes.

b. Before beginning cutting, patching or repairing of existing waterproofing and roofing membranes, obtain approval of all materials, methods and contractor to be used from the Owner and agency, or agencies, holding bond or guarantee/warranty in force for membrane.

2. Water Tightness

a. The Contractor shall be responsible for water tightness of product, materials, and workmanship, including work specified to be watertight and inferred by general practice to be watertight.

b. All floors (slabs), walls, roof, glazing, windows, doors, sleeves through foundation walls, flashings, and similar items shall be watertight.

c. If details or materials shown or specified are felt not satisfactory to produce water tightness, the Contractor shall inform the Owner's Representative before installation and submit proposed substitution or alternative method for review and approval. The Contractor shall execute approved change and make watertight at no additional cost to the Owner.

1.4 WARRANTIES

A. Replace, patch, and repair material and surfaces cut or damaged by methods and with materials in such a manner as not to void any warranties required or existing.

2.0 PRODUCTS

2.1 MATERIALS

A. Comply with the Contract Documents for each product involved.

B. Use materials identical to in-place or existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible. If identical materials are unavailable or cannot be used, use materials whose installed performance will equal or surpass that of in-place or existing materials, and will match visual appearance of in-place or existing materials.

3.0 EXECUTION

3.1 INSPECTION

A. Inspect existing conditions of the Project, including elements subject to damage or to movement during:

1. Cutting and patching.

2. Excavation and backfilling.

B. After uncovering Work, inspect the conditions affecting the installation of products, or performance of the Work.

C. Report unsatisfactory or dubious conditions to the Architect in writing; do not proceed with the Work until the Architect has provided further instructions.

3.2 PREPARATION

A. Provide shoring, bracing and other support as necessary to assure the structural safety of that portion of the Work.

B. Provide devices and methods to protect other portions of the Project from damage.

C. Provide for vertical and lateral support required to protect adjacent buildings and properties.

D. Provide protection from the elements for that portion of the Project which may be exposed by cutting and patching work, including but not limited to pumping to maintain excavations free from water.

E. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

F. Avoid cutting existing pipe, conduit, or ductwork serving the building but scheduled to be removed or relocated until provisions have been made to bypass them.

3.3 PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.

1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.

B. Cutting: Cut existing construction using methods which will assure safety, will be least likely to damage elements retained or adjoining construction, and will provide proper surfaces to receive new work.

1. In general, where cutting, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.

3. Cut through concrete and masonry using a cutting machine, such as a carbon saw or a diamond-core drill.

4. Comply with the requirements of applicable MEP work where cutting and patching of services is required.

C. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.

1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.

2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over patch and apply final paint coat over entire unbroken surface containing patch. Provide additional coats until patch blends with adjacent surfaces.

3. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes:

a. For continuous surfaces, refinish to nearest intersection.

b. For an assembly, refinish the entire unit.

4. When patching existing plaster finished walls and partitions, the Contractor shall utilize plaster trim, lath and other metal components to match the integrity of the existing system. All plaster finishes shall match existing finishes so as to provide a uniform visual appearance.

5. Floors and Walls: Where walls or partitions that are demolished extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

    a. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.

6. Ceilings: Patch, repair, or re-hang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

7. Concrete Masonry Units: Patch walls by toothing-in units using salvaged or new CMU units matching in-place units for type and size. Match coursing patterns, mortar joint profiles, and other features of in-place CMU walls. Use accessory materials compatible with in-place materials.

8. Brick and Masonry: Patch walls by toothing-in units using salvaged or new brick and masonry matching in-place brick and masonry units. Match coursing patterns, mortar joint profiles, and other features of in-place brick and masonry walls. Use accessory materials compatible with in-place materials.

9. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weather-tight condition.

    a. Existing Roofing: Comply with requirements of existing roofing manufacturer for cutting and patching existing roofing system. Provide flashing and trim, base sheets, base flashing, adhesives, insulation, blocking, substrate boards, accessories, and other required items to patch roofing at penetrations and roof-top mounted items.

D. Repairs: Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.

    1. Completely fill holes and depressions in existing masonry walls that are to remain with an approved masonry patching material applied according to manufacturer's written recommendations.

E. Execute excavating and backfilling by methods which will assure safety, will prevent settlement or damage to other work.

F. Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances and finishes.

G. Restore Work which has been cut or removed; install new products to provide completed Work in accordance with requirements of Contract Documents.

H. The Contractor shall replace, repair and patch all surfaces of the ground, and of any structure disturbed by its operations and its Work, which surfaces and structures are intended to remain, even if such operations and work are outside the property lines. Such replacement, repair and patching shall be with like material and shall restore surfaces as they existed.

3.4 CLEANING

A. Clean area and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar items. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.

B. 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.

*****END OF SECTION 01 73 29*****

SECTION 01 77 00 PROJECT CLOSEOUT

1.0 GENERAL

1.1 INSPECTIONS

A. Substantial Completion:

1. Within a minimum of five (5) days prior to substantial completion, when the Work has reached such a point of completion that the building or buildings, equipment and apparatus can be occupied and used for the purpose intended, the Contractor shall conduct a detailed inspection of the Work to ensure that all requirements of the Contract have been met and that the Work is complete and is acceptable. Contractor shall prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

2. After receipt of the Contractor's initial punch list, the Architect will make an inspection of the Work to determine that the Work is substantially complete and that requirements of the Contract have been met and that the Work is sufficiently complete and is acceptable for use. The Architect will submit a marked-up list of items to be completed and/or corrected, inclusive of the Contractor's punch list, with an estimated dollar value for each item.

3. The Architect shall prepare a Certificate of Substantial Completion, template provided by the Owner, on the basis of an inspection, when the Architect has determined that the Work is substantially complete.

4. A copy of the report of the inspection will be furnished to the Contractor as the inspection progresses so that the Contractor may proceed without delay with any part of the Work found to be incomplete or defective.

5. All work performed under a Fire Protection System Installation/Alteration Operating Permit shall be inspected by the Ithaca Fire Department, or if so delegated by the Ithaca Building Department and the Owner's Environmental Health and Safety Department.

    a. A member of the Ithaca Fire Department shall witness all acceptance or reacceptance testing of work performed under a Fire Protection System Installation Operating Permit. All testing and inspections shall be in compliance with the applicable NFPA codes as referenced by Section 906.1 of the Fire Code of NYS.

    b. Work classified as a 'Repair' under the Existing Building Code does not require the Ithaca Fire Department to witness the testing of the affected systems. Systems that have been repaired must still be tested as required by the Fire Code of NYS and NFPA.

    c. The Ithaca Fire Department Shall Witness the Acceptance or Reacceptance Testing for the Following Conditions:

- Testing of any new installation of a fire alarm, fire suppression, or fire detection system as required by the Fire Code of New York State.

- Hydrostatic testing of sprinkler system where the modification affects more than twenty (20) sprinkler heads and the modified area can be isolated from the rest of the system

- Installation or replacement of a fire pump or drive elements of the fire pump.

- A Fire Alarm System with added or deleted components.

- A Fire Alarm System where the wiring or control circuits have been modified.

- A Fire Alarm System where the control unit (Fire Alarm Panel) has been replaced or the control unit software has been replaced.

- A smoke control system where the master control unit, individual fan control unit, or fan drive unit has been replaced or modified.

- An alternative fire suppression system that has been replaced or the actuation elements have been modified. Except: fusible link replacement.

- A modification or extension of the piping fur a fire standpipe system where a hydrostatic test is required by NFPA 14.

B. Final Acceptance:

1. When the items appearing on the report of inspection have been completed or corrected, the Contractor shall so advise the Architect. After receipt of this notification and Contractor's certified list of completed items, the Owner's Representative will inform the Contractor of the date and time of final inspection. A copy of the report of the final inspection containing all remaining contract exceptions, omissions and incomplete Work will be furnished to the Contractor.

2. After receipt of notification of completion and all remaining contract exceptions, omissions and incomplete Work from the Contractor, the Architect will make an inspection to verify completion of the exception items appearing on the report of final inspection.

1.2 SUBMITTALS

A. Contractor's List of Incomplete Items: Initial punch list submittal at Substantial Completion.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor, listing by room or space number. Organize items applying to each space by major element, including categories for individual exterior face elevations, ceilings, individual walls, floors, doors, roof levels, casework, equipment, and building systems.

B. Contractor's Certified List of Completed Items: Final signed punch list submittal at Final Completion.

C. Certificates of Release: Occupancy permits from authorities having jurisdiction.

1.3 FINAL CLEAN UP

A. Upon completion of the Work covered by the Contract the Contractor shall leave the completed Project ready for use and occupancy without the need of further cleaning of any kind and with all Work in new condition and in perfect order. In addition, upon completion of all Work, the Contractor shall remove from the vicinity of the Work all plant, buildings, rubbish, unused materials, concrete forms and other materials belonging to him or used under its direction during construction or impairing the use or appearance of the property and shall restore such areas affected by the Work to their original condition, and, in the event of its failure to do so, the same shall be removed by the Owner at the expense of the Contractor, and the Contractor and/or its surety shall be liable therefore. Final clean-up shall include but not be limited to the following:

1. All finished surfaces shall be swept, dusted, washed and polished. This includes cleaning of the Work of all finishing trades where needed, whether or not cleaning by such trades is included in their respective sections of the specifications.

2. Roofs, utility tunnels, manholes and pipe trenches and spaces between the new and existing Work shall be left thoroughly cleaned.

3. Finished flooring shall be thoroughly cleaned in accordance with the manufacturer's recommendations.

4. Where the finish of floors has been marred or damaged in any space or area, the entire floor of that space or area shall be refinished as recommended by the manufacturers of the flooring.

5. All equipment shall be in an undamaged, bright, clean, polished and new appearing condition.

6. All new glass shall be washed and polished, both sides. The Contractor shall be responsible for all breakage of glass in the area of the Work from the commencement of its activities until the building is turned over to Owner. The Contractor shall replace all broken glass and deliver the entire building with all glazing intact and clean.

7. Provide new filters for all fan convectors after final cleaning.

8. Refer to exterior clean up. Remove paint and glazing compound from surfaces.

B. Clean adjacent structures and improvements of dust, dirt, and debris caused by construction operations. Return adjacent areas to condition existing before construction operations began.

1.4 MAINTENANCE STOCK

A. Turn over to Owner's Representative the maintenance stock specified. Contractor shall obtain signed receipt from Owner's Representative for all maintenance stock.

2.0 PRODUCTS – NOT USED

3.0 EXECUTION – NOT USED

*****END OF SECTION 01 77 00*****

SECTION 01 78 23 OPERATING AND MAINTENANCE DATA

1.0 GENERAL

1.1 DESCRIPTION

A. The Contractor shall compile product data and related information appropriate for Owner's maintenance and operation of products furnished under the Contract.

1. Prepare operating and maintenance data as specified in this Section, as referenced in other pertinent sections of Specifications and as necessary to operate the completed Work.

2. Operations and maintenance data, in final format, shall be available to the Owner prior to substantial completion.

B. Instruct Owner's personnel in the maintenance of products and in the operation of equipment and systems.

1.2 FORM OF SUBMITTALS

A. Prepare data in the form of an instructional manual for use by Owner's personnel.

B. Upload electronic files to ePM system of complete manual in final form.

1. Format:

a. Size: 8-1/2" x 11”.

b. Text: Manufacturer's, scanned .pdf and/or neatly typewritten Word file.

c. Drawings in electronic format

- Drawings are required in PDF format. Drawings shall be in AutoCAD v14 or higher format.

d. Provide divider for each separate product, and major component parts of equipment.

- Provide type description of product, and major component parts of equipment.

- Provide indexed PDF bookmarks.

- Provide a series of files organized in subdirectories with a summary index with hyperlinks to the various documents.

e. Cover: Identify each volume with title "OPERATIONS AND MAINTENANCE INSTRUCTIONS".

List:

- Title of Project
- Identity of separate structure as applicable.
- Identity of general subject matter covered in the manual.

1.3 CONTENT OF MANUAL

A. Table of contents, typewritten, for each volume, arranged in a systematic order.

1. Contractor, name of responsible principal, address and telephone number.
2. A list of each product required to be included, indexed to the content of the volume.
3. List, with each product, the name, address and telephone number of:
    a. Subcontract or installer.
    b. Maintenance contractor, as appropriate.
    c. Identify the area of responsibility of each.
    d. Local source of supply for parts and replacement.
4. Identify each product by product name and other identifying symbols as set forth in Contract Documents.

B. Product Data:

1. Include only those sheets which are pertinent to the specific product.
2. Annotate each sheet to:
    a. Clearly identify the specific product or part installed.
    b. Clearly identify the data applicable to the installation.
    c. Delete reference to inapplicable information.

C. Submittal Data:

1. Include a record copy of the final, approved product submittal. Record copy shall be a clean copy (free of notes from the design professional) which has been updated to reflect the “as-installed” system.

D. Drawings:

1. Supplement product data with drawings as necessary to clearly illustrate:

a. Relations of component parts of equipment and systems.

b. Control and flow diagrams.

2. Coordinate drawings with information on Record Documents to assure correct illustration of completed installation.

3. Do not use Record Documents as maintenance drawings.

E. Written text, as required to supplement product data for the particular installation:

1. Organize in a consistent format under separate headings for different procedures.

2. Provide a logical sequence of instructions for each procedure.

F. Original copy of each warranty, bond, and service contract issued.

1. Provide information sheet for Owner's personnel, give:

a. Proper procedures in the event of failure.

b. Instances which might affect the validity of warranties or bonds.

1.4 MANUAL FOR MATERIALS AND FINISHES

A. Upload electronic files to ePM system.

B. Content, for architectural products, applied materials and finishes:

1. Manufacturer's data, giving full information on products:

a. Catalog number, size, and composition.

b. Color and texture designations.

c. Information required for reordering special-manufactured products.

d. Certification as to asbestos free

2. Instructions for care and maintenance:

a. Manufacturer's recommendation for types of cleaning agents and methods.

b. Cautions against cleaning agents and methods which are detrimental to the product.

c. Recommended schedule for cleaning and maintenance.

C. Content, for moisture-protection and weather-exposed products:

1. Manufacturer's data, giving full information on products.

a. Applicable standards

b. Chemical composition

c. Details of installation

2. Instructions for inspection, maintenance, and repair.

D. Additional requirements for maintenance data: The respective sections of Specifications.

1.5 MANUAL FOR EQUIPMENT AND SYSTEMS

A. Upload electronic files to ePM system.

B. Content, for each unit of equipment and system, as appropriate:

1. Description of unit and component parts.

a. Function, normal operating characteristics, and limiting conditions.

b. Performance curves, engineering data and tests.

c. Complete nomenclature and commercial number of all replaceable parts.

2. Operating procedures:

a. Start-up, break-in, routine and normal operating instructions.

b. Regulation, control, stopping, shut-down and emergency instructions.

c. Summer and winter operating instructions.

d. Special operating instructions.

3. Maintenance Procedures:

a. Routine operations.

b. Guide to "trouble-shooting".

c. Disassembly, repair and reassembly.

d. Alignment, adjusting and checking.

4. Servicing and lubrication required:

a. List of lubricants required.

5. Manufacturer's printed operating and maintenance instructions.

6. Description of sequence of operation by control manufacturer.

7. Original manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance.

    a. Predicted life of parts subject to wear.

    b. Items recommended to be stocked as spare parts.

8. As-installed control diagrams by controls manufacturer.

9. Each contractor's coordination drawings.

    a. As-installed color coded piping diagrams.

10. Charts of valve tag numbers, with the location and function of each valve.

11. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.

12. Other data as required under pertinent sections of Specifications.

C. Content, for each electric and electronic system, as appropriate:

1. Description of system and component parts:

    a. Function, normal operating characteristics, and limiting conditions.

    b. Performance curves, engineering data and tests.

    c. Complete nomenclature and commercial number of replaceable parts.

2. Circuit directories of panel boards:

    a. Electrical service.

    b. Controls.

    c. Communications.

3. As-installed color coded wiring diagrams.

4. Operating procedures:

    a. Routine and normal operating instructions.

    b. Sequences required.

    c. Special operating instructions.

5. Maintenance procedures:

   a. Routine operations.

   b. Guide to "trouble-shooting".

   c. Disassembly, repair and reassembly.

   d. Adjustment and checking.

6. Manufacturer's printed operating and maintenance instructions.

7. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.

8. Other data as required under pertinent sections of Specifications.

D. Additional requirements for operations and maintenance data: See the respective sections of Specifications and General Conditions.

1.6 SUBMITTAL REQUIREMENTS

A. Submit through ePM system preliminary draft of proposed formats and outlines of contents of the O&M Manual thirty (30) calendar days after approved submittals.

B. Submit completed data in final form twenty (20) calendar days prior to the Acceptance Phase (final Payment Application) of the Project.

1.7 INSTRUCTIONS OF OWNER'S PERSONNEL

A. Prior to final inspections or acceptance, fully instruct Owner's designated operating and maintenance personnel in the operation, adjustment and maintenance of all products, equipment and systems:

1. Instruction time shall be sufficient to fully instruct all shifts of the Owner's operating and maintenance personnel.

B. Operations and maintenance shall constitute the basis of instruction:

1. Review contents of manual with Owner personnel in full detail to explain all aspects of operations and maintenance.

C. Submit documentation, signed by each of the Owner's Representatives who have been instructed, describing:

1. Method of Instruction.

2. Equipment and Systems Operated.

3. Length of Instruction Period.

D. Contractor is fully responsible until final acceptance, even though operated by Owner's personnel, unless otherwise agreed in writing.

1.8 OPERATING INSTRUCTIONS

A. Upload in ePM system all operating, maintenance and starting precautions and procedures to be followed by Owner for operating all systems and equipment.

2.0 PRODUCTS – NOT USED

3.0 EXECUTION – NOT USED

*****END OF SECTION 01 78 23*****

SECTION 01 78 36 WARRANTIES AND BONDS

1.0 GENERAL

1.1 DESCRIPTION

The Contractor shall:

A. Compile specified warranties and bonds.

B. Compile specified service and maintenance contracts.

C. Co-execute submittals when so specified.

D. Review submittals to verify compliance with Contract Documents.

E. Submit to Architect for transmittal to Owner.

1.2 SUMMARY

A. This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturers standard warranties on products and special warranties.

1. Refer to the General Conditions for terms of the Contractor's special warranty of workmanship and materials.

2. General closeout requirements are included in Section 01 77 00 - "Project Closeout."

3. Specific requirements for warranties for the Work and products and installations that are specified to be warranted, are included in the individual Sections of Divisions 2 through 40.

4. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.

B. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and Subcontractors required to countersign special warranties with the Contractor.

1.3 DEFINITIONS

A. Standard Product Warranties are pre-printed written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

B. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner

1.4 QUALITY ASSURANCE

A. Use adequate care and diligence to review Contract Documents to identify detailed requirements relating to warranties and bonds.

B. Verify that each item required for this submittal conforms with specified requirements.

1.5 WARRANTY REQUIREMENTS

A. In addition to standard and special warranties described in Divisions 2 through 40, Contractor shall warrant work included in this Project, for a minimum period of one (1) year following acceptance of a Certificate of Substantial Completion by Owner, to cover performance, materials, workmanship and compliance with Contract Documents.

B. Corrective Work: Provide service within thirty (30) calendar days when requested by Owner. Perform services during normal working hours, unless specifically directed otherwise by Owner. Coordinate with Owner's representative to schedule performance of corrective work. Where designated service providers cannot perform corrective work within the Owner's required time frame, engage another qualified service provider. Submit a written statement to Owner upon completion of corrective work; document work performed and list outstanding items, if any.

1. When a completed breakdown of a piece of equipment occurs of the malfunction of a system affects the environment or program involving 50 or more persons at a time (employees and students combined), or creates a safety or security risk to the Owner, an EMERGENCY may be declared by the Owner. The Owner may declare an emergency as defined above at which time the service response must be within 4 hours and may require action during non-normal working hours.

2. When an emergency condition occurs, the Owner may take immediate corrective action to relieve the problem by making, a minimum as possible, temporary adjustments and/or repairs when necessary to decrease the problem until the designated Contractor's representative can respond. These temporary adjustments and repairs will in no way jeopardize the existing warranty.

3. The Owner's service staff will advise the Contractor's Representative of all temporary adjustments and repairs done in relation to the malfunctioning equipment or facility.

4. If the Contractor fails to respond with actual service within four (4) hours, and/or the necessary repairs or adjustments are not satisfactorily complete twenty-four (24) hours, the Owner will have the authority to make the necessary repairs or adjustments and charge the Contractor for parts and labor.

5. If all adjustments and repairs done by the Owner in relation to the above conditions are done by authorized district personnel, there will be no negative effect of future warranty claims.

C. Related Damages and Losses: When correcting failed or damaged warranted work, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted work.

D. Reinstatement of Warranty: When work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

E. Replacement Cost: Upon determination that work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

F. Owner's Recourse: Expressed warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

G. Contractor's Procurement Obligations: Do not purchase, subcontract for, or allow others to purchase or subcontract for materials or units of work for Project where a special project guaranty, specified product warranty, certification, or similar commitment is required until it has been determined that entities required to sign or countersign such commitments are willing to do so.

H. Specific Warranty. Where a special warranty, certification, or similar commitment is required on such work or part of the Work, the Owner reserves the right to refuse to accept the Work until the Contractor presents evidence that entities required to countersign such commitments are willing to do so.

1.6 SUBMITTAL REQUIREMENTS

A. Submit written warranties to the Architect prior to the date certified for Substantial Completion. If the Architect's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Architect or Owner.

1. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Architect and Owner within fifteen (15) days of completion of that designated portion of the Work.

B. When a special warranty is required to be executed by the Contractor, or the Contractor and a Subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner through the Architect for acceptance prior to final execution.

1.7 SUBMITTALS REQUIRED

A. Submit warranties, bonds, and service and maintenance contracts as specified in the respective sections of Specifications. Submit a list of all required warranties.

2.0 PRODUCTS – NOT USED

3.0 EXECUTION

3.1 FORM OF SUBMITTALS

A. The Warranties and Bonds shall be in electronic pdf format. Each submission shall include the title of the Project and the name of the Contractor.

B. Provide a series of files organized in subdirectories with a summary index with hyperlinks to the various documents and or references.

C. Assemble warranties, bonds and service and maintenance contracts, executed by each of the respective manufacturers, suppliers and subcontractors.

D. Table of Contents: Neatly typed, in orderly sequence. Provide complete information for each item.

1. Product or work item.
2. Item description.
3. Notation of what the equipment serves (e.g. – Provides perimeter heat)
4. Warranty Provider. Is the warranty provided by a manufacturer or installer?
5. Firm, with name of principal and responsible party, address and telephone number.
6. Scope.
7. Duration.
    a. Date of beginning of warranty, bond or service and maintenance contract
    b. End date of warranty, bond or service and maintenance contract.

8. Provide information for Owner's personnel:

   a. Proper procedure in case of failure.

   b. Instances which might affect the validity of warranty or bond.

9. Contractor, name of responsible principal, address and telephone number.

3.2 TIME OF SUBMITTALS

A. Make final submittals within ten (10) days after Date of Substantial Completion, prior to final request for payment.

B. For items of work when acceptance is delayed materially beyond the Date of Substantial Completion, provide updated submittal within ten (10) days after acceptance, listing the date of acceptance as the start of the warranty period.

*****END OF SECTION 01 78 36*****

SECTION 01 78 39 RECORD DOCUMENTS

1.0 GENERAL

1.1 DESCRIPTION

A. The Contractor shall maintain at the site, during construction, one record copy of:

1. Drawings
2. Specifications
3. Addenda
4. Change Orders and other Modifications to the Contract
5. Architect's Field Orders or written instructions.
6. Final Shop Drawings, Product Data and Samples
7. Field Test records
8. Construction photographs

1.2 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Store documents and samples in Contractor's field office apart from documents used for construction.

B. File documents and samples in accordance with the Owner’s electronic project management system document structure.

C. Maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.

D. Make documents and samples available at all times for review by the Owner’s Representative and the Architect.

1.3 RECORDING

A. Label each document "AS BUILT" in neat large printed letters.

B. Record information concurrently with construction progress.

1. Do not conceal any Work until required information is recorded.

C. Drawings

As built drawings shall consist of making any changes neatly and clearly on the Contract Drawings using colored ink or pencil, shall be kept current by the contractor on a day-to-day basis in concert with the progress of the Work. Where applicable, the change marked on a drawing is to carry the notation “per Change Order No. X”, or similar reference which cites the reason for the change. As an alternative approach the Contractor can submit a plan for producing the “As-Built” drawings via electronic mark-up in Bluebeam, Adobe Professional, or other similar program as an alternative to colored pencil or ink mark-ups. Such plan shall be subject to approval of the Owner.

The day-to-day construction as built drawings shall be made available to the Architect or Owner’s Representative for review upon request. The "As built" drawings shall show all changes to the following areas of construction:

1. Architectural:
    a. Modifications to components dictated by the building code
    b. Wall, door, window locations
    c. Built in casework locations
    d. New rated door and wall schedules/ locations
    e. Material and products where submittals are requested
2. Mechanical (HVAC, Plumbing and Fire Protection)
    a. Products where submittals are requested
    b. Final locations of all equipment.
    c. Final sizes and materials of piping and ductwork.
    d. Final locations of inaccessible piping and ductwork.
    e. Final locations of all controls equipment, including all sensors and actuators.
    f. Final locations of all valves and dampers, including all shutoff valves, balance dampers and fire dampers.
    g. Location of access doors for all equipment in concealed locations.
    h. Final location and arrangement of all mechanical equipment and concealed gas, sprinkler, domestic, sanitary and drainage systems piping and other plumbing, including, but not limited to, supply and circulating mains, principal valves, meters, clean-outs, drains, pumps and controls, vent stacks, sanitary and storm water drainage.
3. Electrical
    a. Products where submittals were requested.

b. Circuit (wire and raceway) size, number, and type.

c. Main circuit pathways for Fire Alarm, Emergency Power, and Access Control/Security systems.

d. Final locations of equipment and devices, interior and exterior luminaires, and power supplies.

e. Final location of electric signal system panels, final arrangement of all circuits and any significant changes made in electrical signal system design as a result of Change Order or job conditions.

D. Specifications and Addenda

Legibly mark each section to record:

1. Manufacturer, trade name, catalog number, and Supplier of each product and item of equipment actually installed.

2. Changes made by Field Order or by Change Order.

1.4 SUBMITTAL

A. After completion of Punchlist, deliver copies of all record documents to the Owner's Representative.

B. Accompany submittal with transmittal letter in duplicate, containing:

1. Date

2. Project title and number

3. Contractor's name and address

4. Title and number of each record document

5. Certification that each document is complete and accurate

6. Signature of Contractor or its authorized representative.

2.0 PRODUCTS – NOT USED

3.0 EXECUTION – NOT USED

*****END OF SECTION 01 78 39*****

TECHNICAL SPECIFICATIONS

FOR

RHODES HALL B50 LAB RENOVATION

CORNELL UNIVERSITY
ITHACA, NEW YORK

SECTION 024119

SELECTIVE DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes demolition and removal of selected portions of a building or structure as indicated on the Drawings and as required to complete the Work.

B. Includes repair, patching, and preparation of substrates exposed by selective demolition operations.

C. Work includes removal, salvage, protection, and reinstallation of existing materials where indicated.

1.2 RELATED SECTIONS

A. Section 011100 – Summary of Work.

B. Section 012300 – Alternates.

C. Section 055000 – Miscellaneous Metals.

D. Section 087100 – Door Hardware.

E. Section 064023 – Architectural Woodwork.

G. Section 078413 – Firestops and Smokeseals.

H. Section 079200 – Joint Sealers.

I. Section 087100 – Door Hardware.

J. Section 099000 – Painting and Finishings.

K. Divisions 22, 23, and 26.

1.3 DEFINITIONS

A. Remove/Demolish: Detach items from existing construction and legally dispose of them off-site.

B. Remove and Salvage: Detach items, clean, and prepare for reuse.

C. Remove and Reinstall: Detach items, prepare, store, and reinstall in original location.

D. Existing to Remain: Existing construction not indicated to be removed.

1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolished materials shall become Contractor property and shall be removed from Project site.

B. Items indicated to be salvaged or reused remain property of Owner.

1.5 SUBMITTALS

A. Qualification Data: Provide documentation of experience for demolition firm.

B. Demolition Schedule: Detailed sequence including utilities, access, partitions, and coordination with Owner occupancy.

C. Dust and Noise Control Plan: Indicate methods, locations, and duration.

D. Predemolition Photographs: Document existing conditions.

E. Inventory of Salvaged Items: Submit upon completion of demolition.

1.6 QUALITY ASSURANCE

A. Comply with ANSI A10.6 and NFPA 241.

B. Comply with governing regulations for demolition and disposal.

C. Contractor shall comply with FM Data Sheet 10-4.

D. Conduct predemolition conference to review procedures.

1.7 FM GLOBAL REQUIREMENTS

A. Comply with FM Data Sheets 2-0, 5-31, 10-3, 10-4, and 10-7.

B. Provide hot work permits and fire watch.

C. Maintain fire protection systems unless impairment procedures are followed.

D. Remove combustible debris prior to hot work.

E. Maintain sprinkler coverage and avoid obstruction of spray patterns.

1.8 PROJECT CONDITIONS

A. Conduct Work to minimize disruption to occupied areas.

B. Maintain safe access and egress at all times.

C. Do not close or obstruct occupied areas without approval.

D. Protect existing construction to remain from damage.

E. Hazardous materials shall not be disturbed; notify Owner immediately.

1.9 UTILITY SERVICES

A. Maintain existing utilities to remain in service.

B. Do not interrupt services without written approval.

C. Provide temporary services during interruptions.

D. Provide minimum seven days notice prior to shutdown.

1.10 HOT WORK

A. Comply with FM Data Sheet 10-3.

B. Provide fire watch during and after hot work.

C. Protect adjacent materials from sparks and heat.

PART 2 PRODUCTS

2.1 MATERIALS

A. Provide materials required for patching and repair matching existing materials.

B. Comply with requirements of related specification sections.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting Work.

B. Document conditions with photographs.

C. Report discrepancies to Architect.

3.2 PREPARATION

A. Provide temporary barriers, enclosures, and protection.

B. Protect adjacent surfaces, equipment, and finishes.

C. Maintain sprinkler coverage per FM 2-0.

D. Remove or protect items subject to damage.

3.3 UTILITY SERVICES

A. Maintain utilities to remain.

B. Coordinate shutdowns with Owner.

C. Provide temporary services as required.

3.4 POLLUTION CONTROL

A. Use water mist, enclosures, and cleaning to control dust.

B. Prevent spread of debris to adjacent areas.

C. Clean surfaces daily and maintain site in safe condition.

3.5 SELECTIVE DEMOLITION

A. Demolish only to extent required.

B. Use methods that prevent damage to adjacent construction.

C. Cut and drill from exposed side where possible.

D. Remove debris promptly and continuously.

E. Remove unused cables and wiring in accordance with FM 5-31.

3.6 SALVAGE AND REINSTALLATION

A. Clean, pack, label, and store salvaged items.

B. Protect salvaged materials from damage.

C. Reinstall items in original locations unless otherwise indicated.

D. Provide connections and supports for reuse.

3.7 PATCHING AND REPAIRS

A. Repair damage caused by demolition at no expense to the Owner.

B. Match existing materials and finishes.

3.8 DISPOSAL

A. Remove demolished materials promptly.

B. Transport and dispose of materials legally.

C. Do not allow accumulation of debris on site.

END OF SECTION

SECTION 042200

CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes modification of existing concrete masonry walls, including cutting, patching, and coordination of penetrations.

1.2 RELATED SECTIONS

A. Section 055000 – Metal Fabrications: Supports, anchors, and framing attached to masonry.

B. Section 078413 – Firestopping: Sealing of penetrations through fire-rated masonry assemblies.

C. Section 079200 – Joint Sealers: Sealants at joints adjacent to masonry work.

D. Divisions 22, 23, and 26: Mechanical, plumbing, and electrical work requiring penetrations through masonry walls.

1.3 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 ACTION SUBMITTALS

A. Product data for patching materials, if required.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with applicable masonry standards for cutting and patching of existing construction.

1.6 FM GLOBAL REQUIREMENTS

A. General

1. Comply with FM Global Property Loss Prevention Data Sheets applicable to modification of existing masonry construction.
2. FM requirements shall govern where more stringent than code or referenced standards.

B. Cutting and Penetrations
1. Perform all cutting of existing masonry in a controlled manner.
2. Coordinate all penetrations with Sections 078413 – Firestopping and Divisions 22, 23, and 26 prior to cutting.
3. Do not cut masonry in a manner that interferes with sprinkler coverage or fire protection systems.

C. Fire-Resistance and Fire Protection
1. Maintain fire-resistance rating of existing masonry assemblies at all locations.
2. Restore fire-resistance rating at all penetrations and modifications in accordance with Section 078413.
3. Do not perform work that impairs fire protection systems without prior notification and approval in accordance with FM Global Data Sheet 10-7.

D. Construction Operations
1. Work involving cutting, drilling, grinding, or other spark-producing operations shall comply with FM Global Data Sheet 10-3.
2. Maintain fire protection systems in service during construction. Where impairments are required, comply with FM Global Data Sheet 10-7.
3. Coordinate construction activities in accordance with FM Global Data Sheet 10-4.

E. Coordination
1. Verify locations and extents of all penetrations prior to cutting.
2. Do not proceed with cutting until all affected trades have coordinated installation requirements.
3. Notify Architect if structural or load-bearing elements are encountered prior to cutting.
4. Coordinate masonry modifications with adjacent construction to prevent damage to existing materials and systems.

PART 2 EXECUTION

2.1 REPAIRING, POINTING, AND CLEANING

A. Clean existing masonry surfaces after work is complete. Remove debris and dust resulting from cutting operations.

2.2 MASONRY WASTE DISPOSAL

A. Remove debris resulting from cutting operations and dispose of off site in accordance with applicable regulations.

2.3 MODIFICATION OF EXISTING MASONRY

A. Cutting of existing Masonry

1. Perform cutting using saw cutting methods only.
2. Do not use impact tools or uncontrolled demolition methods.
3. Limit size of openings to minimum required for installed systems.
4. Do not cut in a manner that affects sprinkler coverage or fire protection systems.
5. Core drilling is permitted where required for circular penetrations.
6. Perform cutting operations in accordance with FM Global requirements for construction activities.

B. Patching Masonry

1. Patch openings to match existing construction in material, texture, and finish.
2. Restore fire-resistance rating of assemblies where penetrations occur.

C. Coordination with Penetrations

1. Coordinate all penetrations with Section 078413 – Firestopping.
2. Coordinate with Divisions 22, 23, and 26 prior to cutting.
3. Do not cut openings until locations and sizes have been coordinated with all affected trades.

D. Structural Integrity

1. Do not cut or remove load-bearing elements without prior approval.
2. Notify Architect if structural elements are encountered.

END OF SECTION

SECTION 055000

MISCELLANEOUS METALS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the miscellaneous metal work as indicated on the drawings and/or specified herein, including, but not limited to, the following:

1. Rough hardware.
2. Metal fabrications, including steel angles and aluminum shapes, plates, angles and supports required for installation of miscellaneous metal work.
3. Aluminum speed rail systems, including aluminum pipe, fittings, supports, brackets and anchorage devices.
4. Light steel framing and supports not included as part of work of other trades.
5. Steel framing, bracing, supports, anchors, bolts, shims, fastenings, and all other supplementary parts indicated on drawings or as required to complete each item of work of this Section.
6. Prime painting, touch-up painting, galvanizing and separation of dissimilar metals for work of this Section.
7. Cutting, fitting, drilling and tapping work of this Section to accommodate work of other Sections and of concrete, masonry or other materials as required for attaching and installing work of this Section.

1.3 RELATED SECTIONS

A. Section 012300 – Alternates.

B. Section 024119 – Selective Demolition.

C. Section 042200 – Concrete Unit Masonry.

D. Section 064023 – Architectural Woodwork.

E. Section 078100 – Sprayed Fire-Resistive Materials.

F. Section 078413 – Firestops and Smokeseals.

G. Section 087100 – Door Hardware.

H. Section 099000 – Painting and Finishing.

I. Section 132816 – Safety Netting.

J. Divisions 22, 23, and 26.

1.4 QUALITY ASSURANCE

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible. Do not delay job progress; allow for trimming and fitting where taking field measurements before fabrication might delay work.

B. Shop Assembly: Pre-assemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for re-assembly and coordinated installation.

C. Reference Standards: The work is subject to requirements of applicable portions of the following standards:

1. "Manual of Steel Construction," American Institute of Steel Construction.

2. AWS D1-1 "Structural Welding Code," American Welding Society.

3. SSPC SP-3 "Surface Preparation Specification No. 3, Power Tool Cleaning," Steel Structures Painting Council.

4. SSPC PA-1 "Painting Application Specification," Steel Structures Painting Council.

5. "Handbook on Bolt, Nut and Rivet Standards," Industrial Fasteners Institute.

6. Aluminum Design Manual, The Aluminum Association.

1.5 FM GLOBAL REQUIREMENTS

A. All Work shall comply with applicable FM Global Property Loss Prevention Data Sheets, including but not limited to:

1. Data Sheet 1-21 – Fire Resistance of Building Assemblies.

2. FireSData Sheet 2-0 – Installation Guidelines for Automatic Sprinklers

3. Data Sheet 5-31 – Cables and Bus Bars

4. Data Sheet 10-3 – Hot Work Management

5. Data Sheet 10-4 – Contractor Management
6. Data Sheet 10-7 – Fire Protection Impairment Management

B. FM requirements shall govern where more stringent than code or other referenced standards.

1.6 SUBMITTALS

A. Manufacturer's Literature: Submit manufacturer's specifications, load tables, dimension diagrams, anchor details and installation instructions for products to be used in the fabrication of miscellaneous metal work, including paint products.

B. Shop Drawings: Shop drawings for the fabrication and erection of all assemblies of miscellaneous work which are not completely shown by manufacturer's data sheets. Include plans and elevations at not less than 1" to 1'-0" scale and include details of sections and connections at not less than 3" to 1'-0" scale. Show anchorage and accessory items.

C. Welding shall be indicated on shop drawings using AWS symbols and showing length, size and spacing (if not continuous). Auxiliary views shall be shown to clarify all welding. Notes such as 1/4" weld, weld and tack weld are not acceptable.

D. Certification: For items to be hot-dip galvanized, identify each item galvanized and to show compliance of application. The Certificate shall be signed by the galvanizer and shall contain a detailed description of the material processed and the ASTM standard used for the coating and, the weight of the coating. In addition, and as attachment to Certification, submit reports of testing and inspections indicating compliance with the provisions of this Section.

PART 2 PRODUCTS

2.1 MATERIALS

A. Metals: Provide steel and aluminum materials of the types, sizes, and properties required to complete the work, including shapes, plates, bars, pipe, and extrusions, with sufficient structural properties to sustain imposed loads.

B. Aluminum: Provide aluminum pipe, extrusions, and fittings complying with ASTM B221, Alloy 6063-T6, suitable for fabrication of speed rail systems and related supports. Provide fittings, including elbows, tees, flanges, and connectors, compatible with aluminum piping. Fittings shall be of modular aluminum system type designed for mechanical connection without field welding. Provide brackets, supports, and anchors fabricated from aluminum or stainless steel, designed to support imposed loads without excessive deflection. Design aluminum pipe and support systems to limit deflection and vibration under imposed loads.

   a. Aluminum Pipe Manufacturers: Subject to compliance with requirements, provide products by Hollaender Manufacturing Company or equal approved by Architect.

b. Fittings Manufacturers: Provide products by Hollaender Manufacturing Company.

c. Isolate aluminum from dissimilar metals to prevent galvanic corrosion. Provide non-conductive separators, coatings, or compatible fasteners as required.

1. Metal Surfaces, General: For fabrication of miscellaneous metal work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.

2. Steel Plates, Shapes and Bars: ASTM A36.

3. Structural Steel Sheet: Hot rolled, ASTM A1011; or cold rolled, ASTM A1008, Class 1; of grade required for design loading.

4. Concrete Anchors and Inserts: Provide Hilti concrete anchors suitable for imposed loads and substrate conditions. Anchors shall comply with applicable ICC-ES and FM Global requirements. Provide bolts, washers, shims, and accessories as required, hot-dip galvanized in accordance with ASTM A153 where exposed to corrosion or dissimilar metals.

5. Aluminum Pipe: ASTM B221, Alloy 6063-T6; size and wall thickness as required for design loads and indicated applications.

6. Brackets, Flanges, and Anchors: Cast or formed metal, including steel, aluminum, or stainless steel, as required for compatibility with supported systems, including speed rail assemblies.

7. Aluminum Extrusions: ASTM B221, Alloy 6063-T6.

8. Aluminum Fittings: Cast or machined aluminum fittings compatible with aluminum pipe and speed rail systems, including elbows, tees, flanges, and connectors; modular system type suitable for mechanical connection without field welding.

9. Speed Rail Supports and Brackets: Fabricated aluminum or stainless steel brackets, supports, and anchors as required for complete installation; designed to support imposed loads without excessive deflection.

10. Isolation: Provide separation between dissimilar metals to prevent galvanic corrosion. Use non-conductive separators, coatings, or compatible fasteners as required.

C. Grout: Non-shrink, non-metallic grout conforming to the requirements of Section 033000.

D. Fasteners

1. General: Provide fasteners of type, grade, and material compatible with connected materials and required for strength and durability. Provide stainless steel fasteners for aluminum components and where exposed to moisture.

2. Bolts and Nuts: Regular hexagon head type, ASTM A 307, Grade A, except provide stainless steel bolts for aluminum speed rail systems and connections as specified herein.

3. Anchor Bolts: ASTM F 1554, Grade 36.
4. Plain Washers: Round, carbon steel, ASME B18.22.1.
5. Masonry Anchorage Devices: Expansion shields, FS FF-S-325.
6. Toggle Bolts: Tumble-wing type, FS FF-B-588, type, class and style as required.
7. Lock Washers: Helical spring type carbon steel, ASME B18.21.1.

E. Aluminum Speed Rail and Fitting Connections:

1. General: Provide fasteners and connection methods for aluminum speed rail systems and fittings in accordance with manufacturer's written recommendations and approved shop drawings.

F. Through-Bolted Fitting Connections:

1. Where indicated or necessary for hanger or structural applications, provide through-bolted connections in lieu of set screw connections.
2. Provide bolts, washers, and nuts, minimum 3/8-inch diameter, unless otherwise required by manufacturer.
3. Where required by manufacturer or for structural support conditions, provide 1/2-inch or 5/8" diameter bolts, washers, and nuts.
4. Bolts shall be stainless steel, Type 300 series minimum (304 or 316).
5. Provide flat washers at both sides of connection.
6. Provide lock nuts or self-locking nuts.
7. Drill holes cleanly through fittings and pipe; do not deform members.
8. Connections shall be designed to transfer load in shear and bearing, not by friction alone.

G. Set Screw Replacement:

1. Where set screws are replaced with through-bolts:
   a. Remove or drill out existing tapped holes as required.
   b. Align holes to ensure proper load transfer and avoid eccentric loading.
   c. Provide isolation between stainless fasteners and aluminum components to prevent galvanic corrosion.

H. Anchors at Concrete Slabs (Top Supports):

1. Provide anchors for attachment to concrete slabs in accordance with manufacturer's recommendations.

2. Where embedded anchors are used, provide Hilti stainless steel screw anchors, wedge anchors, or approved equal anchor systems sized as required for imposed loads and substrate conditions, but not less than 3/8-inch diameter unless otherwise required by design. Anchors shall comply with applicable ICC-ES and FM Global requirements and shall be suitable for existing concrete conditions where applicable.
3. Anchor length shall be coordinated with slab thickness to maintain required embedment without exceeding slab depth or affecting slab integrity.

I. Anchors at Masonry (CMU Walls):

1. Provide anchors suitable for hollow CMU construction, including through-bolts, sleeve anchors, expansion anchors rated for hollow base materials.
2. Do not use standard wedge anchors in ungrouted CMU unless specifically approved.
3. Provide minimum 1/2-inch diameter fasteners for structural support conditions, unless otherwise indicated.
4. Provide stainless steel or appropriately coated fasteners compatible with aluminum components.

J. Shop Paint: Shop prime all non-galvanized miscellaneous metal items using Series 88 Azeron Primer made by Tnemec, ICI Devoe "Rust Guard" quick dry alkyd shop coat No. 41403, or "Interlac 393" by International Protection Coatings.

1. If steel is to receive high performance coating as noted in Section 099000, shop prime using primer noted in Section 099000.

2.2 PRIME PAINTING

A. Scope: All ferrous metal (except galvanized steel and stainless steel) shall be cleaned and shop painted with one coat of specified ferrous metal primer. No shop prime paint required on galvanized steel or aluminum work.

B. Cleaning: Conform to Steel Structures Painting Council Surface Preparation Specification SP 3 (latest edition) "Power Tool Cleaning" for cleaning of ferrous metals which are to receive shop prime coat.

1. Steel to get high performance coating as noted in Section 099000 shall be cleaned as per SSPC SP.6 "Commercial Blast Cleaning."

C. Application

1. Apply shop prime coat immediately after cleaning metal. Apply paint in dry weather or under cover. Metal surfaces shall be free from frost or moisture when painted. Paint all metal surfaces including edges, joints, holes, corners, etc.

2. Paint surfaces which will be concealed after shop assembly prior to such assembly. Apply paint in accordance with approved paint manufacturer's printed instructions, and the use of any thinners, adulterants or admixtures shall be only as stated in said instructions.

3. Paint shall uniformly and completely cover the metal surfaces, 2.0 mils minimum dry film thickness. No work shall be shipped until the shop prime coat thereon has dried.

D. Touch-Up: In the shop, after assembly and in the field, after installation of work of this Section, touch-up damaged or abraded portions of shop prime paint with specified ferrous metal primer.

E. Apply one shop coat to fabricated metal items, except apply two (2) coats of paint to surfaces inaccessible after assembly or erection. Change color of second coat to distinguish it from the first.

2.3 WORKMANSHIP

A. General

1. Miscellaneous metal work shall be fabricated by an experienced fabricator or manufacturer and installed by an experienced tradesman.

2. Materials, methods of fabrication, fitting, assembly, bracing, supporting, fastening, operating devices, and erection shall be in accordance with drawings and specifications, approved shop drawings, and best practices of the industry, using new and clean materials as specified, having structural properties sufficient to safely sustain or withstand stresses and strains to which materials and assembled work will be subjected. Provide coordination between steel and aluminum components, including speed rail systems, to ensure compatibility of materials, finishes, and connections. Isolate dissimilar metals to prevent galvanic corrosion.

3. All work shall be accurately and neatly fabricated, assembled and erected.

B. Shop Assembly: Insofar as practicable, fitting and assembly of work shall be done in shop. Shop assemble work in largest practical sizes to minimize field work. It is the responsibility of the miscellaneous metal subcontractor to ensure that the shop-fabricated miscellaneous metal items will properly fit the field condition. In the event that shop-fabricated miscellaneous metal items do not fit the field condition, the item shall be returned to the shop for correction.

C. Cutting: Cut metal by sawing, shearing, or blanking. Flame cutting will be permitted only if cut edges are ground back to clean, smooth edges. Make cuts accurate, clean, sharp and free of burrs, without deforming adjacent surfaces or metals.

D. Holes: Drill or cleanly punch holes; do not burn.

E. Connections: Make connections with tight joints, capable of developing full strength of member, flush unless indicated otherwise. Locate joints where least conspicuous. Unless indicated otherwise, weld or bolt shop connections; bolt or screw field connections. Provide expansion and contraction joints to allow for thermal movement of metal at locations and by methods

approved by Architect. For aluminum speed rail systems and hanger assemblies, connections relying solely on set screws for load transfer shall not be used where members are suspended or required to support imposed loads. Provide through-bolted or otherwise mechanically secured connections capable of transferring design loads in shear and bearing.

1. Welding

    a. Shall be in accordance with AWS D1.1 Structural Welding Code of the American Welding Society and shall be done with electrodes and/or methods recommended by the manufacturer of the metals being welded.
    b. Welds shall be continuous, except where spot welding is specifically permitted. Welds exposed to view shall be ground flush and dressed smooth with and to match finish of adjoining surfaces; undercut metal edges where welds are required to be flush.
    c. All welds on or behind surfaces which will be exposed to view shall be done so as to prevent distortion of finished surface. Remove weld spatter and welding oxides from all welded surfaces.

2. Bolts and Screws: Make threaded connections tight with threads entirely concealed. Use lock nuts. Bolts and screw heads exposed to view shall be flat and countersunk. Cut off projecting ends of exposed bolts and screws flush with nuts or adjacent metal.

F. Operating Mechanism: Operating devices (i.e. pivots, hinges, etc.) mechanism and hardware used in connection with this work shall be fabricated, assembled, installed and adjusted after installation so that they will operate smoothly, freely, noiselessly and without excessive friction.

G. Built-In Work: Furnish anchor bolts, inserts, plates and any other anchorage devices, and all other items specified under this Section of the Specifications to be built into concrete, masonry or work of other trades, with necessary templates and instructions, and in ample time to facilitate proper placing and installation.

H. Supplementary Parts: Provide as necessary to complete each item of work, even though such supplementary parts are not shown or specified.

I. Coordination: Accurately cut, fit, drill and tap work of this Section to accommodate and fit work of other trades. Furnish or obtain, as applicable, templates and drawings to or from applicable trades for proper coordination of this work.

J. Exposed Work

1. In addition to requirements specified herein and shown on drawings, all surfaces exposed to view shall be clean and free from dirt, stains, grease, scratches, distortions, waves, dents, buckles, tool marks, burrs, and other defects which mar appearance of finished work.

2. Metal work exposed to view shall be straight and true to line or curve, smooth arrises and angles as sharp as practicable, miters formed in true alignment, profiles accurately intersecting, and with joints carefully matched to produce continuity of line and design.

3. Exposed fastenings, where permitted, shall be of the same material, color and finish as the metal to which applied, unless otherwise indicated.

2.4 MISCELLANEOUS METALS ITEMS

A. Rough Hardware

1. Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels and other miscellaneous steel and aluminum shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware items are specified in Division 6 Sections.

2. Light steel framing, bracing, supports, framing, clip angles, shelf angles, plates, etc., shall be of such shapes and sizes as indicated on the drawings and details or as required to suit the condition and shall be provided with all necessary supports and reinforcing such as hangers, braces, struts, clip angles, anchors, bolts, nuts, welds, etc., as required to properly support and rigidly fasten and anchor same in place and to steel, concrete, masonry and all other connecting and adjoining work.

2.5 ALUMINUM CONNECTIONS AND CORROSION PROTECTION

A. General:
Provide isolation and corrosion protection at all connections between aluminum components, including aluminum pipe, Speed-Rail fittings, aluminum members, and any adjacent dissimilar metals.

B. Aluminum Components:
Aluminum pipe and extrusions shall comply with ASTM B221, Alloy 6063-T6 unless otherwise required by structural design.

C. Dissimilar Metal Isolation:
Where aluminum comes into contact with steel, galvanized steel, or other dissimilar metals, provide non-conductive separation to prevent galvanic corrosion. Acceptable methods include:

1. Neoprene, EPDM, or nylon isolation gaskets or pads

2. Non-conductive bushings or sleeves at fasteners

3. Dielectric coatings or isolation compounds

D. Fasteners:
Provide stainless steel fasteners (Type 300 series minimum) for all aluminum connections unless otherwise indicated.
Fasteners shall be compatible with aluminum and protected against galvanic action.

E. Coatings and Finishes:

1. Aluminum components shall be anodized or powder-coated where exposed.

2. Steel components in contact with aluminum shall be galvanized or coated with high-performance protective coating.

3. Repair damaged coatings prior to installation.

F. Joint Protection:
Coordinate sealants at dissimilar metal interfaces with Section 079200 – Joint Sealers.

G. Installation:

1. Install components to prevent water accumulation at connections.

2. Avoid direct contact between aluminum and untreated steel.

3. Provide tight, stable connections to minimize movement and wear at interfaces.

H. Coordination:

1. Coordinate installation with adjacent systems, including fire protection, to maintain required clearances and avoid interference with building systems.

I. Fastener Isolation:

1. Provide non-conductive bushings or sleeves at through-bolted connections where stainless steel bolts pass through aluminum fittings.

2. Provide nylon or polymer washers where required to isolate dissimilar metals.

3. Prevent direct contact between aluminum and untreated steel.

PART 3 EXECUTION

3.1 INSPECTION

A. Examine the areas and conditions where miscellaneous metal is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 ERECTION

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; including threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required. Provide Hilti anchors where post-installed anchors are required in concrete or masonry.

B. Cutting, Fitting and Placement: Perform cutting, drilling and fitting required for installation of miscellaneous metal fabrications. Set work accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items which are to be built into concrete, masonry, or similar construction.

C. Fitting Connections: Fit exposed connections accurately together to form tight hairline joints. Weld connections which are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Grind exposed joints smooth and touch up shop paint coat.

D. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance, and quality of welds made, and methods used in correcting welding work.

E. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

F. Coordinate installation of aluminum pipe systems and supports with adjacent construction, including cable trays, netting systems, and other overhead installations, to maintain required clearances and avoid conflicts.

G. Hot Work:

1. All welding, cutting, grinding, and other spark-producing operations shall comply with FM Data Sheet 10-3.

2. Provide hot work permits, fire watch personnel, and fire extinguishing equipment.

3. Remove combustible materials from work area prior to performing hot work.

4. Protect adjacent construction from sparks, slag, and heat.

H. Fire Protection Systems:

1. Do not impair fire protection systems without compliance with FM Data Sheet 10-7.

2. Coordinate work affecting sprinkler systems with Owner and Architect.

3. Provide temporary protection where systems are impaired.

I. Cable and Electrical Systems Coordination:

1. Coordinate installation of metal supports and framing with cable trays and electrical systems to comply with FM Data Sheet 5-31.

2. Do not install supports in a manner that obstructs sprinkler protection of cable systems.

3. Maintain required spacing and accessibility for cable installations.

J. Fire Load Control:

1. Remove combustible debris and packaging materials daily.

2. Do not allow accumulation of combustible materials in work areas.

3. Store materials in a manner that minimizes fire risk.

END OF SECTION

SECTION 064023

ARCHITECTURAL WOODWORK

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the architectural woodwork as shown on the drawings and/or specified herein, including, but not limited to, the following:

1. Wood trim associated with existing counters.
2. Painted plywood mounting boards for electrical components.
3. Wood framing and rough lumber as required for work of this Section.
4. Wood grounds, blocking, nailers, furring as required for work of this Section.
5. All rough hardware and fastenings for work of this Section.
6. Drilling concrete and masonry, drilling and/or tapping metal work, as required, for the installation of work of this Section.
7. Back painting of plywood.
8. Shop finish of work of this Section, except items indicated herein to be shop primed only.
9. Metal angle supports associated with existing counter.

1.3 RELATED SECTIONS

A. Section 055000 – Metal Fabrications.

B. Section 079200 – Caulking between architectural woodwork and any wall, floor, or ceiling joints.

C. Section 078413 – Firestopping at penetrations and joints.

D. Section 078100 – Sprayed Fire-Resistive Materials.

E. Section 099000 – Painting and Finishing.

1.4 QUALITY STANDARDS

A. The quality standards of the Architectural Woodwork Institute, "Architectural Woodwork Standards," 2nd Edition, dated October 1, 2014, and enhancements 2019 shall apply to all workmanship including materials and installation, for architectural woodwork and by reference are made a part of this specification. All work shall conform to "Premium" grade requirements of the AWI "Architectural Woodwork Standards," unless otherwise modified herein.

B. In the event of a dispute as to the quality grade (or grades), the Contractor shall call upon the Architectural Woodwork Institute for an inspection under AWI's Quality Certification Program which shall include a QCP Inspection and Report. The Contractor agrees to abide by the decision of this Report. The cost of said inspection and report shall be borne by the Contractor.

C. Employ only tradesmen experienced in the fabrication and installation of architectural woodwork.

D. Woodworking firm must be accredited by the AWI Quality Certification Program (QCP).

E. Provide fire test reports by an accredited testing laboratory of all woodwork demonstrating compliance with fire rating classification as required by Code.

1.5 SUBMITTALS

A. Samples: Submit samples of each of the following items:

1. Wood trims with coatings.

1.6 QUALIFICATIONS

A. The work of this Section shall be provided by a firm having a minimum of five (5) years' experience on projects of similar size and quality to that specified and shown.

1.7 FM GLOBAL REQUIREMENTS

A. Comply with FM Global Property Loss Prevention Data Sheets applicable to interior finish materials and fire-retardant-treated wood products.

1. Data Sheet 1-21 – Fire Resistance of Building Assemblies.

2. Data Sheet 2-0 – Installation Guidelines for Automatic Sprinklers.

3. Data Sheet 10-3 – Hot Work Management.

4. Data Sheet 10-4 – Contractor Management.

5. Data Sheet 10-7 – Fire Protection Impairment Management.

B. FM requirements shall govern where more stringent than code or referenced standards.

1.8 COORDINATION

A. Coordinate the work of this Section with other appropriate Sections of the specifications to insure proper scheduling for fabrication and installation of the work specified herein

B. Coordinate with partition and finish trades to insure that proper provisions are made for the installation of the work specified herein.

C. Verify all dimensions in the field prior to fabrication of all Architectural Woodwork to assure proper fit.

1.9 PRODUCT HANDLING

B. All materials and work of this Section shall be protected from damage, from time of shipment from shop to final acceptance of work. Cover, ventilate, and protect work of this Section from damage caused by weather, moisture, heat, staining, dirt, abrasions, any other causes which may adversely affect appearance or use, or which may cause deterioration of finish, warping, distortion, twisting, opening of joints and seams, delamination, loosening, etc., of work of this Section.

C. Keep all finish carpentry, millwork, and cabinet work under cover both in transit and at the premises. Do not deliver any finish carpentry, millwork or cabinet work before it is required for installation. Protect such work to avoid damage in transit, during erection and after erection until acceptance of the building; use all such methods to provide the proper protection. Remove such protection when directed by the Architect.

D. Deliver finish carpentry, millwork, and cabinet work in a dry stable condition; protect same against injury and dampness. Do not store or install finish carpentry, millwork or cabinet work until after the concrete, masonry and plaster work are thoroughly dry.

E. Damaged or defective items of work of this Section are subject to rejection and replacement with new by Contractor, at no cost to Owner.

1.10 JOB CONDITIONS

F. Humidity Controls: The ambient relative humidity at the site, including both the storage and the installation areas, shall be maintained between 25% and 55% prior to delivery and through the life of the installation.

G. Determine equilibrium moisture content and maintain required temperature and relative humidity as required for a tolerance of plus or minus one (1) percent of the specified optimum moisture content until woodwork receives specified finishes. Refer to "Guide to Wood Species Selection," AWI, for method of determining equilibrium moisture content values.

H. Examination of Substrate and Conditions: The installer must examine the substrate and the conditions under which the work of this Section is to be performed, and notify the Contractor in writing of unsatisfactory conditions. Do not proceed with work under this Section until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

I. Areas to receive architectural woodwork must be fully enclosed with windows and/or curtain wall installed and glazed, exterior door in place, HVAC systems operational and temporary openings closed. Any plaster, wet grinding and concrete work shall be fully dry.

J. Architectural woodwork shall be allowed to come to equilibrium on site for 7 days prior to installation.

PART 2 PRODUCTS

2.1 BASIC REQUIREMENTS

A. Wood Moisture Content: Provide kiln-dried (KD) lumber with an average moisture content range of six (6) to eleven (11) percent.

B. Measurements: Before proceeding with woodwork required to be fitted to other construction, obtain field measurements and verify all dimensions of shop drawing details as required for accurate fit.

C. Compatibility of Grain and Color: Provide wood trim materials with consistent grain and appearance.

D. Machine and sand woodwork to comply with requirements of Standards for specified grade.

E. Fabricate woodwork to dimensions, profiles and details shown. Rout or groove back of flat trim members, kerf backs of other wide flat members except plywood or veneered members.

F. Miter joints by joining, splining and gluing to comply with requirements for the specified grade.

G. Inspect each piece of lumber and plywood or each unit of woodwork after drying; do not use twisted, warped, bowed of otherwise damaged or defective wood.

2.2 GENERAL - MATERIALS

A. Softwood lumber shall conform to the requirements of the latest edition of American Lumber Standards Simplified Practice Recommendation R-16. Grades shall conform to the grading rules of the Association having jurisdiction, and shall bear the official grade and trademark of the Inspection Bureau of the Association and a mark of mill identification.

B. Framing and Rough Lumber: No. 1 KD grade Southern Pine or Dense Construction grade Douglas Fir, having extreme fiber in bending stress of at least 1700 psi, surfaced four sides (S4S). Fire-retardant-treated wood shall comply with Section 062000.

C. Grounds, Blocking, Nailers, Furring: Southern Pine, Douglas Fir or Sitka Spruce, grade to suit particular purpose and to be straight, square edged, straight grained, surfaced four sides (S4S), and which will retain nails and screws without splitting. Fire-retardant-treated wood shall comply with Section 062000.

D. Plywood: AWI Section 4; Veneer core, particleboard, or plywood core:

1. Provide A-A grade sanded plywood for exposed electrical mounting boards indicated to receive paint finish.

2. Plywood shall be fire-retardant-treated.

3. Prepare exposed surfaces smooth and suitable for paint finish specified in Section 099000.

E. Finishing (Wood)

1. Transparent Finish for wood Trim

a. AWI Factory Finish System “Conversion Varnish”, System 5, Transparent.
b. AWI Premium Grade.
c. Stain: As selected by the Architect.
d. Degree of Sheen: Low-sheen satin.
e. Unfilled finish.

2. Electrical mounting boards shall receive paint finish and shall be backpainted.

F. Metal Angle Supports

1. Steel angles and related fasteners shall comply with Section 055000.

2. Exposed metal angle supports shall receive paint finish to match adjacent wall surfaces.

3. Prepare exposed metal surfaces for paint finish in accordance with Section 099000.

2.3 FABRICATION - GENERAL

A. Provide lumber framing for architectural woodwork, complete with all bracing and fastening devices as required for a rigid installation, and as required to sustain the imposed loads.

B. Do all fabrication from field measurement with provision for scribing as required to meet built-in conditions.

C. Coordinate the work of this Section with the work of other trades.

D. Fabricate units in largest practicable sections. Assemble in the shop for trial fit, disassemble for shipment and reassemble with concealed fasteners.

E. Maintain relative humidity and temperature during fabrication, storage and finishing operations matching that of the areas of installation.

F. Details indicate the required type and quality of construction. Modifications to conform to manufacturer's standards will be considered providing they comply with the Contract Documents, maintain the profiles shown and subject to acceptance by the Architect.

G. Reinforcing shown is minimum. Provide additional reinforcing as required to ensure a rigid assembly. Exposed surfaces shall be free from dents, tool marks, warpage, buckle, glue and open joints, or other defects affecting serviceability or appearance. Accurately fit all joints, corners and miters. Conceal all fasteners. Make threaded connections up tight so that threads are entirely concealed.

H. Factory finish all items where possible. Defer final touch-up, cleaning and polishing until after delivery and installation.

I. Comply with AWI, Premium Grade standards for sanding, filling countersunk fasteners, back priming and similar preparations for the finishing of architectural woodwork, as applicable to each unit of work.

J. Prepare exposed fasteners and surfaces for transparent finish.

PART 3 EXECUTION

3.1 INSPECTION

A. Examine the areas and conditions where architectural woodwork is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 FRAMING

A. Use specified framing lumber, sizes and spacing as indicated on drawings and as required to support loads.

B. Framing shall be cut square on bearings, closely fitted, accurately set to required lines and levels, rigidly secured in place at bearings and connection with lag screws and/or bolts as required by conditions.

3.3 GROUNDS, BLOCKING, NAILERS AND FURRING

A. Provide all wood grounds, blocking, nailers, furring, and the like for work of this Section, where shown and where required, dressed to size indicated or required to suit the condition. Install

grounds, blocking, nailers, furring, etc., rigidly, in proper alignment, trued with a long straight edge.

3.4 ROUGH HARDWARE

A. Provide all rough hardware, such as screws, bolts, anchors, hangers, clips and similar items. Hardware shall be of the proper size and kind to adequately secure the work together and in place, in a rigid and substantial manner. Use galvanized hardware at locations where subject to moisture or where water will be present.

B. Secure wood to concrete and to solid masonry with countersunk bolts in expansion sleeves or other approved manner, to steel with countersunk bolts, to hollow masonry and to drywall with heavy duty countersunk toggle bolts. Space fastenings not more than sixteen (16) inches apart. Power-driven fastenings, or other suitable devices may be used where approved by the Architect.

C. Connections and fastenings shall be made in such manner as will compensate for swelling and shrinkage and shall permit the work to remain permanently in place without any splitting or opening of joints.

3.5 GENERAL INSTALLATION

A. Install the work plumb, level, true and straight with no distortions. Shim as required using concealed shims. Install to a tolerance of 1/8" in 8'-0" for plumb and level (including countertops), and with 1/16" maximum offset in flush adjoining surfaces, 1/8" maximum offset in revealed adjoining surfaces.

B. Scribe and cut work to fit adjoining work, and refinish cut surfaces or repair damaged finish at cuts.

C. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners as required for a complete installation.

3.6 TRIM, MOLDINGS, ETC.

A. Install with minimum number of joints possible, using full-length pieces for each run. Stagger joints in adjacent and related members. Cope at returns, miter corner.

B. Joints of all trim and/or moldings shall be set tight, miter exterior angles and cope interior angles. Joints, except end joints less than twelve (12) feet apart, will not be permitted in straight runs of trim and/or moldings and rails.

C. Secure all trim and/or moldings with glue and blind nail with finishing nails. Set exposed nail heads in finished work and putty. Sand all work to remove any tool marks and irregularities.

D. Wood shall receive finish as specified in Section 099000 - Painting.

3.7 PAINTING AND FINISHING

A. General: All painting and finishing work of this Section shall be shop applied, unless otherwise noted, as specified below. All painting and finishing shall match approved samples. Field finish painting, where specified below, shall be by painting Subcontractor, as specified for in Painting Section.

B. Schedule of Painting and Finishing

1. Shop Natural and Stained Finish On: Wood Trim.

2. Shop Primed Finish and finish painting On: Electrical mounting boards.

3. Field Painted Finish On: Exposed metal angle supports associated with existing counter.

C. Back-Painting: All work of this Section in contact with concrete or masonry or other moisture areas and all concealed surfaces of concealed wood surfaces, shall be back-painted with one (1) moisture-resistant backer coating compatible with adjacent materials and finishes.

D. Field Touch-Up: Field touch-up shall be the responsibility of the installing Subcontractor, and shall include the filling and touch-up of exposed job made nail or screw holes, refinishing of raw surfaces resulting from job fitting, repair of job inflicted scratches and mars, and final cleaning up of the finished surfaces.

3.8 CLEAN UP AND PROTECTION

A. Clean Up: At regular intervals during the course of the work, all debris and excess material shall be cleaned up and removed from the site. Upon completion of installation, clean all spaces of debris caused by woodwork installation.

B. Protection: Protect all woodwork from marring, defacement of other damage until final completion and acceptance of the project by the Owner. Repair or replace all defective units prior to final inspection as directed by the Architect. Any units that cannot be satisfactorily repaired in the opinion of the Architect shall be replaced with new units of same original design, at no additional cost to the Owner.

END OF SECTION

SECTION 078413

FIRESTOPS AND SMOKESEALS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the firestops and smokeseals as shown on the drawings and/or specified herein, including, but not limited to, the following:

1. Penetrations through fire-resistance-rated walls and partitions, including openings containing cables, pipes, ducts, conduits, and other penetrating items.

2. Firestopping and restoration of fire-resistive materials at penetrations through horizontal assemblies where existing fireproofing is removed or disturbed.

1.3 RELATED SECTIONS

A. Section 012300 – Alternates.

B. Section 024119 – Selective Demolition.

C. Section 042200 – Concrete Unit Masonry.

D. Section 055000 – Miscellaneous Metals.

E. Section 079200 – Joint Sealers.

F. Divisions 22, 23, and 26.

1.4 REFERENCES

A. ASTM E 814 "Standard Method of Fire Tests of Through-Penetration Firestops."

B. UL 1479, UBC 7-5 (Both are same as A. above).

C. ASTM E 119 "Standard Method of Fire Tests of Building Construction and Materials."

D. UL 263, UBC 7-1 (Both are same as C. above).

E. ASTM G 21 "Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi."

F. Inspection Requirements: ASTM E 2174, "Standard Practice for On-site Inspection of Installed Firestops."

G. Published Through-Penetration Systems by recognized independent testing agencies.

1. UL Fire Resistance Directory, Volume II of current year.

2. Warnock Hersey Certification Listings, current year.

3. Omega Point Laboratories, current year.

H. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments.

1.5 SUBMITTALS

A. Submit manufacturer's product literature for each type of firestop material to be installed. Literature shall indicate product characteristics, typical uses, performance, limitation criteria, test data and indication that products comply with specified requirements.

B. Submit documentation, including illustrations, for proposed UL listed (or equal) firestop and smokeseal assembly required for the Project.

C. Material Safety Data Sheets: Submit MSDS for each firestop product.

1.6 QUALITY ASSURANCE

A. General: Provide firestopping systems that are produced and installed to resist the spread of fire and the passage of smoke and other gases.

B. Installation Responsibility: Assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single sole source firestop specialty contractor.

C. Firestopping materials shall conform to Flame (F) and Temperature (T) ratings as required by local building code and as tested by nationally accepted test agencies per ASTM E 814 or UL 1479. The F-rating must be a minimum of one (1) hour, but not less than the fire resistance rating of the assembly being penetrated. T-rating, when required by code authority, shall be based on measurement of the temperature rise on the penetrating item(s). The fire test shall be conducted with a minimum positive pressure differential of 0.01 inches of water column.

1. Penetrations in Horizontal Assemblies: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.

a. F-Rating: Minimum of 1-hour rating, but not less than the fire-resistance rating of the floor construction being penetrated.
b. T-Rating: When penetrant is located outside of a wall cavity, minimum of 1-hour rating, but not less than the fire-resistance rating of the floor construction being penetrated.
c. W-Rating: Class 1 rating in accordance with water leakage test per UL 1479.

D. Firestopping products shall be asbestos free and free of any PCBs.

E. Do not use any product containing solvents or that requires hazardous waste disposal.

F. Do not use firestop products which after curing, dissolve in water.

G. Do not use firestop products that contain ceramic fibers.

H. Firestopping Installer Qualifications: Firestop application shall be performed by a single firestopping contractor who specializes in the installation of firestop systems, whose personnel to be utilized have received specific training and certification or approval from the proposed respective firestop manufacturer, and firestop installer shall have a minimum of three years' experience (under present company name) installing firestop systems of the type herein specified.

1. Provide firestop systems that comply with FM Global requirements where applicable.

I. Mold Resistance: Provide penetration firestopping with mold and mildew resistance rating of less than or equal to 1 as determined by ASTM G 21.

J. Firestopping materials shall be suitable for post-installed applications in existing construction..

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in manufacturer's original unopened containers with manufacturer's name, product identification, lot numbers, UL or Warnock Hersey labels, and mixing and installation instructions, as applicable.

B. Store materials in the original, unopened containers or packages, and under conditions recommended by manufacturer.

C. All firestop materials shall be installed prior to expiration of shelf life.

1.8 PROJECT CONDITIONS

A. Verify existing conditions and substrates before starting work

B. Do not use materials that contain solvents, show sign of damage or are beyond their shelf life.

C. During installation, provide masking and drop cloths as needed to prevent firestopping products from contaminating any adjacent surfaces.

D. Conform to ventilation requirements if required by manufacturer's installation instructions or Material Safety Data Sheet.

E. Schedule installation of firestop products after completion of penetrating item installation but prior to covering or concealing of openings.

F. Coordinate this work as required with work of other trades.

G. Coordinate all penetrations with Divisions 22, 23, and 26 prior to installation to ensure proper sizing, location, and firestop system selection.

1.9 SEQUENCING AND SCHEDULING

A. Pre-Installation Conference: Convene a pre-installation conference to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

B. Sequence: Perform work of this and other sections in proper sequence to prevent damage to the firestop systems and to ensure that their installation will occur prior to enclosing or concealing work.

C. Install all firestop systems after voids and joints are prepared sufficiently to accept the applicable firestop system.

D. Do not cover firestop systems until they have been properly inspected and accepted by the authority having jurisdiction.

E. Do not install firestopping until all penetrations are properly coordinated and installed by other trades.

1.10 FM GLOBAL REQUIREMENTS

A. Comply with FM Global Property Loss Prevention Data Sheets, including but not limited to:

1. Data Sheet 2-0 – Installation Guidelines for Automatic Sprinklers
2. Data Sheet 5-31 – Cables and Bus Bars
3. Data Sheet 10-3 – Hot Work Management
4. Data Sheet 10-4 – Contractor Management
5. Data Sheet 10-7 – Fire Protection Impairment Management
6. Data Sheet 1-21 – Fire Resistance of Building Assemblies.

B. FM requirements shall govern where more stringent than code or other referenced standards.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, provide products of one of the following manufacturers:

1. Hilti, Inc.
2. Metacaulk.
3. Nelson.
4. Specified Technologies Inc.
5. 3M.
6. Tremco.
7. U.S. Gypsum Co.

2.2 FIRESTOPPING, GENERAL

A. Compatibility: Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by firestopping manufacturer based on testing and field experience.

B. Accessories: Provide components for each firestopping system that are needed to install fill materials. Use only components specified by the firestopping manufacturer and approved by the qualified testing and inspecting agency for the designated fire-resistance-rated systems. Accessories include but are not limited to the following items:

1. Permanent forming/damming/backing materials including the following:

    a. Semirefractory fiber (mineral wool) insulation.
    b. Firestop sealants used as part of tested firestop systems to prevent leakage of fill materials during installation.
    c. Fire-rated form board.
    d. Joint backing materials required for firestop systems only, including mineral wool or other approved noncombustible backing materials.

2. Temporary forming materials.
3. Substrate primers.
4. Collars.
5. Steel sleeves.

C. Applications: Provide firestopping systems composed of materials specified in this Section that comply with system performance and other requirements.

D. Fire-Resistive Repair Materials

1. Provide field-applied, noncombustible fire-resistive materials suitable for restoring fire-resistance ratings at locations where existing fireproofing is removed or disturbed.

2. Materials shall be compatible with existing substrates and firestop systems and shall be capable of being applied in confined or localized conditions without specialized spray equipment.

3. Acceptable materials include:

a. Cementitious fire-resistive coatings.

b. Trowel-applied fire-resistive compounds.

c. Intumescent fire-resistive coatings where approved for the required rating.

4. Provide materials tested or listed for fire-resistance restoration of horizontal assemblies.

2.3 FILL MATERIALS FOR THROUGH-PENETRATION FIRESTOP SYSTEMS

A. Endothermic, Latex Compound Sealant: Single-component, endothermic, latex formulation.

B. Intumescent, Latex Sealant: Single-component, Intumescent, latex formulation.

C. Intumescent Putty: Non-hardening, dielectric, water-resistant putty containing no solvents, inorganic fibers, or silicone compounds.

D. Job-Mixed Vinyl Compound: Prepackaged vinyl-based powder product for mixing with water at Project site to produce a paintable compound, passing ASTM E 136, with flame-spread and smoke-developed ratings of zero per ASTM E 84.

E. Mortar: Prepackaged dry mix composed of a blend of inorganic binders, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a non-shrinking, homogeneous mortar.

2.4 MINERAL FIBER/CERAMIC WOOL NON-COMBUSTIBLE INSULATION (FIRE SAFING)

A. Provide min. 4 pcf Thermafiber as manufactured by Thermafiber Co., min. 4 pcf FBX Safing Insulation as manufactured by Fibrex, or approved equal to suit conditions and to comply with fire resistance and firestop manufacturer's requirements.

B. Material shall be classified non-combustible per ASTM E 119.

C. Provide mineral fiber insulation as backing material for firestop systems at slab penetrations where required by tested assemblies.

2.5 MIXING

A. For those products requiring mixing prior to application, comply with firestopping manufacturer's directions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other procedures needed to produce firestopping products of uniform quality with optimum performance characteristics for application indicated.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions with Installer present, for compliance with requirements for opening configuration, penetrating items, substrates, and other conditions affecting performance of firestopping. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Clean out openings and joints immediately prior to installing firestopping to comply with recommendations of firestopping manufacturer and the following requirements:

1. Remove all foreign materials from surfaces of opening and joint substrates and from penetrating items that could interfere with adhesion of firestopping.

2. Clean opening and joint substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation.

3. Remove laitance and form release agents from concrete.

B. Priming: Prime substrates where recommended by firestopping manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestopping materials. Remove tape as soon as it is possible to do so without disturbing seal of firestopping with substrates.

D. Coordinate preparation of openings involving cutting or other spark-producing operations with FM Data Sheet 10-3 requirements.

E. Do not perform work that impairs fire-resistance-rated assemblies or fire protection systems without compliance with FM Data Sheet 10-7.

F. Do not remove or disturb fire-resistive materials at slabs or structural members beyond limits required for installation. Restore all disturbed areas to maintain fire-resistance rating in accordance with FM Global requirements.

3.3 CONDITIONS REQUIRING FIRESTOPPING

A. Interior Walls and Partitions

1. Firestop system installed shall have been tested by either UL or Omega Point, including exposure to hose stream test and including for use with steel fluted deck floor assemblies.

2. Firestop system used shall allow for deflection of floor above.

B. Penetrations

1. Penetrations include conduit, cable, wire, pipe, duct, or other elements which pass through one or both outer surfaces of a fire rated floor, wall, or partition.

2. These requirements for penetrations shall apply whether or not sleeves have been provided, and whether or not penetrations are to be equipped with escutcheons or other trim. If penetrations are sleeved, firestop annular space, if any, between sleeve and wall of opening.

C. Provide firestopping to fill miscellaneous voids and openings in fire rated construction in a manner essentially the same as specified herein before.

D. Coordinate cable and conduit penetrations to avoid excessive grouping of cables and to maintain compliance with FM Data Sheet 5-31.

E. Fire-Resistance Restoration at Horizontal Assemblies

1. Where fire-resistive materials are removed or disturbed to accommodate penetrations, supports, or demolition, restore fire-resistance rating of the assembly using field-applied fire-resistive materials.

2. Apply materials to match thickness and performance of existing fire-resistive construction.

3. Coordinate installation with firestop systems to maintain continuity of fire-resistance-rated assemblies.

3.4 INSTALLING THROUGH PENETRATION FIRESTOPS

A. General: Comply with the through penetrations firestop manufacturer's installation instructions and drawings pertaining to products and applications indicated.

B. Install forming/damming materials and other accessories of types required to support fill materials during their application and in the position needed to produce the cross-sectional

shapes and depths required to achieve fire ratings of designated through-penetration firestop systems. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

C. Install fill materials for through penetration firestop systems by proven techniques to produce the following results:

1. Completely fill voids and cavities formed by openings, forming materials, accessories, and penetrating items.

2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.

3. For fill materials that will remain exposed after completing work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.5 FIRESTOP BACKING MATERIALS (FOR FIRE-RATED ASSEMBLIES ONLY)

A. Install mineral fiber or other approved backing materials as required for firestop systems at penetrations through horizontal and vertical assemblies.

B. Install backing materials to support firestop sealants and maintain required fire-resistance ratings.

3.6 FIELD QUALITY CONTROL

A. Firestopping shall be subject to inspection by the Architect or Authority Having Jurisdiction.

B. Inspecting agency will report observations promptly and in writing to Contractor, Owner and Architect.

C. Do not proceed to enclose firestopping with other construction until reports of examinations are issued.

D. Where deficiencies are found, Contractor must repair or replace firestopping so that it complies with requirements.

3.7 CLEANING

A. Clean off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturers of firestopping products and of products in which openings and joints occur.

B. Protect firestopping during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage

or deterioration occurs, cut out and remove damaged or deteriorated firestopping immediately and install new materials to product firestopping complying with specified requirements.

END OF SECTION

SECTION 079200

JOINT SEALERS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

A. The Work of this Section includes all labor, materials, equipment and services necessary to complete the joint sealers work as shown on the drawings and/or specified herein, including but not necessarily limited to the following:

1. Interior wall joints not specified to be sealed in other Sections of work, including caulking to fill between architectural woodwork and any wall, floor and/or ceiling imperfections.

2. Control and expansion joints in walls.

3. Non-fire-rated joints at wall penetrations. Do not use sealants in fire-resistance-rated assemblies; fire-rated penetrations and joints are specified in Section 078413.

4. Joints between items of equipment and other construction.

5. All other non-fire-rated joints indicated on Drawings or required to provide air and moisture control.

B. Exclusions:

1. Do not perform sealing of fire-resistance-rated penetrations or joints under this Section. Such work is specified in Section 078413.

1.3 RELATED SECTIONS

A. Concrete Unit Masonry – Section 042200

B. Firestopping – Section 078413. Do not install sealants at fire-resistance-rated penetrations or joints; such work is specified in Section 078413.

1.4 QUALITY ASSURANCE

A. Qualification of Installers: Use only personnel who are thoroughly familiar, skilled and specially trained in the techniques of sealant work, and who are completely familiar with the published recommendations of the sealant manufacturer.

B. Pre-Construction Field Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to project joint substrates according to the method in ASTM C 794 and C 1521 that is appropriate for the types of Project joints.

C. Perform testing per ASTM C 1248 on interior and exterior sealants to determine if sealants or primers will stain adjacent surfaces. No sealant work shall start until results of these tests have been submitted to the Architect and he has given his written approval to proceed with the work.

D. Sealants shall be suitable for intended location and shall not introduce excessive flame spread or smoke development.

1.5 FM GLOBAL REQUIREMENTS:

A. Comply with FM Global Property Loss Prevention Data Sheets, including but not limited to:

1. Data Sheet 2-0 – Installation Guidelines for Automatic Sprinklers
2. Data Sheet 5-31 – Cables and Bus Bars
3. Data Sheet 10-3 – Hot Work Management
4. Data Sheet 10-4 – Contractor Management
5. Data Sheet 10-7 – Fire Protection Impairment Management

B. FM requirements shall govern where more stringent than code or other referenced standards.

1.6 SUBMITTALS

A. Shop Drawings: Submit shop drawings showing all joint conditions, indicating relation of adjacent materials, all sealant materials (sealant, bond breakers, backing, primers, etc.), and method of installation. Materials shall be compatible with adjacent construction, including masonry and finishes. Coordinate with firestopping systems where joints occur adjacent to rated assemblies.

1. Submit joint sizing calculations certifying that movement capability of sealant is not being exceeded.
2. Indicate coordination with adjacent materials and firestopping systems where applicable.

B. Samples: Submit the following:

1. Color samples of sealants, submit physical samples (not color chart).

2. Sealant bond breaker and joint backing.

C. Product Data: Submit manufacturer's technical information and installation instructions for:

1. Sealant materials, indicating that material meets standards specified herein.

2. Backing rods.

D. Submit manufacturer's certification.

E. Submit results of testing required in Article 1.4 herein.

1.7 MANUFACTURER'S RESPONSIBILITY AND CERTIFICATION

A. Contractor shall require sealant manufacturer to review the Project joint conditions and details for this Section of the work. Contractor shall submit to the Architect written certification from the sealant manufacturer that joints are of the proper size and design, that the materials supplied are compatible with adjacent materials and backing, that the materials will properly perform to provide permanent watertight, airtight or vaportight seals (as applicable), and that materials supplied meet specified performance requirements.

1.8 ENVIRONMENTAL CONDITIONS

A. Temperature: Install all work of this Section when air temperature is above forty (40) degrees F. and below eighty (80) degrees F., unless manufacturer submits written instructions permitting sealant use outside of this temperature range.

B. Moisture: Do not apply work of this Section on surfaces which are wet or damp.

1.9 PRODUCT HANDLING

A. Protection: Use all means necessary to protect the materials of this Section, before, during and after installation and to protect the installed work and materials of all other trades.

B. Replacements: In the event of damage, immediately make all repairs and replacements necessary.

C. Storage

1. Store sealant materials and equipment under conditions recommended by their manufacturer.

2. Do not use materials stored for a period of time exceeding the maximum recommended shelf life of the material.

3. Material shall be stored in unopened containers with manufacturers' name, batch number and date when shelf life expires.

D. Coordinate installation sequence with painting and finishing work to avoid contamination of sealant joints.

1.10 GUARANTEE

A. Provide a written, notarized guarantee from the manufacturer stating that the applied sealants shall show no material failure for a period of twenty (20) years.

B. Contractor to provide a written, notarized, guarantee stating that the applied sealants shall show no failure due to improper installation for a period of five (5) years.

C. Guarantee shall be in a form acceptable to the Owner and executed by an authorized individual.

D. Include in guarantee provision, agreement to repair and/or replace, at Contractor's expense, sealant defects which develop during guarantee period, because of faulty labor and/or materials.

PART 2 PRODUCTS

2.1 SEALANT MATERIALS

A. Interior Sealant: Provide acrylic latex or silicone sealant as appropriate for substrate, conforming to ASTM C 834 or ASTM C 920

B. Colors: Colors selected from manufacturer's standard selection.

C. Sealants shall comply with applicable code and FM requirements for flame spread and smoke development.

2.2 MISCELLANEOUS MATERIALS

A. Back-Up Materials: Provide non-staining, non-absorbent backing materials compatible with sealants and primers for non-fire-rated joints only.

B. Provide bond breakers, where required, of polyethylene tape as recommended by manufacturer of sealant.

C. Provide primers recommended by the sealant manufacturer for each material to receive sealant. Note that each exterior joint must be primed prior to sealing.

D. Provide solvent, cleaning agents and other accessory materials as recommended by the sealant manufacturer.

E. Materials shall be delivered to the job in sealed containers with manufacturer's original labels attached. Materials shall be used per manufacturer's printed instructions.

PART 3 EXECUTION

3.1 INSPECTION

A. Examine the areas and conditions where joint sealers are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work. Verify that joint size and configuration are in accordance with Drawings prior to installation.

3.2 INSTALLATION

A. Sealant Installation Standard: Comply with instructions and recommendations of the manufacturer and in accordance with ASTM C 1193 for use of joint sealants as applicable to materials, applications and conditions required by this Project where more stringent installation requirements are specified herein, such requirements shall apply.

B. Supervision: The Contractor shall use only skilled and experienced workmen for installation of sealant.

C. Apply sealant under pressure with a hand or power actuated gun or other appropriate means. Gun shall have nozzle of proper size and provide sufficient pressure to completely fill joints as detailed. Neatly point or tool joint to provide the contour as indicated on the drawings.

D. Preparation and Application

1. Thoroughly clean all joints, removing all foreign matter such as dust, oil, grease, water, surface dirt and frost. Sealant must be applied to the base surface. Previously applied film must be entirely removed.

2. Stone, masonry and concrete surfaces to receive sealant shall be cleaned where necessary by grinding, mechanical abrading, or combination of these methods as required to provide a clean, sound base surface for sealant adhesion.

    a. Do not use any acid or other material which might stain surfaces.
    b. Remove laitance by grinding or mechanical abrading.
    c. Remove loose particles present or resulting from grinding, abrading, or blast cleaning by blowing out joints with compressed air, oil and water free, or vacuuming joints prior to application of primer or sealant.

3. Clean non-porous surfaces such as metal and glass chemically. Remove protective coatings on metallic surfaces by solvent that leaves no residue and is compatible with sealant. Use solvent and wipe dry with clean, dry lint free paper towels. Do not allow

solvent to air dry without wiping. Clean joint areas protected with masking tape or strippable films as above after removal of tape film.

4. Do not seal joints until they are in compliance with drawings or meet with the control section standard.

5. Joint Size and Sealant Size: Joints to receive sealant shall be at least 1/4" wide. In joint 1/4" to 3/8" wide, sealant shall be 1/4" deep. In joints wider than 3/8" and up to 1" wide, sealant depth shall be one half the joint width. For joints wider than 1", sealant depth shall be as recommended by the sealant manufacturer. Depth of joint is defined as distance from outside face of joint to closest point of the filler. Joint sizes shall not be increased beyond those indicated without approval.

6. Primer: Thoroughly clean joints and apply primer to all surfaces that will receive sealant. Apply primer on clean, dry surfaces, and prior to installation of joint backing. Completely wet both inner faces of the joint with primer. Mask adjacent surfaces of joint with non-staining masking tape prior to priming. Apply primer with clean brush and only when temperature is above 45 deg. F.

7. Joint Backing: In joints where depth of joint exceeds required depth of sealant, install joint backing (after primer is dry) in joints to provide backing and proper joint shape for sealant. Proper shape for sealant is a very slight "hourglass" shape, with back and front face having slight concave curvature. Use special blunt T-shaped tool or roller to install joint backing to the proper and uniform depth required for the sealant. Joint backing shall be installed with approximately twenty-five (25) percent compressions. Do not stretch, twist, braid, puncture, or tear joint backing. Butt joint backing at intersections.

8. Bond Breaker: Install bond breaker smoothly over joint backing so that sealant adheres only to the sides of the joint and not backing.

9. Sealant Application: Apply sealant in accordance with the manufacturer's application manual and manufacturer's instructions, using hand guns or pressure equipment, on clean, dry, properly prepared substrates, completely filling joints to eliminate air pockets and voids. Mask adjacent surfaces of joint with non-staining masking tape. Force sealant into joint in front of the tip of the "caulking gun" (not pulled after it) and force sealant against sides to make uniform contact with sides of joint and to prevent entrapped air or pulling of sealant off of sides. Fill sealant space solid with sealant.

10. Tooling: Tool exposed joints to form smooth and uniform beds, with slightly concave surface conforming to joint configuration per Figure 5A in ASTM C 1193. Finished joints shall be straight, uniform, smooth and neatly finished. Remove masking tape immediately after tooling of sealant and before sealant face starts to "skin" over. Neatly remove any excess sealant from adjacent surfaces of joint, leaving the work in a neat, clean condition.

E. Coordinate sealant installation with masonry patching and adjacent work. Install sealants after completion of firestopping at rated assemblies.

G. Coordination with Penetrations:

1. Do not install sealant at penetrations until locations and sizes have been coordinated with all affected trades.
2. Do not use sealants in place of firestopping at fire-resistance-rated assemblies.
3. Install sealants only at non-rated joints or where specifically indicated.
4. Do not install sealant until masonry cutting and patching work is complete.

H. Work involving cutting, grinding, or other spark-producing operations shall comply with FM Data Sheet 10-3.

END OF SECTION

SECTION 087100

DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes commercial door hardware for the following:

1. Swinging doors.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.

C. RELATED SECTIONS

1. Section 042200 – Concrete Unit Masonry.
2. Section 055000 – Miscellaneous Metals.
3. Section 078413 – Firestops and Smokeseals.
4. Section 323116 – Welded Wire Fences and Gates.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ICC/IBC - International Building Code.
3. NFPA 70 - National Electrical Code.

4. NFPA 80 - Fire Doors and Windows.
5. NFPA 101 - Life Safety Code.
6. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:

1. ANSI/BHMA Certified Product Standards - A156 Series.
2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
3. ANSI/UL 294 - Access Control System Units.

F. Battery-Operated Access Control: Door B50 is provided with a battery-operated wireless access control system. No hardwired electrified hardware, power transfer devices, or pre-wiring is required unless otherwise indicated.

G. System shall be fully compatible with Owner’s existing access control infrastructure.

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
3. Content: Include the following information:
    a. Type, style, function, size, label, hand, and finish of each door hardware item.
    b. Manufacturer of each item.
    c. Fastenings and other pertinent information.

d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.

e. Explanation of abbreviations, symbols, and codes contained in schedule.

f. Mounting locations for door hardware.

g. Door and frame sizes and materials.

h. Warranty information for each product.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: For battery-operated access control systems, provide device location and integration information only. Wiring diagrams are not required unless specifically indicated by Architect or Owner.

1. Wiring Diagrams: Wiring diagrams are not required for battery-operated wireless access control systems unless specifically requested by Architect or Owner.
2. Electrical Coordination: Coordinate device mounting requirements and interface coordination at access-controlled openings.

D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

E. Informational Submittals:

1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

1.4 CLOSEOUT SUBMITTALS

A. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

B. Project Record Documents: Provide record documentation of as-built door hardware sets in digital format (.pdf, .docx, .xlsx, .csv) and as required in Division 01, Project Record Documents.

1.5 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).

C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributor with documented experience supplying retrofit hollow metal door hardware and wireless access control systems compatible with Owner’s existing access control infrastructure. Supplier shall coordinate door hardware, wireless access control devices, cylinders, and related components required for proper operation of the specified openings.

E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.

   1. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

F. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.

G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

   1. Function of building, purpose of each area and degree of security required.
   2. Plans for existing and future key system expansion.
   3. Requirements for key control storage and software.
   4. Installation of permanent keys, cylinder cores and software.
   5. Address and requirements for delivery of keys.

H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.

2. Review installation coordination requirements for wireless access control hardware and related devices.

3. Review sequence of operation narratives for each unique access controlled opening.

I. At completion of installation, provide written documentation that components were applied according to manufacturer's instructions and recommendations and according to approved schedule.

1.6 DELIVERY, STORAGE AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.7 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Coordinate installation requirements for battery-operated wireless access control devices at Door B50. No hardwired power transfer devices or concealed raceways are required unless otherwise indicated.

C. Coordinate door hardware attachment with aluminum gate framing. Verify that hinges, fasteners, and accessories are compatible with aluminum construction and do not cause galvanic corrosion.

1.8 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

1.9 FM GLOBAL REQUIREMENTS

A. Comply with FM Global Property Loss Prevention Data Sheets applicable to door hardware installations and associated construction activities, including but not limited to:

1. Data Sheet 1-21 – Fire Resistance of Building Assemblies.
2. Data Sheet 2-0 – Installation Guidelines for Automatic Sprinklers.
3. Data Sheet 10-3 – Hot Work Management.
4. Data Sheet 10-4 – Contractor Management.
5. Data Sheet 10-7 – Fire Protection Impairment Management.

B. FM requirements shall govern where more stringent than code or referenced standards.

PART 2 - PRODUCTS

2.1 BUTT HINGES

A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.

1. Quantity: Provide the following hinge quantity:

a. Two Hinges: For doors with heights up to 60 inches.

b. Three Hinges: For doors with heights 61 to 90 inches.

c. Four Hinges: For doors with heights 91 to 120 inches.

d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:

a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.

b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.

3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:

a. Interior Doors: Heavy weight, steel, ball bearing or oil impregnated bearing hinges.

4. Hinge Options: Comply with the following:

a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for all out-swinging lockable doors.

5. Manufacturers:

a. Hager Companies (HA) - BB Series, 5-knuckle.

b. McKinney (MK) - TA/T4A Series, 5-knuckle.

6. Hinges used on aluminum-framed gate assemblies shall be heavy-duty type and suitable for attachment to aluminum members. Provide reinforcement or backing plates as required to distribute loads and prevent deformation of aluminum framing.

2.2 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:

1. Threaded mortise cylinders with rings and cams to suit hardware application.
2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
4. Tubular deadlocks and other auxiliary locks.
5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
6. Keyway: Match Facility Restricted Keyway.

C. Security Cylinders: ANSI/BHMA A156.5, Grade 1 Certified Products Directory (CPD) listed security cylinders and keys able to be used together under the same facility master or grandmaster key system. Cylinders to be factory keyed.

1. New security key systems shall not be established with products that have an expired patent. Expired systems shall only be specified and supplied to support existing systems.

2. Manufacturers:

a. Best (BE)

b. No Substitution.

D. Keying System: Each type of lock and cylinders to be factory keyed.

1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.

2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.

3. Existing System: Field verify and key cylinders to match Owner's existing system.

E. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Two (2)
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Keys (where required): Three (3).

F. Construction Keying: Provide temporary keyed construction cores at all locking devices.

G. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

2.3 MORTISE LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): Provide ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed mortise locksets. Listed manufacturers shall meet all functions and features as specified herein.

1. Manufacturers:

a. Schlage/ Allegion.
b. No Substitution.

2.4 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

2.5 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders. Coordinate stop and holder locations with operation of double-acting doors.

1. Manufacturers:

a. Rockwood (RO).

b. Trimco (TC).

2.6 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

B. Provide fasteners suitable for use with aluminum framing. Use stainless steel or other corrosion-resistant fasteners compatible with aluminum to prevent galvanic corrosion.

2.7 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

2.13 MATERIAL REQUIREMENTS

A. Materials used in door hardware assemblies shall be noncombustible or meet applicable FM requirements for flame spread and smoke development.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications. Work involving cutting, drilling, welding, or other spark-producing operations shall comply with FM Global Data Sheet 10-3.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. In Hollow Metal Door: In existing door opening.
2. In Aluminum Door: As indicated.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Push Plates and Door Pulls: When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.

E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

F. Coordinate installation of hardware with aluminum gate framing to ensure proper alignment, support, and long-term performance.

3.4 FIELD QUALITY CONTROL

A. Field Inspection (Punch Report): Reference Division 01 Sections “Closeout Procedures”. Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.

1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

1. Quantities listed are for each pair of doors, or for each single door.
2. The supplier is responsible for handing and sizing all products.

   Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.

B. Manufacturer’s Abbreviations:

1. AA – Assa Abloy
2. AB – Dormakaba
3. AD – Adams Rite
4. BE – Best
5. BO – Bommer
6. DE – Deltana
7. IF – Infineum
8. MH – Marcer Hamilton
9. MK – McKinney
10. MR – Markar
11. NA – National Guard Product
12. NO – Norton
13. PE – Pemko
14. PR – Precision
15. RF – Rixson
16. RO – Rockwood

17. SA – Sargent
18. SC – Schlage/ Allegion
19. SO – Soss
20. SU – Securitron
21. TR – Trimco
22. VD – Von Duprin
23. OT – Other

Hardware Sets

Set: 1.0 (Existing-Modify)

Door B50

1 Wireless Access Control Lock	AD400 MS 70 MT RHO 626 BD 8B	US26D	SC	087100
1 Cylinder	Match Existing Keying System	US26D	BE	087100

Notes:

- Remove existing lock and prepare door to receive mortise lockset.
- Prepare hollow metal door and frame per ANSI/DHI A115 series and Schlage template (metal door).
- Provide door and frame reinforcement for mortise lock installation where not existing.
- Verify existing door prep is compatible with standard ANSI mortise lock (Schlage L Series).
- Field verify door thickness, backset (2-3/4"), handing, and existing conditions prior to procurement.
- Provide retrofit trim, filler plates, or scar plates as required to cover existing door preparations.
- Coordinate lock function MS-50 (Classroom) / L9070 with Owner and access control requirements.
- Battery-operated wireless system. No hardwired power transfer devices required.
- All modifications to existing 1-hour rated hollow metal door and frame shall comply with NFPA 80 and maintain existing fire-resistance rating.
- System shall be compatible with Owner’s existing access control infrastructure.
- Wireless access control lock to comply with Section 281316.
- Coordinate lock function MS-50 (Classroom) / L9070 with Owner and access control requirements.
- Provide wireless access control trim with keyed cylinder compatible with Owner’s existing master key system.
- Provide programming/wireless connection to existing PIM control device.

Set: 2.0 (Existing)

Door B50A

- No changes to existing hardware.

Set: 3.0 (Existing)

Door B50B

- No changes to existing hardware.

Set: 4.0

Door B50C (Mesh door)

4	Heavy-Duty Hinges Double Acting Spring	3029-6-652 (or equal)	US32D	BO	087100
4	Heavy-Duty Hinges	BB5006-450N-630 (or equal)	US32D	BO	087100
1	Door Stop	440 (or equal)	US26D	RO	087100
2	Heavy Duty Caster	2-Inch BLK Rubber Wheel Concealed Spring-Loaded , Stem Tubing, Side Mounting Plate and BLK brake capacity of 200lbs Min. (or equal)	BLK	OT	087100
4	Surface-mounted cane bolts rods	Iron Valley 20 Inch Cane Bolt	BLK	OT	087100
2	Dust poof Catch for Drop Bolts	Trudoor TD-DPS Dust Proof Flush Bolt Strick (or equal)	BLK	OT	087100

Notes:

- Door B50C consists of a full-height aluminum-framed mesh gate assembly with a full-height personnel door integrated at one side.
- Provide engineered hardware suitable for aluminum-framed gate construction and capable of supporting imposed loads without sagging, deformation, misalignment, or binding.
- Personnel door leaf shall be double-acting and self-centering.

- Outer gate shall be single-acting.
- Provide separate hinge systems for outer gate leaf and integral personnel door as required for proper operation.
- Verify hinge or pivot capacity for actual fabricated door weights and dimensions and provide heavier-duty assemblies where required.
- Hinges, fasteners, and accessories shall be compatible with aluminum framing and protected against galvanic corrosion.
- Isolate dissimilar metals using non-conductive shims, gaskets, coatings, or separators.
- Provide stainless steel fasteners compatible with aluminum framing.
- Provide reinforcement or backing plates as required to distribute loads and prevent deformation of aluminum framing members.
- Coordinate hardware mounting locations with aluminum framing fabricator to be placed as indicated in drawings.
- Supplier shall verify door construction, frame configuration, clearances, and hardware compatibility prior to fabrication and procurement.
- Coordinate location of stops and holders to avoid interference between gate leaf and integral personnel door.
- Verify floor conditions are suitable for operation of kick-down holder and door stop devices.
- Provide reinforcement or backing plates as required to support imposed hinge loads and prevent deformation of aluminum framing.
- Verify hinge capacity for door size and weight and provide heavier-duty hinges.
- Provide four black-finish surface-mounted cane bolts rod. Two at bottom gate and two at top of gate on Work Area side to secure gate in closed position.
- Refer to drawings to coordinate cane bolt mounting location with aluminum framing fabricator for gate operation requirements.
- Provide spring loaded swivel caster with black finished steel bracket, 2 inch diameter TPR wheel, and double ball bearing swivel assembly. Caster shall provide 360 degree rotation, automatic compensation for surface irregularities, suitable for gate loads of 200 LB Min.. Furnish complete with manufacturer's standard mounting hardware.

END OF SECTION

SECTION 096566

RESILIENT ATHLETIC FLOORING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interlocking, rubber floor tile.

1.2 COORDINATION

A. Coordinate layout and installation with adjacent work, including welded wire gate assemblies and safety netting systems, to maintain proper clearances and alignment at floor interfaces. Coordinate with joint sealers and adjacent wall construction to maintain continuous sealed floor-to-wall interfaces.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Submit shop drawings showing layout, profiles, and product components, including anchorage, accessories, finish colors, patterns, and textures.

C. Samples: For each exposed product and for each type, color, and pattern specified.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 QUALITY ASSURANCE

A. Flooring Installer Qualifications: An experienced installer who has completed flooring installations using seaming methods indicated for this Project and similar in material, design, and extent to that indicated for this Project; who is acceptable to manufacturer; and whose work has resulted in installations with a record of successful in-service performance.

B. FM Global Requirements: Comply with FM Global Property Loss Prevention Data Sheets applicable to interior finish materials. Materials shall meet requirements for flame spread and smoke development and shall not contribute to increased fire load.

1.6 FM GLOBAL REQUIREMENTS

A. Comply with FM Global Property Loss Prevention Data Sheets applicable to the Work, including but not limited to:

1. Data Sheet 1-21 – Fire Resistance of Building Assemblies.

2. Data Sheet 2-0 – Installation Guidelines for Automatic Sprinklers.

3. Data Sheet 10-3 – Hot Work Management.

4. Data Sheet 10-4 – Contractor Management.

5. Data Sheet 10-7 – Fire Protection Impairment Management.

B. FM requirements shall govern where more stringent than code or other referenced standards.

PART 2 PRODUCTS

2.1 INTERLOCKING, RUBBER FLOOR TILE (RT-1)

A. Basis-of-Design Product: FieldTurf Dropzone Speckle Interlocking Tile, 8 mm thickness, Color DZ04 Blue Gray, installed as a loose-laid interlocking system over the existing floor, with Johnsonite/Tarkett EG-40-G Edge Guard transition profiles, Color 40 Black, at exposed edges and transitions.

1. Tarkett Sports; a division of the Tarkett Group.
2. Amarco Products.

B. Description: Flooring shall consist of interlocking recycled-rubber tiles manufactured for loose-laid installation without adhesive.

C. Material: Recycled-rubber compound.

D. Tile Interlock: As selected by Architect from manufacturer's full range.

E. Traffic-Surface Texture: As selected by Architect from manufacturer's full range.

F. Size: 24 inches square nominal size.

G. Thickness: 8 mm.

H. Color and Pattern: Dropzone Speckle DZ04 Blue Gray.

I. Transition Profile: Provide Johnsonite/Tarkett Edge Guard EG-40-G transition profile, color 40 Black, at all exposed flooring edges and transitions to adjacent existing floor finishes. Transition profile shall be compatible with 8 mm flooring thickness and installed

in accordance with the manufacturer's written instructions. Provide at all exposed edges and transitions to existing flooring unless noted otherwise on drawings.

J. Installation Method: Flooring shall be installed as a loose-laid interlocking tile system over the existing floor substrate. Adhesives, mastics, and permanent bonding agents shall not be used. Existing floor shall remain in place and serve as the substrate for the interlocking flooring system. Center the tile layout within the Drone Flying Area.

K. Fire Performance: Flooring materials shall comply with applicable code requirements for flame spread and smoke development when tested in accordance with ASTM E84 or equivalent.

PART 3 EXECUTION

3.1 PREPARATION

A. Prepare substrates according to manufacturer's written instructions.

B. Sweep and vacuum clean substrates to be covered by flooring immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FLOOR TILE INSTALLATION

A. Lay out tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

1. Lay tiles in pattern indicated on drawings.

B. Discard broken, cracked, chipped, or deformed tiles.

C. Tile Matching: Match tiles for color and pattern by selecting tiles from cartons in same sequence as manufactured and packaged if so numbered.

1. Lay tiles in pattern of colors and sizes indicated.

D. Free-Lay Tile: Place flooring at locations indicated with units securely interconnected and fully seated on substrate to form a smooth, level surface. Do not install flooring until substrate and adjacent wall construction, including sealants, are complete. Flooring shall be installed as a fully interlocked floating floor system over the existing floor substrate without adhesive. Tiles shall remain removable and replaceable after installation.

E. Provide Johnsonite/Tarkett Edge Guard EG-40-G transition profiles, color 40 Black, at all exposed flooring perimeters, door openings, and locations where new resilient athletic

flooring transitions to existing floor finishes. Coordinate installation with adjacent floor elevations to provide a smooth transition and eliminate trip hazards.

3.3 CLEANING AND PROTECTION

A. Perform the following operations immediately after completing flooring installation:
   1. Sweep and vacuum flooring thoroughly.

B. Protect flooring from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.

   1. Do not move heavy and sharp objects directly over flooring. Protect flooring with plywood or hardboard panels to prevent damage from storing or moving objects over flooring.

END OF SECTION

SECTION 099000

PAINTING AND FINISHING

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the painting and finishing as shown on the drawings and/or specified herein, including, but not limited to, the following:

1. Prime painting unprimed surfaces to be painted under this Section.

2. Painting all items furnished with a prime coat of paint, including touching up of or repairing of abraded, damaged or rusted prime coats applied by others.

3. Painting interior concrete block exposed to view.

4. Painting hollow metal doors and frames.

5. Painting wire fences and gates.

6. Painting of miscellaneous metals.

7. Painting and back-painting plywood panel for equipment mounting.

B. Coordination of paint finishes with other Sections, including miscellaneous metals, door hardware, welded wire fences and gates, and specialty systems requiring painted or factory-applied finishes.

1.3 QUALITY ASSURANCE

A. Job Mock-Up

1. In addition to the samples specified herein to be submitted for approval, apply in the field, at their final location, each type and color of approved paint materials, applied 5 feet wide, 5 feet high of wall surfaces, before proceeding with the remainder of the work, for approval by the Architect. Paint mock-ups to include door and frame assembly. Mock-ups shall demonstrate the required matte, non-reflective finish. Gloss or sheen variations will be rejected.

2. These applications when approved will establish the quality and workmanship for the work of this Section.

3. Repaint individual areas which are not approved, as determined by the Architect, until approval is received. Assume at least three paint mock-ups of each color for approval.

B. Qualification of Painters: Use only qualified painters for the mixing and application of paint on exposed surfaces.

C. Paint Coordination: Provide finish coats which are compatible with the prime paints used. Review other Sections of these specifications in which prime paints are to be provided to ensure compatibility of the total coatings system for the various substrates. Upon request from other subcontractors, furnish information on the characteristics of the finish materials proposed to be used, to ensure that compatible prime coats are used. Provide barrier coats over incompatible primers or remove and re-prime as required. Notify the Architect in writing of any anticipated problems using the coating systems as specified with substrates primed by others.

D. All paints must conform to the Volatile Organic Compounds (VOC) standards of prevailing codes and ordinances.

E. Coordination with Other Sections: Coordinate finish requirements with Sections 08 71 00 Door Hardware, 32 31 16 Welded Wire Fences and Gates, 13 28 16 Safety Netting, and 09 65 66 Resilient Athletic Flooring to maintain consistent appearance, performance, and compatibility of adjacent materials.

F. FM Global Requirements: Comply with FM Global requirements for interior finishes. Coatings shall not contribute to excessive flame spread or smoke development.

1.4 SUBMITTALS

A. Materials List

1. Before any paint materials are delivered to the job site, submit to the Architect a complete list of all materials proposed to be furnished and installed under this portion of the work.

2. This shall in no way be construed as permitting substitution of materials for those specified or accepted for this work by the Architect.

B. Samples

1. Accompanying the materials list, submit to the Architect copies of the full range of colors available in each of the proposed products.

2. Upon direction of the Architect, prepare and deliver to the Architect three (3) identical sets of Samples of each of the selected colors and glosses painted onto 8-1/2" x 11" x 1/4" thick material; whenever possible, the material for Samples shall be the same material as that on which the coating will be applied in the work.

3. Include samples demonstrating required matte (flat, non-specular) finish and compatibility with adjacent materials.

C. Manufacturer's Recommendations: In each case where material proposed is not the material specified or specifically described as an acceptable alternate in this Section of these specifications, submit for the Architect's review the current recommended method of application published by the manufacturer of the proposed material.

D. Close out Submittal

1. Coating Maintenance Manual: Upon conclusion of the project, the Contractor or plant manufacturer/supplier shall furnish a coating maintenance manual such as Sherwin Williams "Custodian Project Color and Product Information" report or equal. Manual shall include an Area Summary with finish schedule, Area Detail designating where each product/color/finish was used, product data pages, MSDS, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.5 PRODUCT HANDLING

A. Deliver all paint materials to the job site in their original unopened containers with all labels intact and legible at time of use.

B. Protection

1. Store only the approved materials at the job site, and store only in a suitable and designated area restricted to the storage of paint materials and related equipment.

2. Use all means necessary to ensure the safe storage and use of paint materials and the prompt and safe disposal of waste.

3. Use all means necessary to protect paint materials before, during and after application and to protect the installed work and materials of all other trades.

C. Replacements: In the event of damage, immediately make all repairs and replacements necessary.

1.6 EXTRA STOCK

A. Upon completion of this portion of the Work, deliver to the Owner an extra stock of paint equaling one (1) five-gallon container of each color used and each coating material used, with all such extra stock tightly sealed in clearly labeled containers.

1.7 JOB CONDITIONS

A. Apply water-based paints only when the temperature of surfaces to be painted and the surrounding air temperatures are between 50 degrees F. and 90 degrees F., unless otherwise permitted by the paint manufacturer's printed instructions.

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PART 2 PRODUCTS

2.1 PAINT MANUFACTURERS

A. Provide painting products manufactured by Benjamin Moore as the basis of design. Subject to compliance with requirements, products by the following manufacturers may be used:

1. Benjamin Moore
2. PPG Paints
3. Sherwin Williams

Equivalent products by other manufacturers may be submitted for approval.

2.2 MATERIALS

A. Provide undercoat paint produced by the same manufacturer as the finish coats. Use only thinners approved by the paint manufacturer and use only to recommended limits.

B. Colors: As selected by Architect.

C. Coloring Pigment: Products of or furnished by the manufacturer of the paint or enamel approved for the work.

D. Finish Sheen: All exposed painted surfaces shall have a flat, non-specular finish. Finish shall be uniform across all substrates and manufacturers. Gloss, semi-gloss, or reflective finishes are not permitted except where required to match existing adjacent painted surfaces, including existing hollow metal doors and frames. Any deviation from flat finish for matching existing conditions shall be submitted to Architect for approval. Exception: Door B50 and frame shall receive the finish indicated in the Finish Schedule and are not required to comply with the flat finish requirement of this Section

E. Fire Performance: Coatings applied to interior surfaces shall comply with applicable code requirements for flame spread and smoke development. Provide materials suitable for institutional occupancies.

2.3 GENERAL STANDARDS

A. The various surfaces shall be painted or finished as specified in Article 2.4. All finishes shall be flat (matte) unless specifically approved otherwise by the Architect.

B. All paints, varnishes, enamels, lacquers, stains and similar materials must be delivered in the original containers with the seals unbroken and label intact and with the manufacturer's instructions printed thereon.

C. All painting materials shall bear identifying labels on the containers with the manufacturer's instructions printed thereon.

D. Paint shall not be badly settled, caked or thickened in the container, shall be readily dispersed with a paddle to a smooth consistency and shall have excellent application properties.

E. Paint shall arrive on the job color-mixed except for tinting of under-coats and possible thinning.

F. Comply with FM Global requirements for interior finishes. Coatings shall not contribute to excessive flame spread or smoke development.

G. It shall be the responsibility of the Contractor to see that all mixed colors match the color selection made by the Architect prior to application of the coating.

2.4 SCHEDULE OF FINISHES

A. Listed products establish the basis of design. Equivalent products by other approved manufacturers shall match performance, appearance, and flat finish requirements.

B. All exposed metal surfaces, including doors, frames, gates, and fabricated metal elements, shall receive a flat, non-specular finish, except Door B50 and frame, which shall receive the finish specified in the Finish Schedule.

C. Acceptable products shall include flat coatings such as:

1. Benjamin Moore Ultra Spec HP DTM Acrylic Flat

D. Interior Ferrous Metal (doors and frames)

1. Coordinate factory-applied finishes for fabricated metal items, including powder-coated assemblies, with Section 32 31 16. Finishes shall be flat and visually consistent with adjacent painted matte surfaces. Door B50 and frame shall receive the finish sheen indicated in the Finish Schedule. All other interior hollow metal doors and frames shall receive a flat finish as specified herein.

Primer: Benj. Moore Ultra Spec-HP Acrylic Metal Primer (HP04)

First Coat: Benj. Moore Ultra Spec HP DTM Acrylic Flat (HP29)

Second Coat: Benj. Moore Ultra Spec HP DTM Acrylic Flat (HP29)
a. Total DFT not less than: 4.0 mils

E. Interior Concrete Block

Flat Finish/Vinyl Acrylic Latex Over Filler
Block Filler: Benj. Moore Ultra Spec Masonry Int./Ext. High Build Block Filler (571)

First Coat: Benj. Moore Ultra Spec 500 Interior Latex Flat (N538)

Second Coat: Benj. Moore Ultra Spec 500 Interior Latex Flat (N538)
a. Total DFT not less than: 10.9 mils

2.5 EXISTING SURFACES TO BE PAINTED

A. Existing surfaces shall be painted in accordance with schedule given in Article 2.4 herein except that first or prime coat may be eliminated where existing paint is sound. Where existing paint must be removed down to base material, provide first or prime coat as specified.

PART 3 EXECUTION

3.1 INSPECTION

A. Examine the areas and conditions where painting and finishing are to be applied and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

B. Verify that substrates and factory-finished items from other Sections are compatible with specified matte finish requirements prior to application of coatings.

C. Verify that floor finishes and base conditions are complete or properly coordinated prior to application of wall coatings at floor interfaces. Coordinate with resilient flooring installation to avoid damage and ensure clean transitions.

3.2 GENERAL WORKMANSHIP REQUIREMENTS

A. Only skilled mechanics shall be employed. Application may be by brush or roller. Spray application only upon acceptance from the Architect in writing.

B. The Contractor shall furnish the Architect a schedule showing when he expects to have completed the respective coats of paint for the various areas and surfaces. This schedule shall be kept current as the job progresses.

C. The Contractor shall protect his work at all times and shall protect all adjacent work and materials by suitable covering or other method during progress of his work. Upon completion of the work, he shall remove all paint and varnish spots from floors, glass and other surfaces. He shall remove from the premises all rubbish and accumulated materials of whatever nature not caused by others and shall leave his part of the work in clean, orderly and acceptable condition.

D. Remove and protect hardware, accessories, device plates, lighting fixtures, and factory finished work, and similar items, or provide ample in place protection. Upon completion of each space, carefully replace all removed items by workmen skilled in the trades involved.

E. Remove electrical panel box covers and doors before painting walls. Paint separately and re-install after all paint is dry.

F. All materials shall be applied under adequate illumination, evenly spread and flowed on smoothly to avoid runs, sags, holidays, brush marks, air bubbles and excessive roller stipple.

G. Coverage and hide shall be complete. When color, stain, dirt or undercoats show through final coat of paint, the surface shall be covered by additional coats until the paint film is of uniform finish, color, appearance and coverage, at no additional cost to the Owner.

H. All coats shall be dry to manufacturer's recommendations before applying succeeding coats.

I. Coordinate protection of installed flooring during painting operations. Do not allow paint overspray, spills, or materials to contact finished flooring surfaces.

3.3 PREPARATION OF SURFACES

A. Existing Surfaces: Clean existing surfaces requiring paint or finishing, remove all loose and flaking paint or finish and sand surface smooth as required to receive new paint or finish. No "telegraphing" of lines, ridges, flakes, etc., through new surfacing is permitted. Where this occurs, Contractor shall be required to sand smooth and re-finish until surface meets with Architect's approval.

B. General

1. The Contractor shall be held wholly responsible for the finished appearance and satisfactory completion of painting work. Properly prepare all surfaces to receive paint, which includes cleaning, sanding, and touching-up of all prime coats applied under other Sections of the work. Broom clean all spaces before painting is started. All surfaces to be painted or finished shall be perfectly dry, clean and smooth.

2. Perform all preparation and cleaning procedures in strict accordance with the paint manufacturer's instructions and as herein specified, for each particular substrate condition.

3. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease with clean cloths and cleaning solvents prior to mechanical cleaning. Program the cleaning and painting so that dust and other contaminants from the cleaning process will not fall in wet, newly painted surfaces.

C. Metal Surfaces

1. Weld Fluxes: Remove weld fluxes, splatters, and alkali contaminants from metal surfaces in an approved manner and leave surface ready to receive painting.

2. Bare Metal: Thoroughly clean off all foreign matter such as grease, rust, scale and dirt before priming coat is applied. Clean surfaces, where solder flux has been used, with benzene. Clean surfaces by flushing with mineral spirits. For aluminum surfaces, wipe down with an oil free solvent prior to application of any pre-treatment.

a. Bare metal to receive high performance coating specified herein must be blast cleaned SSPC SP-6 prior to application if field applied primer; coordinate with steel trades furnishing ferrous metals to receive this coating to ensure that this cleaning method is followed.

3. Shop Primed Metal: Clean off foreign matter as specified for "Bare Metal." Prime bare, rusted, abraded and marred surfaces with approved primer after proper cleaning of surfaces. Sandpaper all rough surfaces smooth.

4. Metal Filler: Fill dents, cracks, hollow places, open joints and other irregularities in metal work to be painted with an approved metal filler suitable for the purpose and meeting the requirements of the related Section of work; after setting, sand to a smooth, hard finish, flush with adjoining surface.

D. Block Masonry Surfaces: Thoroughly clean off all grit, grease, dirt mortar drippings or splatters, and other foreign matter. Remove nibs or projections from masonry surfaces. Fill cracks, holes or voids not previously filled, with Portland cement grout, and bag surface so that it has approximately the same texture as the adjacent masonry surface.

E. Testing for Moisture Content: Contractor shall test all wall surfaces for moisture content using a reliable electronic moisture meter. Contractor shall also test latex type fillers for moisture content before application of top coats of paint. Do not apply any paint or sealer to any surface or to latex type filler where the moisture content exceeds seven (7) percent as measured by the electronic moisture meter.

F. Touch-Up: Prime paint all patched portions in addition to all other specified coats.

3.4 MATERIALS PREPARATION

A. Mix and prepare painting materials in strict accordance with the manufacturer’s directions.

B. Store materials not in actual use in tightly covered containers. Maintain containers used in storage, mixing, and application of paint in a clean condition, free of foreign materials and residue.

C. Stir all materials before application to produce a mixture of uniform density, and as required during the application of the materials. Do not stir any film which may form on the surface into the material. Remove the film and, if necessary, strain the material before using.

D. Tint each undercoat a lighter shade to facilitate identification of each coat where multiple coats of the same material are to be applied. Tint undercoats to match the color of the finish coat but provide sufficient difference in shade of undercoats to distinguish each separate coat.

3.5 APPLICATION

A. Paint finish schedule: Walls and Metal: flat, non-specular.

B. General

1. Apply paint by brush or roller in accordance with the manufacturer’s directions. Use brushes best suited for the type of material being applied. Use rollers of carpet, velvet back, or high pile sheep's wool as recommended by the paint manufacturer for material and texture required.

2. The number of coats and paint film thickness required is the same regardless of the application method. Do not apply succeeding coats until the previous coat has completely dried. Sand between each enamel or varnish coat application with fine sandpaper, or rub surfaces with pumice stone, where required to produce an even, smooth surface in accordance with the coating manufacturer's directions.

3. Apply additional coats when undercoats, stains, or other conditions show through the final coat of paint, until the paint film is of uniform finish, color and appearance. Give special attention to ensure that all surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a film thickness equivalent to that of flat surfaces.

4. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only.

    a. "Exposed surfaces" is defined as those areas visible when permanent or built-in fixtures, convector covers, covers for finned tube radiation, grilles, etc., are in place in areas scheduled to be painted.

5. Finish doors on tops, bottoms, and side edges the same as the faces, unless otherwise indicated.

6. Enamel finish applied to wood or metal shall be sanded with fine sandpaper and then cleaned between coats to produce an even surface.

C. Scheduling Painting

1. Apply the first coat material to surfaces that have been cleaned, pre-treated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

2. Allow sufficient time between successive coatings to permit proper drying. Do not re-coat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and the application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

D. Prime Coats: Re-coat primed and sealed walls and ceilings where there is evidence of suction spots or unsealed areas in first coat, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

E. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage.

F. "Touching-Up" of Factory Finishes: Unless otherwise specified or shown, materials with a factory finish shall not be painted at the project site. To "touch-up," the Contractor shall use the factory finished material manufacturer's recommended paint materials to repair abraded, chipped, or otherwise defective surfaces.

3.6 PROTECTION

A. Protect work of other trades, whether to be painted or not, against damage by the painting and finishing work. Leave all such work undamaged. Correct any damages by cleaning, repairing or replacing, and repainting, as acceptable to the Architect.

B. Provide "Wet Paint" signs as required to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations.

3.7 CLEAN UP

A. During the progress of the work, remove from the site all discarded paint materials, rubbish, cans and rags at the end of each workday.

B. Upon completion of painting work, clean paint spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

C. At the completion of work of other trades, touch-up and restore all damaged or defaced painted surfaces.

END OF SECTION

SECTION 101423

SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes room-identification signs that are directly attached to building elements, including but not necessarily limited to walls and partitions.

1.3 DEFINITIONS

A. Accessible: In accordance with the accessibility standards listed herein and elsewhere in the Construction Documents.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For interior signs, including but not necessarily limited to room identification signs and signage required by Authorities having Jurisdiction.

1. Include fabrication and installation details and attachments to other work.
2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
3. Show message list, typestyles, and graphic elements, including raised characters and Braille, and layout for each sign at full size.
4. Show layout and graphics of each sign indicated on the drawings, including the wall decals.

C. Approved full-size Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.

1. Include representative Samples of available typestyles and graphic symbols.

D. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), and as follows:
   1. Room-Identification Signs: Full-size Sample.
   2. Letter Signage: Full-Size Sample.
   3. Exposed Accessories: Full-size Sample of each accessory type.
   4. Full-size Samples, if approved, will be returned to Contractor for use in Project
E. Product Schedule: For room-identification signs. Use same designations indicated on Drawings or specified.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and manufacturer.

B. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For signs to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish products installed and that are packaged with protective covering for storage and identified with labels describing contents.

   1. Tools: One set of specialty tools for assembling signs and replacing variable sign components.

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

   1. Failures include, but are not limited to, the following:

      a. Deterioration of finishes beyond normal weathering.
      b. Deterioration of embedded graphic image.
      c. Separation or delamination of sheet materials and components.

   2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design and ICC A117.1and Cornell standards.

2.2 ROOM-IDENTIFICATION SIGN

A. Room Signs: Sign system to accommodate changeable insets, with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

1. Provide signs by ASI Sign Systems, Inc., or Signs & Decal, Corp., Mohawk Sign Systems, Signarama, or approved equal products by an approved manufacturer.
2. See drawings for sign material, layout, and details, in addition to material and standards noted below.
3. Custom Room Identification Signs:
   a. Overall Size: 8-1/2 inches wide by 6-1/2 inches high.
   b. Room Identification Panel:
      0.125-inch-thick thermoformed substrate.
      Matte white background.
      Raised black characters and Grade II Braille.
      Helvetica Regular typeface.
   c. Faceplate:
      0.060-inch matte acrylic.
      White accent band.
      Black painted bottom accent band and returns.
   d. Changeable Insert:
      Slide-in insert panel.
      White cardstock insert by Owner.
   e. Backer:
      0.125-inch white acrylic backer.
      Black painted bottom accent band.
   f. Mounting:
      Surface mounted using VHB tape and silicone adhesive.
      Install at locations indicated on the drawings.
4. Sign-Panel Perimeter: Finish edges smooth.
   a. Edge Condition: Square cut.
   b. Corner Condition in Elevation: As indicated on Drawings.
5. Mounting:
   a. At opaque wall surfaces: Surface mounted to walls using VHB tape and silicone adhesive.
6. Text and Typeface: Accessible raised characters and Braille typeface as indicated on

drawings and variable content as scheduled. Finish raised characters to contrast with background color, and finish Braille to match background color, as indicated. Braille shall be Grade II Braille and comply with ADA requirements.

2.3 PHOTOLUMINESCENT EXIT SIGNAGE

A. Basis of Design:
Exit Light Company Model PE Photoluminescent Exit Sign, or approved equal.

B. Construction:
Semi-rigid photoluminescent plastic.
Red background with white EXIT lettering.
Provide directional arrows where indicated on the drawings.

C. Performance:
No electrical connection required.
No batteries required.
Minimum 90-minute illumination after loss of normal lighting when properly charged.
Install only in locations receiving sufficient ambient illumination to maintain the manufacturer's charging requirements.

D. Mounting:
Surface mounted using manufacturer's recommended adhesive system.

E. Dimensions:
Nominal size: 14 inches wide x 10 inches high.

2.4 SIGN MATERIALS

A. See Drawings for sign layout and materials.

B. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

C. Cast Metal: Aluminum

2.5 ACCESSORIES.

A. Adhesive: As recommended by sign manufacturer.

B. Two-Face Tape: 3M brand VHB Heavy Duty Mounting Tape, 0.045-inch-thick, with adhesive on both sides, or approved equal.

C. Two-Face VHB clear acrylic tape: 3M brand 3905, .020 inches thick, or approved equal.

D. All fasteners and standoffs required for letter pin mounting.

2.6 FABRICATION

A. General: Provide sign assemblies according to requirements indicated.

1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
3. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
4. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.

B. Signs with Changeable Message Capability: Fabricate signs to allow insertion of changeable messages as follows:

1. For slide-in changeable inserts, fabricate slot without burrs or constrictions that inhibit function. Furnish initial changeable insert. Subsequent changeable inserts are by Owner

2.7 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.8 INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.

1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
2. Install signs so they do not protrude or obstruct according to the accessibility standard.
3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.

B. Accessibility: Install signs in locations on walls as indicated on Drawings and according to the accessibility standard.

C. Mounting Methods:
1. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose

debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.

2.9 ADJUSTING AND CLEANING

A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.

B. Remove temporary protective coverings and strippable films as signs are installed.

C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION

SECTION 10 22 13

WIRE MESH PARTITIONS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Custom fabricated interior welded-wire mesh partition and gate assemblies.

2. Structural support framing, receiving channels, perimeter framing, and accessories required for a complete installation.

B. Verify field dimensions and conditions prior to fabrication.

1.2 RELATED SECTIONS

A. Section 042200 – Concrete Unit Masonry.

B. Section 055000 – Miscellaneous Metals.

C. Section 078413 – Firestopping.

D. Section 087100 – Door Hardware.

E. Section 099000 – Painting and Coating.

F. Section 132816 – Safety Netting.

1.3 FM GLOBAL REQUIREMENTS

A. Comply with FM Global Property Loss Prevention Data Sheets applicable to interior assemblies and construction operations, including but not limited to:

1. Data Sheet 1-21 – Fire Resistance of Building Assemblies.

2. Data Sheet 2-0 – Installation Guidelines for Automatic Sprinklers.

3. Data Sheet 5-31 – Cables and Bus Bars.

4. Data Sheet 10-3 – Hot Work Management.

5. Data Sheet 10-4 – Contractor Management.

6. Data Sheet 10-7 – Fire Protection Impairment Management.

B. Provide materials that are noncombustible or that comply with FM requirements for flame spread and smoke development.

C. Do not install assemblies in a manner that interferes with fire protection systems, including sprinkler coverage, discharge patterns, and required clearances.

D. Coordinate installation with fire-resistance-rated assemblies to maintain required ratings and avoid unprotected penetrations.

E. Work involving welding, grinding, or other spark-producing operations shall comply with FM Global Data Sheet 10-3.

F. Maintain fire protection systems in service. Where impairment is required, comply with FM Global Data Sheet 10-7.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's literature for aluminum framing, welded-wire mesh, hinges, hardware, powder coating, receiving channels, U-edging, and accessories.

B. Shop Drawings: Submit fabrication and installation drawings indicating overall dimensions, framing member sizes, welded-wire mesh layout, receiving channels, support framing, anchorage, hardware locations, clearances, and relationship to adjacent construction.

C. Samples: Submit the following for Architect's review:

1. One corner mockup, minimum 12 inches by 12 inches, demonstrating completed assembly including aluminum framing members, welded-wire mesh, receiving channel, aluminum U-edging, welds, connections, and factory-applied powder-coated finish.

2. Sample shall accurately represent fabrication quality, edge conditions, joinery, weld quality, mesh attachment, receiving channel details, and finish appearance.

3. Finish color shall be matte black, matching the Drawings and Finish Schedule.

1.5 FABRICATOR QUALIFICATIONS

A. Fabricator shall specialize in the fabrication of custom welded-wire gate and enclosure assemblies of similar size, complexity, and materials.

B. Fabricator shall have a minimum of five years documented experience producing custom architectural metal assemblies incorporating aluminum framing, welded-wire mesh infill, and powder-coated finishes.

C. Fabricator shall have successfully completed not fewer than three projects of comparable scope and complexity within the past five years.

D. Fabricator shall perform fabrication, assembly, and finishing operations using personnel experienced with architectural aluminum construction and welded-wire systems.

1.6 MANUFACTURER QUALIFICATIONS

A. Manufacturer shall regularly produce welded-wire mesh systems, aluminum framing components, receiving channels, and related accessories of the type specified.

B. Manufacturer shall have a minimum of five years experience manufacturing products similar to those specified for this Project.

C. Powder coating applicator shall be experienced in factory application of architectural-grade powder-coated finishes and shall perform all coating work in accordance with coating manufacturer's written instructions.

D. Manufacturer shall maintain documented quality-control procedures for fabrication, finishing, and material traceability.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide gate and panel assembly capable of supporting its own weight and operational loads without excessive deflection, sagging, or racking. Size members, connections, hinges, and supports to maintain alignment and proper operation of a oversized gate under interior service conditions. Design aluminum framing to limit deflection and vibration under operational loads. Fabricate components to be readily disassembled where indicated. Furnish all bolts, anchors, hardware, fasteners, and accessories required for a complete installation.

2.2 CUSTOM WELDED-WIRE MESH PARTITION AND GATE ASSEMBLY

A. General: Provide a custom fabricated welded-wire mesh partition and gate assembly consisting of an oversized gate with an integral single leaf hinged door and structural framing mechanically attached to the building structure. Gate assembly is intended for interior installation and shall be designed for indoor use conditions. Gate framing shall be aluminum.

B. Configuration:

1. Gate: Oversized gate with internal single-leaf door without latch-side frame.

2. Assembly shall form a continuous framed opening with aligned mesh and perimeter members, including integrated structural support framing anchored to wall and floor slab to support gate without reliance on a latch-side frame.

3. Gate Size: Approximately 5 feet wide by 10 feet high with internal door of approximately 3 feet wide by 10 feet high unless otherwise indicated on Drawings.

C. Frame Members:

1. Fabricate door frames from rectangular aluminum tubing.
2. Provide 2-inch by 2-inch rectangular aluminum tube minimum at horizontal and vertical framing members unless 2-inch by 3-inch or 2-inch by 4-inch rectangular members are required.
3. Provide internal reinforcing as required to maintain structural integrity and alignment.
4. Design members to limit deflection and maintain alignment.
5. Provide reinforcement at hinge locations.

D. Infill:

1. Welded-wire mesh with 1-3/4 inch square spacing.

2. Install mesh with horizontal orientation aligned continuously across gate including the internal single-leaf hinged door.

3. Wire Size: Minimum 0.192 inch diameter.

4. Weld mesh continuously to frame members.

5. Provide-factory-applied powder-coated finish on mesh to match aluminum framing.

6. Provide 1/2 inch by 1 inch powder-coated aluminum U-edging at perimeter of welded-wire mesh.

7. U-edging shall fully encapsulate mesh edges and be mechanically fastened and centered with frame members to provide a clean, continuous edge condition.

8. Align mesh and U-edging consistently across gate and adjacent fixed panel to maintain uniform appearance.

9. Install U-edging centered with the gate framing, straight, true, and free of distortion, with tight joints at corners and intersections.

E. Supports and Anchorage:

1. Provide structural support framing for gate.

2. Mechanically attach support framing to wall and floor as indicated.

3. Provide primary support framing sized to resist loads imposed by an approximate 10-foot-high gate leaf and to maintain alignment without visible movement or distortion.

4. Support framing shall not rely on mesh infill for structural stiffness.

F. Hardware:

1. Coordinate with Section 087100 Door Hardware.

2. Provide heavy-duty hinges rated for full weight and configuration of an approximate 10-foot-high oversized gate and internal door leaf.

3. Hinges shall be designed to prevent sag and maintain alignment over time.

4. Hinges shall be suitable for interior use and provide smooth, maintenance-free operation.

5. Hardware components in contact with aluminum framing shall be stainless steel or otherwise isolated to prevent galvanic corrosion.

6. Do not provide latch-side frame.

7. Provide stops or hold-open devices.

8. Prepare framing and gate members to receive hardware. Reinforce, drill, and tap framing as required for installation of specified hardware.

G. Finish:

1. Provide factory-applied powder-coated finish on aluminum framing and mesh. Finish shall be matte, low-reflective, and visually consistent with adjacent painted surfaces.

2. Color: Matte Black unless otherwise indicated on the Drawings.

H. Materials:

1. Provide materials that are noncombustible or comply with FM Global requirements for flame spread and smoke development where applicable.

2. Aluminum Tubing: ASTM B221, Alloy 6063-T6.

3. Welded Wire Mesh: ASTM A1064 steel wire.

4. Fasteners: Type 304 stainless steel unless otherwise indicated.

5. Anchors: Manufacturer's standard mechanical anchors suitable for supporting substrate.

6. Aluminum Receiving Channels: Extruded aluminum, ASTM B221, Alloy 6063-T6, matching the framing alloy, profile, and factory applied powder-coated finish.

PART 3 EXECUTION

3.1 GATE INSTALLATION

A. Install gate plumb and level.

B. Ensure rigid installation without deflection.

C. Anchor support framing to wall and floor using mechanical anchors suitable for the supporting substrate. Coordinate anchor type with the supporting substrate and install anchors in accordance with the anchor manufacturer's written instructions.

D. Adjust hinges and supports for smooth, quiet operation without binding, racking, vibration, or measurable sag. Install framing plumb, level, square, and true. Shim and adjust supports as required to maintain alignment and proper operation.

E. Install assembly with tight tolerances suitable for interior architectural applications, with uniform gaps and consistent alignment between gate and internal door.

F. Install gate assembly so as not to obstruct or interfere with sprinkler discharge patterns. Coordinate location and height of gate framing with ceiling-mounted railing and fire protection systems in accordance with FM Global Data Sheet 2-0.

G. Coordinate gate installation with adjacent work, including safety netting and cable tray systems, to avoid conflicts and maintain required clearances.

H. Work involving welding, grinding, or other spark-producing operations shall comply with FM Global Data Sheet 10-3.

I. Adjust hinges, stops, and hardware so that the gate and integral door operate smoothly without binding, sagging, excessive play, or misalignment. Verify that latches engage properly.

J. Do not field cut, weld, or modify fabricated components without Architect's approval.

3.2 CLEANING

A. Remove protective coverings and construction debris. Clean exposed aluminum, welded-wire mesh, and hardware in accordance with manufacturer's written recommendations.

3.3 TOUCH UP

A. Repair damaged finishes immediately after installation using manufacturer's recommended touch-up materials. Replace components exhibiting damage that cannot be satisfactorily repaired.

END OF SECTION

SECTION 13 28 16

SAFETY NETTING

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

A. This Section includes the following:

1. Safety netting systems for panels and connections including Owner-provided anchorage system.

1.3 RELATED SECTIONS:

A. Section 012300 – Alternates.

B. Section 055000 – Miscellaneous Metals.

C. Section 079200 – Joint Sealers.

D. Section 099000 – Painting and Finishing.

D. Divisions 22, 23, and 26.

1.4 SUBMITTALS

A. Product Data: Manufacturer specifications and installation instructions.

B. Shop Drawings: Layout, anchorage, and support details.

C. Certificates: Compliance with OSHA and ANSI A10.11.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Experienced firm specializing in safety net systems.

B. Standards: Comply with OSHA 29 CFR 1926, ANSI A10.11.

1.6 FM GLOBAL REQUIREMENTS:

A. Comply with FM Global Property Loss Prevention Data Sheets, including but not limited to:

1. Data Sheet 2-0 – Installation Guidelines for Automatic Sprinklers
2. Data Sheet 5-31 – Cables and Bus Bars
3. Data Sheet 10-3 – Hot Work Management
4. Data Sheet 10-4 – Contractor Management
5. Data Sheet 10-7 – Fire Protection Impairment Management

B. FM requirements shall govern where more stringent than code or other referenced standards.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance, provide products by:

1. US Netting - Basis of Design.
2. Douglas
3. Approved equal

2.2 MATERIALS

A. Netting: High-strength synthetic fiber.

B. Border Ropes: Reinforced edges per ANSI.

C. Mesh Size: 1 ¾” Square. Suitable for intended protection.

D. Color Black

E. Fabrication: Provide custom-fabricated net panels where required to match project dimensions, penetrations, edge conditions, or support locations.

F. Materials shall comply with FM requirements for flame spread and smoke development and shall be suitable for interior applications. Provide materials that do not contribute to increased fire load.

2.3 PERFORMANCE REQUIREMENTS

A. Netting system shall be capable of intercepting and containing falling objects greater than 2 inches in any dimension, including rigid or irregularly shaped objects without rupture, detachment, or excessive deflection.

B. Netting, border ropes, and attachment hardware shall be compatible with and capable of transferring imposed loads to the anchorage system.

C. Provide adequate load capacity for the intended protective use, including containment of falling objects and debris within the size range indicated.

D. Design and install netting so that objects captured by the system are retained and do not roll, rebound, or pass through openings in the net.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify supporting structure adequacy.

B. Verify that Owner-provided anchorage system is installed, properly located, and suitable for attachment of netting system prior to installation. Notify Architect of deficiencies prior to proceeding.

C. Verify that netting installation will not interfere with cable trays, lighting, sprinkler systems, or other overhead systems.

3.2 INSTALLATION

A. Install in accordance with manufacturer and OSHA requirements.

B. Secure to prevent displacement.

D. Install netting taut and continuous, with edges securely fastened and with no openings exceeding those permitted by the specified mesh size.

E. Where multiple panels are used, join adjacent panels to maintain continuous protection across the full protected area.

F. Attach netting to anchorage system using connectors and hardware indicated on drawings. Do not modify anchorage system without approval.

G. Install netting system so as not to obstruct or interfere with sprinkler discharge patterns. Maintain required clearances below sprinkler heads in accordance with FM Global Data Sheet 2-0 and coordinate with fire protection systems.

H. Work involving cutting, welding, or other spark-producing operations shall comply with FM Data Sheet 10-3.

3.3 FIELD QUALITY CONTROL

A. Inspect regularly and after impact events.

B. Replace damaged netting immediately.

3.4 CLEANING

A. Keep netting free of debris. Remove accumulated debris to prevent increased fire load.

END OF SECTION

SECTION 23 0500

BASIC MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 ROUGHING

A. The Contract Drawings have been prepared in order to convey design intent and are diagrammatic only. Drawings shall not be interpreted to be fully coordinated for construction.

B. Due to small scale of Drawings, it is not possible to indicate all offsets, fittings, changes in elevation, interferences, etc. Make necessary changes in contract work, equipment locations, etc., as part of a contract to accommodate work to avoid obstacles and interferences encountered. Before installing, verify exact location and elevations at work site. **DO NOT SCALE** plans. If field conditions, details, changes in equipment or shop drawing information require an important rearrangement, report same to Owner's Representative for review. Obtain written approval for all major changes before installing.

C. Install work so that items both existing and new are operable and serviceable. Eliminate interference with removal of coils, motors, filters, belt guards and/or operation of doors. Provide easy, safe, and code mandated clearances at controllers, motor starters, valve access, and other equipment requiring maintenance and operation. Provide new materials, including new piping and insulation for relocated work.

D. Coordinate work with other trades and determine exact route or location of each duct, pipe, conduit, etc., before fabrication and installation. Coordinate with Architectural Drawings. Obtain from Owner's Representative exact location of all equipment in finished areas, such as thermostat, fixture, and switch mounting heights, and equipment mounting heights. Coordinate all work with the architectural reflected ceiling plans and/or existing Architecture. Mechanical and electrical drawings show design arrangement only for diffusers, grilles, registers, air terminals, lighting fixtures, sprinklers, speakers, and other items. Do not rough-in contract work without reflected ceiling location plans.

E. Before roughing for equipment furnished by Owner or in other Divisions, obtain from Owner and other Divisions, approved roughing drawings giving exact location for each piece of equipment. Do not "rough in" services without final layout drawings approved for construction. Cooperate with other trades to insure proper location and size of connections to insure proper functioning of all systems and equipment. For equipment and connections provided in this contract, prepare roughing drawing as follows:

1. Existing Equipment: Measure the existing equipment and prepare for installation in new location.

2. New Equipment: Obtain equipment roughing drawings and dimensions, then prepare roughing-in-drawings. If such information is not available in time, obtain an acknowledgement in writing, then make space arrangements as required with Owner's Representative.

1.2 EQUIPMENT AND MATERIAL REQUIREMENTS

A. Provide materials that meet the following minimum requirements:

1. Materials shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less, in accordance with NFPA 255.

2. All equipment and material for which there is a listing service shall bear a UL label.

3. Potable water systems and equipment shall be built according to AWWA Standards.

4. Gas-fired equipment and system shall meet AGA Regulations and shall have AGA label.

5. All electrical equipment and systems, as a whole, shall be tested and listed by an OSHA approved Nationally Recognized Testing Laboratory (NRTL) for the intended use in accordance with the applicable standards and have a physical label indicating such.

1.3 CONCEALMENT

A. **Conceal all contract work** above ceilings and in walls, below slabs, and elsewhere throughout building. If concealment is impossible or impractical, notify Owner's Representative before starting that part of the work and install only after their review. In areas with no ceilings, install only after Owner's Representative reviews and comments on arrangement and appearance.

1.4 PENETRATION FIRESTOPPING

A. Fire-Stopping for Openings Through Fire and Smoke Rated Wall and Floor Assemblies:

1. Provide materials and products listed or classified by an approved independent testing laboratory for "Penetration Fire-Stop Systems". The system shall meet the requirements of "Fire Tests of Penetrations Fire-Stops" designated ASTM E814.

2. Provide fire-stop system seals at all locations where piping, tubing, conduit, electrical busways/cables/wires, ductwork and similar utilities pass through or penetrate fire rated wall or floor assembly. Provide fire-stop seal between sleeve and wall for drywall construction.

3. The minimum required fire resistance ratings of the wall or floor assembly shall be maintained by the fire-stop system. The installation shall provide an air and watertight seal.

4. The methods used shall incorporate qualities which permit the easy removal or addition of electrical conduits or cables without drilling or use of special tools. The product shall adhere to itself to allow repairs to be made with the same material and permit the vibration, expansion, and/or contraction of any items passing through the penetration without cracking, crumbling and resulting reduction in fire rating.

5. Plastic pipe/conduit materials shall be installed utilizing intumescent collars.

6. Provide a submittal including products intended for use, manufacturer's installation instructions, and the UL details for all applicable types of wall and floor penetrations.

7. Fire-stopping products shall not be used for sealing of penetrations of non-rated walls or floors.

B. Acceptable Manufacturers:

1. Dow Corning Fire-Stop System Foams and Sealants.

2. Nelson Electric Fire-Stop System Putty, CLK and WRP.

3. S-100 FS500/600, Thomas & Betts.

4. Carborundum Fyre Putty.

5. 3-M Fire Products.

6. Hilti Corporation.

1.5 HVAC EQUIPMENT CONNECTIONS

A. Contractor is responsible for draining, filling, venting, chemically treating and restarting any systems which are affected by work shown on the Contract Documents unless specifically noted otherwise.

B. Provide final hot water, glycol, chilled, drain, vent**,** connections to all equipment as required by the equipment. Provide final connections, including domestic water piping, wiring, controls, and devices from equipment to outlets left by other trades. Provide equipment waste, drip, overflow and drain connections extended to floor drains.

C. Provide for Owner furnished and Contractor furnished equipment all valves, piping, piping accessories, traps, pressure reducing valves, gauges, relief valves, vents, drains, insulation, sheet metal work, controls, dampers, as required.

D. Refer to manufacturer drawings and specifications for requirements of laboratory equipment and special equipment. Verify connection requirements before bidding.

1.6 PLUMBING EQUIPMENT CONNECTIONS

A. Contractor is responsible for draining, filling, venting, chemically treating and restarting any systems which are affected by work shown on the Contract Documents unless specifically noted otherwise.

B. Provide roughing and final water, waste, vent connections to all equipment. Provide loose key stops, sanitary "P" traps, tailpiece, adapters, gas or air cocks, and all necessary piping and fittings from roughing point to equipment. Provide installation of sinks, faucets, traps, tailpiece furnished by others. Provide cold water line with gate valve and backflow prevention device at locations called for. Provide continuation of piping and connection to equipment that is furnished by others. Provide relief valve discharge piping from equipment relief valves.

C. Provide valved water outlet adjacent to equipment requiring same. Provide equipment type floor drains, or drain hubs, adjacent to equipment.

D. Install controls and devices furnished by others.

E. Refer to Contract Documents for roughing schedules, and equipment and lists indicating scope of connections required.

F. Provide for Owner furnished and Contractor furnished equipment all valves, piping, piping accessories, traps, pressure reducing valves, gauges, relief valves, vents, drains, as required.

G. Refer to Manufacturer drawings and specifications for requirements of special equipment. Verify connection requirements before bidding.

1.7 ELECTRICAL EQUIPMENT CONNECTIONS

A. Provide complete power connections to all electrical equipment. Provide control connections to equipment. Heavy duty NEC rated disconnect ahead of each piece of equipment. Ground all equipment in accordance with NEC.

B. Provide for Owner furnished and Contractor furnished equipment all power wiring, electric equipment, control wiring, switches, lights, receptacles, and connections as required.

C. Refer to Manufacturer's drawings/specifications for requirements of special equipment. Verify connection requirements before bidding.

END OF SECTION

SECTION 23 0593

TESTING, ADJUSTING AND BALANCING

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide labor, materials, equipment and services to perform operations required for complete adjusting and balancing Work as required in Contract Documents.

B. This Section specifies the requirements and procedures of mechanical systems testing, adjusting, and balancing. Requirements include measurement and establishment of the fluid quantities of the mechanical systems as required to meet design specifications, and recording and reporting the results.

C. Test, adjust, and balance the following mechanical systems:

1. Airside

a. Supply air systems, all pressure ranges; including constant volume and variable volume systems.

b. Return air systems.

c. Exhaust air systems**.**

2. Hydronics

a. Constant flow systems.

b. Variable flow systems.

D. This Section does not include:

1. Testing boilers and pressure vessels for compliance with safety codes;

2. Specifications for materials for patching mechanical systems;

3. Specifications for materials and installation of adjusting and balancing devices. If devices must be added to achieve proper adjusting and balancing, refer to the respective system sections for materials and installation requirements.

4. Requirements and procedures for piping and ductwork systems leakage tests.

1.2 SUBMITTALS

A. Provide information in report form listing items required by specifications. Results shall be guaranteed. Contractor shall be subject to recall to site to verify report information before acceptance of the report by the Owner's Representative.

B. Strategies and Procedures Plan: Within thirty (30) days of Contractor's Notice to Proceed, submit testing and balancing strategies and step-by-step procedures as specified in Section 3.1.B, "Preparation", and consistent with those listed in Part 3 of this specification.

C. System Readiness Checklists: Within thirty (30) days of Contractor's Notice to Proceed, AABC agency shall provide system readiness checklists as specified in Section 3.1.C, "Preparation", to be used and filled out by the installing contractors verifying that systems are ready for Testing and Balancing.

D. Examination Report: Provide a summary report of the examination review required in Section 3.1.D to the Engineer, documenting issues that may preclude the proper testing and balancing of the systems.

E. Certified report format shall consist of the following:

1. Title sheet with job name, contractor, engineer, date, balance contractor's name, address, telephone number and contact person's name and the balancing technician's name.

2. Individual test sheets for air handlers, terminal units, air distribution, exhaust fans, duct traverses, pumps, air handling coils, reheat coils, radiation, convectors, cabinet unit heaters and unit ventilators.

3. Manufacturer's pump and fan curves for equipment installed with design and actual operating conditions indicated.

4. TAB Report Forms: Use standard forms from AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems" or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" or TABB's "Testing, Adjusting and Balancing Bureau".

1.3 DEFINITIONS

A. System testing, adjusting and balancing is the process of checking and adjusting all the building environmental systems to produce the design objectives. It includes:

1. The balance of air and water distribution;

2. Adjustment of total system to provide design quantities;

3. Electrical measurement;

4. Verification of performance of all equipment and automatic controls.

B. Test: To determine quantitative performance of equipment.

C. Adjust: To regulate the specified fluid flow rate and air patterns at the terminal equipment (e.g., reduce fan speed, throttling).

D. Balance: To proportion flows within the distribution system (submains, branches, and terminals) according to specified design quantities.

E. Procedure: Standardized approach and execution of sequence of work operations to yield reproducible results.

F. Report Forms: Test data sheets arranged for collecting test data in logical order for submission and review. This data should also form the permanent record to be used as the basis for required future testing, adjusting, and balancing.

G. Terminal: The point where the controlled fluid enters or leaves the distribution system. There are supply inlets on water terminals, supply outlets on air terminals, return outlets on water terminals, and exhaust or return supply or outside air inlets or outlets on terminals such as registers, grilles, diffusers, and louvers.

H. Main: Duct or pipe containing the system's major or entire fluid flow.

I. Submain: Duct or pipe containing part of the systems' capacity and serving two or more branch mains.

J. Branch Main: Duct or pipe serving two or more terminals.

K. Branch: Duct or pipe serving a single terminal.

1.4 QUALIFICATIONS

A. Follow procedures and methods published by one or more of the following:

1. Associated Air Balance Council (AABC) or National Environmental Balancing Bureau (NEBB) or Testing, Adjusting and Balancing Bureau (TABB).

2. Individual manufacturer requirements and recommendations.

B. Maintain qualified personnel at project for system operation and trouble shooting. TAB contractor shall change sheaves and perform mechanical adjustments in conjunction with balancing procedure.

C. Balancing contractor shall be current member of AABC, NEBB, or TABB.

D. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in the *AABC National Standards for Total System Balance and SMACNA TAB Procedural Guide.*

1.5 GENERAL REQUIREMENTS

A. Before concealment of systems visit the job site to verify and advise on type and location of balancing devices and test points. Make changes as required to balance facilities.

B. Place systems in satisfactory operating condition.

1. Adjusting and balancing shall be accomplished as soon as the systems are complete and before Owner takes possession.

2. Initial adjustment and balancing to quantities as called for or as directed by the engineer, to satisfy job conditions.

3. All outdoor conditions (Db, Wb, and a description of the weather conditions) at the time of testing shall be documented in the report.

4. Airside

a. Prior to balancing, adjust balancing devices for full flow and replace temporary filters.

b. Provide sheaves and belts as required to meet system performance requirements for all belt-driven fan motors 10 HP and greater. Adjust and align sheaves to obtain proper settings and operation. Verify motors are not overloading.

c. Installing contractor shall replace dampers in new systems and identify dampers in existing systems that cannot be manipulated to satisfy balancing requirements.

d. Traverse main ducts to determine total system air quantities after all outlets have been set prior to final adjustment if the system does not meet design requirements. A sum of room CFM's is <u>not</u> acceptable.

e. If duct construction and/or installation prohibits proper traverse readings, provide coil measurements at main coils and/or fresh air intake traverse with units operating in 100% outside air mode (where applicable).

5. Hydronics

   a. Prior to balancing, adjust balancing devices for full flow; fill, vent and clean hydronic systems, replace temporary strainers.

   b. Installing contractor shall replace balancing cocks and flow balancers in new systems and identify flow balancers and balancing cocks in existing systems that cannot be manipulated to satisfy balancing requirements.

1.6 CONTRACTOR RESPONSIBILITIES

A. Provide Testing and Balancing agency one complete set of contract documents, change orders, and approved submittals in digital and hard copy formats.

B. Controls contractor shall provide required BAS hardware, software, personnel and assistance to Testing and Balancing agency as required to balance the systems. Controls Contractor shall also provide trending report to demonstrate that systems are complete.

C. Coordinate meetings and assistance from suppliers and contractors as required by Testing and Balancing agency.

D. Installing contractor shall replace or repair insulation as required by Testing and Balancing agency.

E. Have the HVAC systems at complete operational readiness for Testing and Balancing to begin. As a minimum verify the following:

1. Airside:

   a. Provide additional dampers, sheaves and belts as required by Testing and Balancing agency.

   b. Flag all manual volume dampers with fluorescent or other high-visibility tape.

   c. Provide access to all dampers, test ports, nameplates and other appurtenances as required by Testing and Balancing agency.

   d. All ductwork is complete with all terminals installed.

   e. All volume, smoke and fire dampers are open and functional.

   f. Clean filters are installed.

   g. All fans are operating, free of vibration, and rotating in correct direction.

h. ASD start-up is complete and all safeties are verified.

i. System readiness checklists are completed and returned to Testing and Balancing agency.

2. Hydronics:

a. Provide additional valves as required by Testing and Balancing agency.

b. Provide access to all valves, test ports, nameplates and other appurtenances as required by Testing and Balancing agency.

c. Piping is complete with all terminals installed.

d. Water treatment is complete.

e. Systems are flushed, filled and air purged.

f. Strainers are pulled and cleaned.

g. Control valves are functioning per the sequence of operation.

h. All shutoff and balance valves have been verified to be 100% open.

i. Pumps are started, and proper rotation is verified.

j. Pump gauge connections are installed directly at the pump inlet and outlet flange or in discharge and suction pipe prior to any valves or strainers.

k. ASD start-up is complete and all safeties have been verified.

l. System readiness checklists are completed and returned to Testing and Balancing agency.

F. Promptly correct deficiencies identified during Testing and Balancing.

G. Maintain a construction schedule that allows the Testing and Balancing agency to complete work prior to occupancy.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Provide tools, ladders, recording meters, gauges, thermometers, velometers, anemometers, Pitot tubes, inclined gauge manometers, magnehelic gauges, amprobes, voltmeters, psychrometers and tachometers required.

B. Instrumentation Calibration: Calibrate instruments at least every six (6) months or more frequently if required by instrument manufacturer.

1. Keep an updated record of instrument calibration that indicates date of calibration and the name of party performing instrument calibration.

PART 3 - EXECUTION

3.1 PREPARATION

A. Examine Bid Documents and submittals and notify Owner's Representative and Engineer of any questions regarding balancing.

1. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper Testing and Balancing of systems and equipment.

2. Examine the approved submittals for HVAC systems and equipment.

3. Examine equipment performance data including fan and pump curves.

B. Prepare a Testing and Balancing Strategies and Procedures Plan that includes:

1. Equipment and systems to be tested.

2. Strategies and step-by-step procedures for balancing the systems.

3. Instrumentation to be used.

4. Sample forms with specific identification for all equipment.

C. Prepare system-readiness checklists, as described in the *AABC National Standards for Total System Balance and SMACNA TAB Procedural Guide*, for use by contractors in verifying system readiness for Testing and Balancing.

These shall include, at a minimum:

1. Airside:
    a. All ductwork is complete with all terminals installed.
    b. All volume, smoke and fire dampers are open and functional.
    c. Clean filters are installed.
    d. All fans are operating, free of vibration, and rotating in correct direction.
    e. Permanent electrical power wiring and ASD start-up is complete and all safeties are verified.
    f. Automatic temperature-control systems are operational.
    g. Ceilings are installed.
    h. Windows and doors are installed.
    i. Suitable access to balancing devices and equipment is provided.
    j. Equipment and duct access doors are securely closed.
2. Hydronics:
    a. Piping is complete with all terminals installed.
    b. Water treatment is complete.
    c. Systems are flushed, filled and air purged.
    d. Strainers are pulled and cleaned.
    e. Control valves are functioning per the sequence of operation.
    f. All shutoff and balance valves have been verified to be 100% open.
    g. Pumps are started and proper rotation is verified.
    h. Pump gauge connections are installed directly at the pump inlet and outlet flange or in discharge and suction pipe prior to any valves or strainers.

i. Permanent electrical power wiring and ASD start-up is complete and all safeties are verified.

j. Suitable access to balancing devices and equipment is provided.

D. Examine construction and notify Owner's Representative and Engineer of outstanding issues related to balancing, as part of "Examination Report" submittal.

1. Examine HVAC equipment and verify that bearings are greased, belts are aligned and tight, clean permanent filters are installed, and controls are ready for operation.

2. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected, configured by the controls contractor and functioning.

3. Airside

a. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they are properly separated from adjacent areas.

b. Examine systems for installed balancing devices, such as test ports, gage cocks, flow-control devices, and manual volume dampers prior to pressure testing. Note the locations of devices that are not accessible for testing and balancing.

4. Hydronics

a. Examine strainers to verify that Mechanical Contractor has replaced startup screens with permanent screens and that all strainers have been cleaned.

b. Examine two-way valves for proper installation and function.

c. Examine three-way valves for proper installation for their intended function of diverting or mixing fluid flows.

d. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

e. Examine air vents to verify that mechanical contractor has removed all air from all hydronic systems.

f. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings and weld-o-lets prior to pressure testing. Note the locations of devices that are not accessible for testing and balancing.

3.2 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems" or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" or TABB's "SMACNA TAB Procedural Guide" and this Section.

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to insulation Specifications for this Project.

C. Mark equipment and balancing device settings with paint or other suitable, permanent identification material, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, to show final settings.

D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.3 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.

1. Measure fan static pressures to determine actual static pressure as follows:

a. Measure outlet static pressure as far downstream from the fan as practicable and upstream from restrictions in ducts such as elbows and transitions.

b. Measure static pressure directly at the fan outlet or through the flexible connection.

c. Measure inlet static pressure of single-inlet duct as near the fan as possible, upstream from flexible connection and downstream from duct restrictions.

d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.

2. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and treating equipment.

    a. Simulate dirty filter operation and record the point at which maintenance personnel must change filters.

3. Measure static pressures entering and leaving other devices such as sound traps, heat recovery equipment, and air washers, under final balanced conditions.

4. Compare design data with installed conditions to determine variations in design static pressures versus actual static pressures. Compare actual system effect factors to identify where variations occur. Recommend corrective action to align design and actual conditions.

5. Obtain approval from Engineer for adjustment of fan speed higher or lower than indicated speed. Make required adjustments to sheaves sizes, motor sizes, and electrical connections to accommodate fan-speed changes.

6. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full cooling, full heating, economizer, and any other operating modes to determine the maximum required brake horsepower.

B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.

1. Measure static pressure at a point downstream from the balancing damper and adjust volume dampers until the proper static pressure is achieved.

    a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.

2. Re-measure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.

C. Measure terminal outlets and inlets without making adjustments.

1. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.

D. Adjust terminal outlets and inlets for each space to indicated airflows within specified tolerances of indicated values.

Make adjustments using volume dampers rather than extractors and the dampers at air terminals.

1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.

2. Adjust patterns of adjustable outlets for proper distribution without drafts.

3.4 PROCEDURES FOR VARIABLE-AIR-VOLUME SYSTEMS

A. Compensating for Diversity: When the total airflow of all terminal units is more than the indicated airflow of the fan, place a selected number of terminal units at a maximum set-point airflow condition until the total airflow of the terminal units equals the indicated airflow of the fan. Select the reduced airflow terminal units so they are distributed evenly among the branch ducts.

B. Pressure-Independent, Variable-Air-Volume Systems: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:

1. Set outside-air dampers at minimum, and return-and exhaust-air dampers at a position that simulates full-cooling load.

2. Select the terminal unit that is most critical to the supply-fan airflow and static pressure. Measure static pressure. Adjust system static pressure so the entering static pressure for the critical terminal unit is not less than the sum of terminal-unit manufacturer's recommended minimum inlet static pressure plus the static pressure needed to overcome terminal-unit discharge system losses.

3. Measure total system airflow. Adjust to within indicated airflow.

4. Set terminal units at maximum airflow and adjust controller or regulator to deliver the designed maximum airflow. Use terminal-unit manufacturer's written instructions to make this adjustment. When total airflow is correct, balance the air outlets downstream from terminal units as described for constant-volume air systems.

5. Set terminal units at minimum airflow and adjust controller or regulator to deliver the designed minimum airflow. Check air outlets for a proportional reduction in airflow as described for constant-volume air systems.

a. If air outlets are out of balance at minimum airflow, report the conditions but leave outlets balanced for maximum airflow.

6. Re-measure the return airflow to the fan while operating at maximum return airflow and minimum outside airflow. Adjust the fan and balance the return-air ducts and inlets as described for constant-volume air systems.

7. Measure static pressure at the most critical terminal unit and adjust the static-pressure controller at the main supply-air sensing station to ensure that the adequate static pressure is maintained at the most critical unit.

8. Record the final fan performance data.

C. Pressure-Dependent, Variable-Air-Volume Systems with Diversity: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:

3.5 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

A. Prepare test reports for pumps, coils and heat exchangers. Obtain approved submittals and any manufacturer-recommended testing procedures. Cross check the summation of required coil and heat exchanger gpms with pump design flow rate.

B. Verify that hydronic systems are ready for testing and balancing:

1. Check liquid level in expansion tank and verify that tank is set to specified pressure for system fill and expansion.

2. Check that makeup water has adequate pressure to highest vent.

3. Check that control valves are in their proper positions.

4. Check that air has been purged from the system.

5. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

6. Verify that motor starters are equipped with properly sized thermal protection.

3.6 PROCEDURES FOR CONSTANT-FLOW HYDRONIC SYSTEMS

A. Adjust pumps to deliver total design gpm.

1. Measure total water flow.

a. Position valves for full flow through coils.

b. Measure flow by main flow meter, if installed.

c. If main flow meter is not installed, determine flow by pump total dynamic head (TDH) or exchanger pressure drop.

2. Measure pump TDH as follows:

a. Measure discharge pressure directly at the pump outlet flange or in discharge pipe prior to any valves or fittings.

b. Measure inlet pressure directly at the pump inlet flange or in suction pipe prior to any valves or strainers.

c. Convert pressure to head and correct for differences in gauge heights.

d. On single stage centrifugal pumps, verify pump impeller size by measuring the TDH with the discharge valve closed. Note the point on manufacturer's pump curve at zero flow and verify that the pump has the intended impeller size.

e. With all valves open, read pump TDH. Adjust pump discharge valve until design water flow is achieved.

3. Monitor motor performance during procedures and do not operate motor in an overloaded condition.

B. Adjust flow measuring devices installed in mains and branches to design water flows.

1. Measure flow in main and branch pipes.

2. Adjust main and branch balance valves for design flow.

3. Re-measure each main and branch after all have been adjusted.

C. Adjust flow measuring devices installed at terminals for each space to design water flows.

1. Measure flow at all terminals.

2. Adjust each terminal to design flow.

3. Re-measure each terminal after all have been adjusted.

4. Position control valves to bypass the coil and adjust the bypass valve to maintain design flow.

5. Perform temperature tests after all flows have been balanced.

D. For systems with pressure-independent valves at the terminals:

1. Measure differential pressure and verify that it is within manufacturer's specified range.

2. Perform temperature tests after all flows have been verified.

E. For systems without pressure-independent valves or flow measuring devices at the terminals:

1. Measure and balance coils by either coil pressure drop or temperature method.

2. If balanced by coil pressure drop, perform temperature tests after all flows have been verified.

F. Verify final system conditions as follows:

1. Re-measure and confirm that total water flow is within design.

2. Re-measure all final pump operating data, TDH, volts, amps, static profile.

3. Mark all final settings.

G. Verify that all memory stops have been set.

3.7 PROCEDURES FOR VARIABLE-FLOW HYDRONIC SYSTEMS

A. Adjust the variable-flow hydronic system as follows:

1. Verify that the differential pressure (DP) sensor is located per the Contract Documents.

2. Determine if there is diversity in the system.

B. For systems with no diversity:

1. Follow procedures outlined for constant-flow hydronic systems.

2. Prior to verifying final system conditions, determine the system DP setpoint.

3. If the pump discharge valve was used to set total system flow with ASD at 60 Hz, at completion open discharge valve 100% and allow ASD to control system DP setpoint. Record pump data under both conditions.

4. Mark all final settings and verify that all memory stops have been set.

C. For systems with diversity:

1. Determine diversity factor.

2. Simulate system diversity by closing required number of control valves, as approved by the design Engineer.

3. Follow procedures outlined for constant flow hydronic systems.

4. Open control valves that were shut. Close a sufficient number of control valves that were previously open to maintain diversity, and balance the terminals that were just opened.

5. Prior to verifying final system conditions, determine the system DP setpoint.

6. If the pump discharge valve was used to set total system flow with ASD at 60 Hz, at completion open discharge valve 100% and allow ASD to control system DP setpoint. Record pump data under both conditions.

7. Mark all final settings and verify that all memory stops have been set.

D. For systems with pressure-independent valves at the terminals:

1. Measure differential pressure and verify that it is within manufacturer's specified range.

2. Perform temperature tests after all flows have been verified.

3.8 TOLERANCES

A. Set HVAC system's air flow rates and water flow rates within the following tolerances:

1. Supply, Return, and Exhaust Fans: Zero to plus 10 percent.

2. Air Outlets and Inlets: Plus or minus 10 percent.

3. Minimum Outside Air: Zero to plus 10 percent.

4. Maintaining pressure relationships as designed shall have priority over the tolerances specified above.

5. Heating-Water Flow Rate: Plus or minus 10 percent.

6. Cooling-Water Flow Rate: Plus or minus 10 percent.

3.9 FINAL TEST & BALANCE REPORT

A. The report shall be a complete record of the HVAC system performance, including conditions of operation, items outstanding, and any deviations found during the Testing and Balancing process. The final report also provides a reference of actual operating conditions for the owner and/or operations personnel. All measurements and test results that appear in the reports must be made on site and dated by the technicians or Test and Balance Engineers.

B. The report must be organized by systems and shall include the following information as a minimum:

1. Title Page:

a. AABC or NEBB Certified Company Name.

b. Company Address.

c. Company Telephone Number.

d. Project Identification Number.

e. Location.

f. Project Architect.

g. Project Engineer.

h. Project Contractor.

i. Project Number.

j. Date of Report.

k. Certification Statement.

l. Name, Signature, and Certification Number.

2. Table of Contents.

3. National Performance Guaranty.

4. Report Summary:

    a. The summary shall include a list of items that do not meet design tolerances, with information that may be considered in resolving deficiencies.

5. Instrument List:

    a. Type
    b. Manufacturer
    c. Model
    d. Serial Number
    e. Calibration Date

C. Required Airside data - Test, adjust and record the following:

1. Motors:

    a. RPM
    b. BHP
    c. Full load amps
    d. Sheave sizes, number and size of belts
    e. Shaft diameter
    f. Complete nameplate data

2. Fans:

    a. Cfm
    b. RPM
    c. Suction static pressure
    d. Discharge static pressure
    e. Sheave sizes, number and size of belts, key sizes, shaft, diameter
    f. Complete nameplate data
    g. Sketch of system's inlet and outlet connections
    h. Location of test port

3. Duct: Traverse Zones:

    a. Cfm
    b. Static Pressure

4. AHU – Air handling units, Fan coil units (In both minimum O.A. and economizer modes):

    a. Minimum outdoor air Cfm
    b. Total discharge and return Cfm

c. Static profile thru unit
d. Complete nameplate data

5. Coil:

a. Entering air temperature (DB/WB)
b. Leaving air temperature (DB/WB)
c. Static differential
d. Face velocity and area
e. Cfm
f. Complete nameplate data

6. VAV Boxes:

a. Minimum Cfm
b. Maximum Cfm

7. Registers/Grilles/Diffusers:

a. Cfm
b. Set, adjust and record air flow pattern

8. Filter Banks:

a. Nameplate data
b. Static pressure drop

D. Required Fluid Data: Test, adjust and record the following:

1. Heat Transfer Devices: Including, but not limited to air handlers, convectors, fin tube radiation sections, unit ventilators, fan coils, cabinet heaters, unit heaters, heat pumps, heat exchangers.

a. GPM (coil and bypass)
b. Entering water temperature
c. Leaving water temperature
d. Water pressure drop
e. Complete nameplate data

E. The final test and balance report shall be provided as a formal project submittal for review by the Engineer of Record.

END OF SECTION

SECTION 23 0710

INSULATION

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents.

1.2 SUBMITTAL

A. Submit product data, product description, manufacturer's installation instructions.

B. Submit schedule of types and thicknesses for each application, and location of materials.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. Section 233100 - Sheet Metal and Ductwork Accessories Construction.

PART 2 - PRODUCTS

2.1 GENERAL

A. See Exhibits at the end of this section for where insulating materials shall be applied, thickness, jacketing and remarks.

B. Provide work in compliance with the following Codes and Standards based on the current edition in effect at project location:

1. Energy Conservation Code of New York State.

C. Insulation, jackets, adhesive, and coatings shall comply with the following:

1. Products shall not contain asbestos, lead, mercury, or mercury compounds.

2. Insulation, including jackets, finishes and adhesives on the exterior surfaces of ducts, pipes, and equipment, shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less, when tested in accordance with ASTM E84 or UL 723.

a. Plenums: Insulation materials shall be noncombustible or listed and labeled per ASTM E84 or UL 723.

b. Treatment of jackets or facing for flame and smoke safety must be permanent. Water-soluble treatments are not permitted.

3. All adhesives, coatings and sealants used for insulation in the interior of the building shall comply with the maximum Volatile Organic Compound (VOC) limits as called for in the current version of U.S. Green Building Council LEED Credits EQ 4.1 and EQ 4.2.

4. Provide materials which are the standard products of manufacturers regularly engaged in the manufacture of such products and that essentially duplicate items that have been in satisfactory use for at least two (2) years prior to bid opening. Provide insulation systems in accordance with the approved MICA or NAIMA Insulation Standards.

5. Insulation shall be clearly marked with manufacturer's name, identification of installed thermal resistance (R) value, out-of-package R value, flame spread and smoke developed indexes in accordance with Energy Code requirements.

6. Products that come into contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested in accordance with ASTM C 871.

7. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable in accordance with ASTM C 795.

2.2 ACCEPTABLE MANUFACTURERS

A. Fiberglass: Johns Manville, Knauf/Manson, Owen-Corning, or approved equal.

B. Adhesives, Coatings, Mastics, Sealants: Childers, Foster, or approved equal.

C. Flexible Elastomeric: Armacell, K-Flex.

2.2 PIPE INSULATION (FLEXIBLE TYPE)

A. Flexible Elastomeric Thermal Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials. Adhesive: As recommended by insulation material manufacturer.

B. Insulation (1 in. thickness and smaller) shall have a flame-spread index of less than 25 and a smoke-developed index of less than 50 as tested by ASTM E 84 and CAN/ULC S-102, "Method of Test for Surface Burning Characteristics of Building Materials".

2.3 RIGID FIBERGLASS

A. Pre-formed glass fibers bonded with a thermosetting resin.

B. Pipe:

1. Product meeting ASTM C 547, ASTM C 585, and ASTM C 795; rigid, molded, noncombustible.

2. 'K' Value: 0.23 BTU-in/ft^2 hr. °F at 75°F mean temperature.

3. Maximum Service Temperature: 1000°F.

4. Vapor Retarder Jacket: Factory applied ASJ/SSL conforming to ASTM C 1136 Type I, secured with self-sealing longitudinal laps and butt strips.

5. Field applied PVC Fitting Covers with Flexible Fiberglass Insulation: Proto Corporation 25/50 or Indoor/Outdoor, UV resistant fittings, jacketing and accessories, white or colored. Fitting cover system consists of pre-molded, high-impact PVC materials with blanket type fiberglass wrap inserts. Blanket fiberglass wrap inserts shall have a thermal conductivity ('K') of 0.26 at 75°F mean temperature. Closures to be stainless steel tacks, matching PVC tape, or PVC adhesive per manufacturer's recommendations.

C. Board:

1. Product meeting ASTM C 612 Type IA and IB. Maximum Service Temperature: 450º F.

2. 'K' Value: 0.24 BTU-in/ft^2 hr. °F at 75°F mean temperature.

3. Vapor Retarder Jacket:

a. ASJ conforming to ASTM C 1136 Type I

b. FSK or PSK conforming to ASTM C 1136 Type II.

4. Density: As required to meet specified R-value in Exhibit, unless otherwise noted.

2.4 ADHESIVES, COATINGS, MASTICS, SEALANTS

A. Provide per manufacturer product requirements for associated system and application/installation location.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. All materials shall be installed by skilled labor regularly engaged in this type of work and installed in strict accordance with manufacturer's recommendations, building codes, and industry standards. Install insulation materials, forms, vapor barriers or retarders, jackets, and of thicknesses required for each item of pipe system per manufacturer requirements. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

B. Locate insulation and cover seams in the least visible location. All surface finishes shall be extended in such a manner as to protect all raw edges, ends and surfaces of insulation. No glass fibers shall be exposed to the air. Install insulation with longitudinal seams at top and bottom of horizontal runs. Install multiple layers of insulation with longitudinal and end seams staggered and with the least number of joints possible.

C. All pipe and duct insulation shall be continuous through hangers.

D. Provide thermal insulation on clean, dry surfaces and after piping, ductwork and equipment (as applicable) have been tested. Do not cover pipe joints with insulation until required tests are completed.

E. All cold surfaces that may "sweat" must be insulated. Vapor barrier must be maintained; insulation shall be applied with a continuous, unbroken moisture and vapor seal. All hangers, supports, anchors, or other projections that are secured to cold surfaces shall be insulated and vapor sealed to prevent condensation.

F. Items such as boiler manholes, handholds, clean-outs, ASME stamp, and manufacturers' nameplates, may be left uninsulated unless omitting insulation would cause a condensation problem. When such is the case, appropriate tagging shall be provided to identify the presence of these items. Provide neatly beveled edges at interruptions of insulation.

G. Provide protective insulation as required to prevent personnel injury: Piping from zero to seven feet above all floors and access platforms including hot (above 140°F) piping and any other related hot surface.

H. If any insulation material has become wet because of transit or job site exposure to moisture or water, the contractor shall not install such material, and shall remove it from the job site.

I. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

J. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches in similar fashion to butt joints.

K. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.

2. Testing agency labels and stamps.

3. Nameplates and data plates.

3.2 PENETRATIONS

A. Aboveground Exterior Wall: Install insulation continuously through penetrations.

1. Seal penetrations with flashing sealant.

2. For applications requiring only indoor insulation, terminate insulation above through surface and seal with joint sealant.

B. Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

C. Interior Floor, Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

D. Fire-Rated Floor, Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

3.3 DUCTWORK INSULATION

A. Provide external thermal insulation for ductwork. Not required where ducts have internal acoustical insulation. Make special provisions at dampers, damper motors, thermometers, instruments, and access doors.

B. Provide factory ASJ jacket for ductwork required to be insulated and to be painted.

EXHIBIT "I" - PIPE INSULATION MATERIALS

SERVICE	INSULATION MATERIAL	THICKNESS	REMARKS
AC unit drains, overflows and indirect waste piping associated with any HVAC equipment	Glass fiber flexible	All Sizes: 1/2 in.	Not required for exposed PVC drains.

EXHIBIT "II" - DUCT INSULATION MATERIALS

SERVICE	INSULATION MATERIAL	THICKNESS	REMARKS
Supply	Rigid Fiberglass	1-1/2 in.	Min. installed R value of 6

END OF SECTION

SECTION 23 2010

PIPING SYSTEMS AND ACCESSORIES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide labor, materials, equipment and services as required for the complete installation designed in Contract Documents.

1.2 SUBMITTALS

A. Schedule of pipe materials, fittings, and connections.

B. Applicable miscellaneous materials (i.e. dielectric protection, hangers, inserts, supports, sealing elements, firestop systems etc.).

C. Anchors and Guides:

1. Provide detailed fabrication drawings for all field-fabricated anchors and guides and intermediate structural elements.

2. Provide submittals for pre-manufactured anchors and guides.

PART 2 - PRODUCTS

2.1 GENERAL

A. Pipe and fittings shall be new, marked with manufacturer's name and comply with applicable ASTM and ANSI Standards.

B. All adhesives, sealants, primers and paint used for piping in the interior of the building shall comply with the maximum Volatile Organic Compound (VOC) limits called for in the current version of U.S. Green Building Council LEED Credits EQ 4.1 and EQ 4.2.

2.2 COPPER DRAINAGE TUBE AND FITTINGS - SOLDER JOINT

A. Pipe: ASTM B88; Type M hard temper.

B. Tees, Elbows, Reducers: Wrought copper, ASME B16.22; ASME B16.18 solder end connections.

C. Solder Materials: No lead solder, using alloys made from tin, copper, silver and nickel.

D. Make: Harris "Stay-Safe 50" and "Bright", Engelhard "Silverbright 100", Canfield "Watersafe", or approved equal.

2.3 DIELECTRIC PIPE FITTINGS

A. Description: Assembly or fitting having insulating material isolating joined dissimilar metals to prevent galvanic action and stop corrosion.

B. Dielectric unions shall not be used due to their tendency to leak. Provide a dielectric waterway fitting or a brass nipple for dielectric protection. A brass valve is also an acceptable method of dielectric protection.

C. Flanges: Factory-fabricated, companion-flange assembly, for 150 or 300 psig minimum pressure to suit system fluid pressures and temperatures with flange insulation kits and bolt sleeves.

D. Waterway Fittings: 300 psi maximum working pressure at 230°F, male threaded or grooved ends, electroplated ductile iron or steel body with LTHS high temperature polyolefin polymer liner.

E. Make: EPCO, Capitol Manufacturing, Watts or approved equal.

F. The use of brass valves and brass nipples (3 in. and larger) may be used for dielectric isolation.

2.4 HANGERS, INSERTS, AND SUPPORTS

A. Hangers, Inserts, Clamps: B-Line, Grinnell, Michigan Hanger, PHD Manufacturing, Anvil, Hilti.

B. Hangers:

1. Adjustable, wrought malleable iron or steel with electroplated zinc or cadmium finish. Copper plated or PVC coated where in contact with copper piping. Hot-dipped galvanized finish for exterior locations.

2. Adjustable ring type where piping is installed directly on hanger for piping 3 in. and smaller.

3. Adjustable steel clevis type for 4 in, and larger, and where insulation passes through hanger.

4. Hangers sized to permit passage of insulation through the hanger for all piping.

C. Nuts, washers and rods with electroplated zinc or cadmium finish. Hot-dipped Hanger Shields:

1. Pre-Insulated Type:

a. Insulated pipes shall be protected at point of support by a 360° insert of high density, 100 psi waterproof calcium silicate, encased in a 180° sheet metal shield. Insulation insert to be same thickness as adjoining pipe insulation and extend 1 in. beyond sheet metal shield. Insulation shall be provided with a factory installed ASJ.

2. Field-Insulated Type:

a. #18 USSG, galvanized steel shields, minimum 120° arc. Provide ICA-HAMFAB-BLOCK, 18# density molded fiberglass inserts, between pipe and hanger shield to maintain proper spacing for insulation. Insulation inserts shall extend 1 in. beyond the sheet metal shields. Material shall comply with ASTM E84 25/50, have a thermal conductivity of K=.30 (stable) and have a service temperature of -120°F to +650°F. Install in accordance with manufacturer's printed instructions.

3. Shield Sizing:

PIPE SIZE	SHIELD LENGTH	MINIMUM GAUGE
1/2 in. to 3-1/2 in.	9 in.	20
4 in.	9 in.	20
5 in. and 6 in.	9 in.	20
8 in. to 12 in.	12 in.	18
14 in. to 24 in.	18 in.	16

4. Hanger shield gauges listed are for use with band type hangers only. For point loading (roller support), increase shield thickness by one gauge, and length by 50%.

D. Hanger Spacing Schedules: (Based upon most stringent requirement of MCNYS and ASME B31.9)

COPPER OR PLASTIC PIPE SIZE	COPPER PIPE HANGER SPACING	PLASTIC PIPE HANGER SPACING	HANGER ROD SIZE
3/4 to 1 in.	6 ft.	3 ft.	3/8 in.
1-1/4 in.	6 ft.	4 ft.	3/8 in.
1-1/2 to 2 in.	8 ft.	4 ft.	3/8 in.
2-1/2 to 4 in.	10 ft.	4 ft.	1/2 in.

COPPER OR PLASTIC PIPE SIZE	COPPER PIPE HANGER SPACING	PLASTIC PIPE HANGER SPACING	HANGER ROD SIZE
5 in. and larger	10 ft.	4 ft.	3/4 in.

STEEL PIPE SIZE	STEEL PIPE HANGER SPACING	HANGER ROD SIZE
3/4 to 1 in.	8 ft.	3/8 in.
1-1/4 in.	10 ft.	3/8 in.
1-1/2 to 2-1/2 in.	12 ft.	3/8 in.
3 to 4 in.	12 ft.	1/2 in.
5 in. and larger	12 ft.	3/4 in.

E. Inserts: Carbon steel body and square insert nut, galvanized finish, maximum loading 1,300 lbs., for 3/8 in. to 3/4 in. rod sizes. Drill through decking for hanger rods and secure devices with integral support plate strap with sheet metal screws. Devices shall have a safety factor of four.

F. Beam Attachments:

1. C-Clamp, locknut, electroplated finish, UL listed, FM approved, for pipe sizes 2 in. and smaller.

2. Center load style with clamp attachments that engage both edges of beam, electroplated finish, UL listed, FM approved, for pipe sizes larger than 2 in., refer to "Supports" for additional requirements.

3. Welded beam attachments may be considered only upon the review and acceptance of the structural engineer of record with written confirmation of weld meet configuration, location and service/pipe size submitted to the Mechanical Engineer for review.

G. Supports:

1. Provide intermediate structural steel members where required for hanger attachment. Secure member to structure. Select size of members based on a minimum factor of safety of four.

2. For Weights Under 1000 lbs.: Insert, "U" shaped channel, beam clamps or other structurally reviewed support. The factor of safety shall be at least four. Follow manufacturer's recommendations.

3. For Weights Above 1000 lbs.: Drill through floor slabs and provide flush plate welded to top of rod or provide additional inserts and hangers to reduce load per hanger below 1000 lbs.

4. Make: Hilti, ITW Ramset, Phillips "Red Head", or approved equal.

H. Trapeze Hangers:

1. For use on 1-1/2" and smaller piping only. Use of trapeze hangers for piping 2" and greater may be considered only upon the review and acceptance of the structural engineer of record with written confirmation of configuration, location and service/pipe size submitted to the Mechanical and Structural Engineer for review.

2. Hangers shall be supported with rod sized with a safety factor of four.

3. May be manufactured type "U" shaped channel, or suitable angle iron or channel. Round off all sharp edges.

4. Securely fasten piping to trapeze with "U" bolt or straps, dissimilar metals shall not touch, use isolation gaskets.

5. Make: B-Line, Kindorf, Unistrut, or approved equal.

2.5 PIPING ACCESSORIES

A. Escutcheon Plates: Provide escutcheon plates on uninsulated piping in exposed and finished areas. Steel or cast brass polished chrome, split hinge type with setscrew, high plates where required for extended sleeves.

B. Pipe Guides: Cylindrical steel guide sleeve, proper length for travel, integral bottom base anchor, top half removable. Split steel spider to bolt to pipe, copper plated spider for copper pipe. Insulated style where pipe is required to be insulated. Make: Tri-State Industries, or equal.

C. Anchors:

1. Pipe support; same material as pipe; as manufactured by Pipe Shields Model C1000 or C2000, Keflex, Metraflex, Flexonics or Advanced Thermal Systems.

2. Pipe Anchors:

a. Anchors shall be designed and located as to prevent stress to piping or building structural components from exceeding those permitted by ASME B31.9 and to prevent transfer of loading and stressing to connected equipment.

D. Pipe Roll Stand: Cast iron roll stand. Make: Advanced Thermal Systems, Carpenter and Patterson, ITT Grinnell, Pipe Shields.

2.6 SLEEVES

A. Standard Type:

1. Schedule 40 black steel pipe sleeves shall be used for sleeves in horizontal and vertical applications through structural surfaces. Sleeves shall extend a minimum of 1 in. beyond both sides of the structure surface being penetrated. The sleeve shall be sized to account for the total diameter of the service, inclusive of insulation and the appropriate annular space for firestopping installation or requirements of the sealing element manufacturer.

2. Full circle water stop collar for sleeves located in below grade walls, wet wells and waterproofed surfaces. The collar shall be fabricated from steel plate and welded to the sleeve around its entire circumference.

3. Schedule 40, PVC sleeves or sheet metal sleeves for nonstructural surfaces and existing construction. Sheet metal sleeves shall be 18 gauge minimum and braced to prevent collapsing. Sleeves shall extend a minimum of 1/2 in. beyond both sides of the non-structural vertical surface being penetrated. The sleeve shall be sized to account for the total diameter of the service, inclusive of insulation and the appropriate annular space for firestopping.

B. Pre-Insulated Type:

1. Adjustable or fixed length metal cans, 24 gauge minimum sized for 1 in. spacing between insulation and can. Insulation shall consist of a 360° waterproofed calcium silicate insert sized to extend 1 in. beyond wall or floor penetration. Calcium silicate insert shall be the same thickness as adjoining pipe insulation. Spacing between shield and can packed at each end with double neoprene rope positively fastened.

2.7 FIRESTOP SYSTEM FOR OPENINGS THROUGH FIRE RATED WALL FLOOR ASSEMBLIES

A. Materials for firestopping seals shall be listed by an approved independent testing laboratory for "Penetration Firestop Systems". The system shall meet the standard fire test for Penetration Firestop Systems designated ASTM E814. Firestop system shall be provided at locations where piping passes through fire rated wall, floor/ceiling, or ceiling/roof assembly. Minimum required fire resistant ratings of the assembly shall be maintained by the Firestop System. Installation shall conform with the manufacturer's recommendations and other requirements necessary to meet the testing laboratory's listing for the specific installation.

2.8 PIPING MATERIALS AND SCHEDULE

A. See Exhibit "A", "Schedule of Piping Materials" at end of this Section for (HVAC) piping.

PART 3 - EXECUTION

3.1 EQUIPMENT AND SYSTEMS

A. Provide equipment and systems in accordance with laws, codes, and provisions of each applicable section of these specifications. Accurately establish grade and elevation of piping before setting sleeves. Install piping without springing or forcing (except where specifically called for), making proper allowance for expansion and anchoring. Arrange piping at equipment with necessary offsets, union, flanges, and valves, to allow for easy part removal and maintenance. Offset piping and change elevation as required to coordinate with other work. Avoid contact with other mechanical or electrical systems. Provide adequate means of draining and venting units, risers, circuits and systems. Install drains consisting of a tee fitting with a 3/4 in. ball valve with hose end cap and chain, at low points in hydronic piping system mains, and elsewhere as required for system drainage.

B. Conceal piping unless otherwise called for. Copper tubing shall be cut with a wheeled tubing cutter or other approved copper tubing cutter tool. The tubing must be cut square to permit proper joining with the fittings. Ream pipes after cutting and clean before installing. Cap or plug equipment and pipe openings during construction. Install piping parallel with lines of building, properly spaced to provide clearance for insulation. Make changes in direction and branch connections with fittings unless submitted and accepted per Part 2. Do not install valves, union and flanges in inaccessible locations. Provide trap seal of adequate depth on drain pans.

C. Provide reducers at all control valves, where control valve is smaller than pipeline size. Reducers for steam control valves shall be eccentric type. Provide unions at each side of every control valve and reducers directly adjacent to the unions.

D. Provide reducers at all balance valves, where balance valve is smaller than pipeline size.

3.2 PIPING OVER ELECTRICAL EQUIPMENT

A. Contractor shall route piping to avoid installation directly over electric equipment, including, but not limited to panels, transformers, disconnects, starters, motor control center, adjustable speed drives and fused switches.

B. Piping shall not be installed in the dedicated electric and working space as defined by NEC 110. Dedicated electrical space is generally equal to the depth and width of electrical equipment, and extends 6 ft. above the electrical equipment, or to a structural ceiling.

Dedicated working space is a minimum of 30 in. wide or the width of equipment (whichever is larger) a minimum of 6 ft.-6 in. tall, with a depth of 3 ft. to 9 ft. depending on the voltage.

3.3 CONDENSATE DRAIN PIPING

A. Condensate drain piping shall be sloped a minimum of 1% in the direction of flow to an approved place of disposal. Condensate shall not be disposed into a street, alley or other areas so as to cause a nuisance.

B. Condensate drain piping shall not be less than 3/4" internal diameter and shall not decrease in size from the drain pan connection to the location of condensate disposal.

C. Condensate drains shall be trapped as required by the equipment or appliance manufacturer.

D. Condensate drain piping shall be configured to permit the clearance of blockages and performance of maintenance without requiring the drain piping to be cut.

3.4 HANGERS, INSERTS AND SUPPORTS

A. Piping shall not be supported by wires, band iron, chains, or from other piping. Support each pipe with individual hangers from concrete inserts, welded supports, or beam clamps of proper configuration and point loading design requirements for each location including the designated safety factor. Trapeze hangers are acceptable for racking of multiple pipes of 1-1/2 in. or less in size. Follow manufacturer's safe loading recommendations. Suspend with rods of sufficient length for swing and of size as called for, using four nuts per rod. Provide additional rustproofed structural steel members, where required for proper support. Provide oversized hangers where insulation/supports must pass between pipe and hanger. Only concentric type hangers are permissible on piping larger than 2-1/2 in., "C" types are permitted for piping 2-1/2 in. and smaller. Provide riser clamps for each riser at each floor.

B. Provide a pipe hanger within 12 in. of pipe unions and piping connections to equipment, in order to facilitate disconnections of piping without pipe sagging.

3.5 HANGERS ATTACHED TO JOISTS

A. Individual hangers may be suspended directly from the bottom chord panel point provided that the sum of the concentrated loads within the chord panel does not exceed 100 pounds and the attachments are concentric to the chord. (Eccentrically loaded joists using beam clamps or other attachment methods are not acceptable.)

B. For nominal concentrated loads between panel chords, which have been accounted for in the specified uniform design load for the joists, this Contractor is to provide struts to transfer the load to a panel point on the opposite chord as reviewed and acceptable by the Structural Engineer of Record.

3.6 PIPE CONNECTIONS

A. Solder Connections: Nonacid flux and clean off excess flux and solder.

B. Threaded Connections: Clean out tapering threads, made up with pipe dope; screwed until tight connection. Pipe dope must be specific for each application.

C. Flanged Joints: Select appropriate gasket material, size, type and thickness for service applications. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

D. Dielectric Pipe Fittings: Provide dielectric protection devices at ALL piping connections and ALL equipment connections, where dissimilar metals meet. Follow all applicable manufacturer's recommendations at equipment connections. Dielectric protection systems are not required for air or gas systems.

3.7 HANGER SHIELDS

A. Provide at hangers for all piping. Pre-insulated type or field-insulated type at Contractor's option.

3.8 SLEEVES

A. Provide for pipes passing through floors, walls or ceilings. Not required for floors which are core-drilled, except where floor is waterproofed.

B. Pre-Insulated Type: Required for chilled water.

C. Standard type: Provide for piping, except as called for.

D. Extend 1/8 in. above finished areas. In above grade mechanical and other areas with floor drains; use steel pipe sleeves 2 in. above floor. Use pipe sleeves in bearing walls, structural slabs, beams and other structural surfaces, and where called for. Sleeves shall be as small as practical, consistent with insulation, so as to preserve fire rating. Fill abandoned sleeves with concrete. Provide rubber grommet seals for pipes passing through ducts or air chambers or built-up housings.

3.9 ANCHORS

A. Provide piping system anchors where shown on the plans, and as recommended by the expansion joint/loop manufacturer.

Where an anchor is shown at a change in piping direction, it shall fully control movement in both directions. In lieu of a single anchor fabricated for two directional control, two (2) individual anchors may be provided. Provide detailed fabrication drawings for all field-fabricated anchors.

B. Design anchors and equipment and piping supports including comprehensive structural engineering analysis by a qualified professional engineer, licensed to practice in the State of New York using the performance and design criteria specific to this project.

3.10 ALIGNMENT GUIDES

A. Provide alignment guides to guide expansion and to avoid end-loading and torsional stress.

B. Install two (2) or more guide(s) on each side of flexible expansion loop. Install guides nearest to expansion joint not more than four (4) pipe diameters from expansion joint.

C. Attach guides to pipe and secure guides to building structure.

3.11 SLEEVE PACKING

A. Seal void space at sleeves as follows

1. Interior locations: Firmly pack with fiberglass and caulk.

2. Fire rated, partitions and floor slabs: Use fire rated sealing elements, materials and methods. Provide per manufacturer's instructions to maintain firestop.

3. Waterproofed walls and floors: Use waterproof sealing element, device, or compound.

3.12 ESCUTCHEON PLATES

A. Provide polished chrome escutcheon plates for uninsulated exposed piping passing through floors, walls or ceilings in finished areas.

3.13 PROTECTION AGAINST PHYSICAL DAMAGE

A. In concealed locations where piping, other than cast-iron or steel, is installed through holes or notches in studs, joists, rafters or similar members less than 1-1/2 in. from the nearest edge of the member, the pipe shall be protected by shield plates. Protective steel shield plates having a minimum thickness of 0.0575 in. (No. 16 gage) shall cover the area of the pipe where the member is notched or bored, and shall extend note less than 2 in. above sole plates and below top plates.

3.14 PIPE LINE SIZING

A. Pipe sizes called for are to be maintained. Pipe sizing changes made only as reviewed by Owner's Representative. Where discrepancy in size occurs, the larger size shall be provided.

EXHIBIT "A" - PIPING MATERIALS (HVAC)

SERVICE	PIPE MATERIALS	FITTINGS	CONNECTIONS
Vent, overflow, condensate drain	ASTM B88 Type M hard copper	ASME B16.22 Wrought copper	ASTM B32 95 Sn/5 Sb solder or 95.5 Sn/4 cu/.5 Ag solder

END OF SECTION

SECTION 23 3100

SHEET METAL AND DUCTWORK ACCESSORIES CONSTRUCTION

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide labor, materials, equipment and services required for the complete installation designed in Contract Documents.

1.2 QUALITY ASSURANCE

A. Ductwork shall be fabricated and installed in compliance with latest edition of the following standards and with the edition of the Codes in effect at the time the building permit is obtained.

1. SMACNA Duct Construction Standards - Metal and Flexible Ductwork.
2. SMACNA Duct Liner Application Standard.
3. SMACNA HVAC Air Duct Leakage Test Manual.
4. Mechanical Code of New York State.
5. Energy Conservation Construction Code of New York State.
6. Plans and Specifications which exceed the requirements in any of the referenced standards.

B. All sheet metal shall be fabricated and installed by an experienced Contractor specializing in this type of work.

C. All ductwork and fittings shall have a computer-generated label affixed to the exterior surface of each section, detailing all applicable information including the duct dimensions, gauge, reinforcement type/class and connection type by systems manufacturer. Galvanizing thickness shall be clearly stenciled on each duct section.

D. All ductwork on the project shall meet the SMACNA Duct Cleanliness for New Construction Guidelines, "Advanced Level" of duct cleanliness for production, delivery, storage and installation of ductwork.

1.3 SUBMITTALS

A. Submit a complete shop standard manual including miscellaneous materials, and construction details for all shop fabricated materials including, but not limited to, volume dampers, turning vanes, duct sealant, equipment flexible connections, access doors, flexible duct, acoustical duct lining, etc.

B. Ductwork Shop Drawings

1. Prepare minimum 1/4 in. scale drawings:

a. Detailed ductwork shop drawings shall include size, layouts and pressure classifications. Any ductwork installed without benefit of review by the Engineer of Record may be subject to replacement at the expense of the Contractor.

b. Constructed from actual field inspections and measurements so as to assure a complete job.

c. Incorporate dimensions of actual equipment proposed for use on the project.

d. Showing adequate sections, elevations, and plan views and indicating the bottom of ductwork elevations from the finished floor.

e. Indicating all volume dampers, fire dampers, smoke dampers, damper access doors and other accessories required for a completed project.

f. Indicate roof, wall and floor opening dimensions and locations shown on shop drawings.

g. Indicate the location of the duct smoke detectors, increase duct size, ensure the minimum straight ductwork upstream or/and downstream at smoke detectors, where required for proper installation, per smoke detector manufacturer's recommendations. Coordinate minimum duct size required with 28 "Electronic Safety and Security".

2. Call to the attention of the Engineer immediately, any major deviations from the Contract Drawings, which must be made. All deviations shall be documented in writing. Resubmit with corrections for final Engineer review.

3. Submit prints to each Sub-Contractor of the other trades for review for interferences and coordination with their work.

C. Prepare a duct pressure testing report similar to that suggested by SMACNA and submit for review.

Duct testing shall be conducted in the presence of the Owner's Representative. Provide test reports indicating pressure tests performed. Include date, a ductwork approved shop drawings sheet with the section tested highlighted, test pressure and leakage rate.

1.4 GENERAL

A. All adhesives, sealants, primers and paint used for ductwork in the interior of the building shall comply with the maximum Volatile Organic Compound (VOC) limits called for in the current version of U.S. Green Building Council LEED Credits EQ 4.1 and EQ 4.2.

1.5 DUCTWORK CLASSIFICATION

A. Duct systems are to be classified and constructed per the SMACNA Velocity-Pressure classification system as follows:

1. All ductwork shall be constructed for a minimum pressure class of 2 in. w.g., unless stated otherwise, for the following systems, as applicable:

a. Supply duct downstream of terminal units.

b. Typical low pressure supply ductwork.

c. Typical return ductwork.

d. Typical low pressure exhaust ductwork.

2. Supply duct upstream of terminal units shall be constructed for a minimum pressure class of 3 in. w.g., unless otherwise stated, or required as per below.

3. Pressure classes above 3 in. w.g. shall be provided as follows, based upon the external static pressure as scheduled for each specific fan.

Scheduled External Static Pressure	**Pressure Class**
Over 3 in. up to 4 in. w.g.	4 in. w.g.
Over 4 in. up to 6 in. w.g.	6 in. w.g.
Over 6 in. up to 10 in. w.g.	10 in. w.g.

B. Any new ductwork connected to existing systems must adhere to the requirements outlined above. Contractors are responsible for verifying the maximum static pressure of the existing systems to determine the appropriate pressure class for the new ductwork. Inform Owner's Representative and Engineer of any unknown conditions or discrepancies.

PART 2 - PRODUCTS

2.1 DUCTWORK MATERIALS

A. See Exhibit at the end of this section for where sheet metal materials shall be applied, and remarks.

1. Galvanized Sheet Steel: Comply with ASTM A653 and A924, with G90/Z275 coating.

2. Stainless Steel Sheets: Comply with ASTM A 480/A 480M, Type 304 or 316, as indicated in Exhibit "I"; cold rolled, annealed, sheet. Exposed surface finish shall be No. 2B, No. 2D or No. 3 as indicated in Exhibit "I".

3. Aluminum Sheets: Comply with ASTM B 209 (ASTM B 209M) Alloy 3003, H14 temper; with mill finish for concealed ducts, and standard, one-side bright finish for duct surfaces exposed to view.

4. Gauges per SMACNA HVAC Duct Construction Standards, Metal and Flexible.

B. Make: Semco, United Sheet Metal, unless noted otherwise, or approved equal.

2.2 SQUARE AND RECTANGULAR DUCTWORK

A. Transverse and longitudinal duct seams reinforcement shall conform to appropriate tables and figures per SMACNA Velocity-Pressure Classification for duct construction.

1. Transverse joints shall be sealed with duct joint sealant. "Ductmate" or "Nexus" 4-bolt connection systems may be used in lieu of standard construction.

2. Field assembled longitudinal seams shall be sealed with duct sealant. Factory or shop fabricated rolled or machine pressed longitudinal seams does not require sealant.

B. Corner closures shall be required as described and illustrated by SMACNA Duct Construction Standards.

C. Throat radius on all elbows shall not be less than the dimension of the duct plane of radius. Where this cannot be maintained, use shorter radius with internal guide vanes, or square elbow with turning vanes.

D. Bracing and hanging of ductwork shall be per SMACNA Standards for size and system class of ductwork being used.

E. Any transformations shall not reduce the ductwork cross-sectional area. Maximum angle in straight duct, 20° for diverging flow and 30° for contraction flow. Transformation from square to round seams welded or brazed.

2.3 ROUND DUCTWORK

A. Standard Round Ductwork:

1. All spiral ducts shall have locked seams so made as to eliminate leakage under pressure for which this system has been designed. Longitudinal seams duct shall have fusion-welded butt seams.

2. No stovepipe will be allowed.

3. Round Ductwork Fittings:

a. All fittings fabricated per SMACNA Standards for round ductwork, material to match straight pieces of ductwork.

b. Fittings shall have continuous, welded seams.

c. 90° tees shall be conical type. 90° tees and 45° laterals up to and including 12 in. diameter tap size shall have a radiused entrance into the tap, produced by machine or press forming. The entrance shall be free of any restrictions.

d. Round taps off the bottom of rectangular ducts down to diffusers shall be made with a 45° square to round shoe-tap.

4. Elbows:

a. Diameters 3 in. through 8 in.: Two-section stamped and continuously welded elbows, material to match straight pieces of ductwork.

b. Over 8 in.: Gored construction with standing seam construction and internally sealed or continuously welded. Less than 35° - two gores, 36° to 71° - three gores, over 71° - five gores.

c. Fabricated to a centerline radius of 1.5 times the cross-section diameter.

d. Adjustable elbows are not allowed.

5. Joints:

a. For duct construction pressure 3 in. w.g. or greater:

1) Round Joints:

a) Unexposed Duct 3 in. - 30 in. Diameter: Connect round duct with a one piece interior slip coupling, at least two gauges heavier than duct wall, beaded at center and fastener to duct with screws. Seal joint with an approved sealant applied continuously around both end of coupler prior to assembling and after fastening.

b) All Exposed Duct and Unexposed Duct 30 in. - 72 in. Diameter: Install using a three piece, gasket flanged-joint consisting of two internal flanges, with integral mastic sealant, and one external closure band, which compress the gasket between the internal flanges.

(1) Acceptable Manufacturer: Ductmate Industries "Spiralmate" system or approved equal.

c) Above 72 in. Diameter: Install using companion angle flanged joints as defined in Figure 3-1 of the 2005 SMACNA Manual, "HVAC Duct Construction Standards, Metal and Flexible" Third Edition. Refer to manual for proper sizing and construction details.

b. Pipe-to-pipe joints in diameters up to 60 in. shall be by the use of sleeve couplings, reinforced by rolled beads.

c. Pipe-to-fitting joints in diameters up to 60 in. shall be by slip-fit of projecting collar of the fitting into the pipe.

d. Insertion length of sleeve coupling and fitting collar shall be 2 in. up to 36 in. diameter and 4 in. above 36 in. diameter.

e. Pipe-to-pipe and pipe-to-fitting connections in ductwork above 60 in. in diameter shall be made by angle ring flanges. The flange on the pipe shall be a 2 in. x 2 in. x 3/16 in. angle attached to the pipe with a continuous weld. The fittings shall have a loose ring "Van Stone" flange. A 5/8 in. flange shall be provided to act as a gasketing surface for sealing with the angle ring being a rolled, welded ring 2 in. x 2 in. x 3/16 in. Bolt hole spacing for angle rings shall be 6 in. centers.

f. If longitudinal seam duct greater than 60 in. in diameter is supplied in lengths greater than 4 ft., one angle ring must be welded to the duct on 4 ft. centers for support.

2.4 DUCTWORK SEALING

A. SMACNA Duct Sealing Classification shall be used for duct systems using the following criteria:

1. Ductwork and all plenums with pressure class ratings shall be constructed to Seal Class A, as required to meet the requirements of SMACNA Duct Construction Standards and with standard industry practice, including transverse joints, longitudinal seams, fitting connections, and all penetrations of the duct wall.

2. Openings for rotating shafts shall be sealed with bushings or other devices that seal off air leakage. Pressure sensitive tape shall not be used.

3. All connections shall be sealed, including but not limited to spin-ins, taps, other branch connections, access doors, access panels and duct connections to equipment.

4. Sealing that would void product listings is not required.

5. Spiral lock seams need not be sealed.

B. Sealants and tapes shall be listed and labeled in accordance with UL 181A or UL181B and marked according to type, and per manufacturer product requirements for associated system and application/installation location.

1. Duct sealant for indoor applications shall be non-fibrated, water based, Hardcast Iron-Grip IG-601, Ductmate PRO Seal, Foster 32-17 or Childers CP146, or approved equal.

2. Duct sealant for outdoor applications shall be fibrated, water based, Hardcast Versa-Grip VG-102, Ductmate Fiberseal, Foster 32-17 or Childers CP148, or approved equal.

2.5 TURNING VANES

A. Provide in mitered elbows as shown on contract drawings. Vanes 36 in. or longer shall be double wall air foil type. All turning vanes shall be installed as per the latest SMACNA Standards. Turning vane size and spacing shall be as per SMACNA. Turning vane spacing greater than SMACNA Standards is not acceptable.

B. Turning vanes shall be Harper or equivalent double wall turning vanes fabricated from the same material as the duct.

C. Turning vane front and back panels shall be securely locked together with adequate crimping to prevent twisting of vane. Vane shall be capable of withstanding 250 pounds of tensile load when secured according to the manufacturer's instructions.

D. Rails for mounting turning vanes shall have self locking, friction fit tabs designed to facilitate proper alignment of vanes. Tab spacing shall be as specified in Figure 4-3 of the 2005 SMACNA Manual, "HVAC Duct Construction Standards, Metal and Flexible". Rail systems with non-compliant tab spacing shall not be accepted.

E. Acoustical Turning Vane: Shall be used in applications that require quiet operating systems. Mounting rails shall have friction insert tabs that align the vanes automatically.

F. Acceptable Manufacturer: Ductmate Industries PRO-Rail Turning Vane or approved equal.

2.6 DAMPERS IN DUCTWORK

A. Blade Type Volume Dampers: Constructed per SMACNA, one gauge heavier than duct material, securely fastened to 3/8 in. sq., cold rolled steel operator rod. Provide stainless steel operator rod in stainless steel ductwork. Provide Ventlock 639 elevated dial regulator for 2 in. insulated ductwork or equal. Provide Ventlock 635 dial regulator for non-insulated ductwork or equal.

B. Multiple Blade Type Volume Dampers: Provide multiple blade volume dampers in ductwork above 12 in. in height.

1. Heavy duty, manual balancing dampers suitable for application in HVAC systems with velocities to 1,500 ft. per minute, open position and max. pressure of 3 in. w.g. close position. Ruskin MD 35 or equivalent.

2. Fabrication:

a. Frame: 5 in. x minimum 16 gauge roll formed, galvanized steel hat-shaped channel, reinforced at corners. Structurally equivalent to 13 gauge U-channel.

3. Blades:

a. Style: Single skin with 3 longitudinal grooves.

b. Action: Opposed.

c. Orientation: Horizontal

d. Material: Minimum 16 gauge equivalent thickness, galvanized steel.

e. Width: Nominal 6 in.

4. Bearings: Molded synthetic sleeve, turning in extruded hole in frame.

5. Linkage: Concealed in frame.

6. Axles: Minimum 1/2 in. diameter, plated steel, hex-shaped, mechanically attached to blade.

7. Control Shaft: 3/8 in. square plated steel.

8. Finish: Mill galvanized.

a. Actuator: Hand quadrant for 3/8 in. square extended shaft.

b. Hand Quadrant Standoff Bracket: 2 in. standoff for insulated ductwork.

c. Oillite bearings.

d. Factory Sleeve: Minimum 20 gauge thickness, minimum 12 in. length.

C. Fire and Smoke Dampers: See "Fire and Smoke Dampers" Section.

D. Automatic Air Dampers: Furnished as part of "Building Management System" Section 230923, and installed by this Contractor.

E. Blast Gates: Aluminum housing, locking thumbscrew, galvanized slide blade. Provide stainless steel housing and slide blade in welded stainless steel ductwork.

2.7 FLEXIBLE AIR DUCTS

A. Flexible air ducts and connectors shall be constructed in compliance with NFPA Bulletin 90A, 90B and UL Standard 181 and shall be listed and labeled as Class I Air Duct.

B. Flexible air ducts and connectors shall be tri-laminate:

1. Consisting of corrosion resistant galvanized steel helix encapsulated by a double lamination of polyethylene or spun bond nylon.

2. Factory applied (R 6.0) fiberglass exterior insulation, sheathed in a seamless, tri-directionally reinforced, metalized polyester, exterior vapor barrier.

3. R-value shall be classified by Underwriters Laboratories, and certified by the Air Diffusion Council, in accordance with ADC Flexible Duct Performance and Installation Standard (1991), using ASTM C-518, at installed wall thickness, on flat insulation only. Comply with ASHRAE/IESNA 90.1.

4. Recommended operating pressure for flexible ductwork shall be three times maximum system press but not less than 6 in. w.g. positive pressure for 4 in. - 20 in. dia., 5 in. w.g. negative pressure through 16 in. dia., 1 in. negative pressure for 18 in. and 20 in. dia. Maximum velocity of 5500 fpm.

5. Operating temperature range - 20°F to 250°F, intermittent @1/2 in. pos. w.g. max., -20°F to 140°F, continuous at maximum pressure.

6. Flame Spread: 25 max. smoke developed rating: 50 max.

7. Porous inner core flexible duct shall not be used.

C. Static pressure and thermal performance shall be tested and certified in accordance with Air Diffusion Council (ADC) Test Code FD-72-R1 under conditions of 140°F for 164 hours and 180°F for 4 hours.

D. Acoustical performance shall be certified in accordance with ASTM E 477 and/or Air Diffusion Council Test Code FD-72-R1.

1. Minimum Acoustic Performance:

a. The insertion loss (dB) of a 6 foot length of duct when tested in accordance with ASTM E477 at a velocity of 1000 feet per minute shall be at least:

	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
8 inch dia.	26	27	27	31	32	27
12 inch dia	22	26	24	31	31	20

E. Friction loss and leakage for flexible duct only shall be certified in accordance with Air Diffusion Council Test Code FD-72-R1. Leakage for connections shall be accordance with UL 181 requirements.

F. Basis-of-Design: Flexmaster 6B (R-6.0).

G. Acceptable Manufacturers:

1. Dundas-Jafine Type SPC R6.0

2. Hart & Cooley Type F216 (R-6.0)

3. Flexible Technologies, Inc. Thermaflex Type M-KE (R-6.0)

4. Atco Rubber Products, Inc. Type 036 (R-6.0)

2.8 FLEXIBLE CONNECTIONS TO FANS AND EQUIPMENT

A. Basis-of-Design: Ventfabrics, Inc.

B. Acceptable Manufacturers: Ductmate Industries, Inc., Duro Dyne Inc., Elgen Manufacturing, Ward Industries, Inc.; a division of Hart & Cooley, Inc.

C. Materials: Flame-retardant or noncombustible fabrics, water and mildew resistant UL Standard 214.

D. Coatings and Adhesives: Comply with UL 181, Class 1.

E. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 in. wide attached to two (2) strips of 2-3/4-in. wide, 0.028-in. thick, galvanized sheet steel or 0.032 in. thick aluminum sheets. Provide metal compatible with connected ducts.

F. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.

1. Minimum Weight: 26 oz./sq. yd.

2. Tensile Strength: 480 lbf/in. in the warp and 360 lbf/in. in the filling.

3. Service Temperature: Minus 40 to plus 200°F.

G. Thrust Limits: Combination coil spring and elastomeric insert with spring and insert in compression, and with a load stop. Include rod and angle-iron brackets for attaching to fan discharge and duct.

1. Frame: Steel, fabricated for connection to threaded rods and to allow for a maximum of 30 degrees of angular rod misalignment without binding or reducing isolation efficiency.

2. Outdoor Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.

3. Minimum Additional Travel: 50 percent of the required deflection at rated load.

4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.

5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.

7. Coil Spring: Factory set and field adjustable for a maximum of 1/4-in. movement at start and stop.

2.9 DUCT ACCESSORY HARDWARE

A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.

B. Ventlock 699 or 699-2 based upon insulation thickness.

C. Install duct test holes where required for duct traverse testing and balancing purposes.

PART 3 - EXECUTION

3.1 REQUIREMENTS

A. Equipment and systems shall be installed in accordance with local and state codes and regulations having jurisdiction. Bracing and hanging of ductwork shall be per SMACNA - HVAC Duct Construction Standard.

B. Install all ductwork concealed and tight to the structure above unless noted otherwise on shop drawings. Fabricate only after the approval of shop drawings, and in locations to avoid interferences.

1. Ductwork installed without approved shop drawings, which requires removal/modification and/or reinstallation due to conflicts or improper installation shall be repaired at no cost to the Owner.

C. Sizes given on contract drawings are inside dimensions.

D. The ductwork sizes and types (round and rectangular) were selected for space limitation and acoustical requirements within the building. In addition, the ductwork sizes and types were chosen to allow space above the ceilings for future ductwork, piping and/or conduit. It is not acceptable for the contractor to change the size or type of ductwork for bidding or installation unless specifically approved by the engineer.

E. Keep openings continuously closed and sealed with protective plastic wrapping during construction to prevent entrance of dirt and debris.

F. Extend access openings, damper rods and levers, to outside of external insulation make systems airtight.

G. No piping, conduit or other obstruction to airflow is permitted in ductwork.

H. Provide necessary openings, hanger inserts, framing, chases, and recesses, not provided by other trades.

I. Exposed exhaust or return registers and grilles shall be flush with face of duct; exposed supply registers and grilles shall be mounted outside airstream with 45° shoe-tap extension collars.

J. Where a return or exhaust duct is shown to be left open ended, provide hardware 05 inch aluminum mesh screen at opening.

K. Do not utilize flexible ductwork or connection in any way to connect variable or constant volume boxes to ductwork.

L. Penetrations:

1. Provide 14 gauge sleeves for ducts passing through Mechanical Room floors. Set sleeves 4 in. above finished floor in Mechanical Rooms, seal watertight to floor.

2. For duct penetrations of non-rated walls, provide sheet metal angle framing or sheet metal closure panels around the entire perimeter of each duct wall penetration on both sides of the wall, where the gap exceeds 1/4 inch. Where the gap is less than 1/4 inch, the gap may be caulked on both sides of the wall. Non-rated wall penetrations SHALL NOT be fire caulked under any circumstances.

3. For duct penetrations of rated walls, see Specification Section 230500 - Basic Mechanical and Electrical Requirements.

M. Ductwork that is called for to be welded shall be fully welded, continuous around the entire perimeter at all joints/seams, and shall be fully airtight and watertight.

3.2 FLEXIBLE CONNECTIONS

A. Provide flexible connections for the intake and discharge connections of duct connected to fans and air handling equipment.

B. Round connections are to be made with adhesive and metal drawbands with ends tightly bolted.

C. Rectangular connections shall be made with material securely held in grooved seam between flanges. Attach with adhesive and mechanical fasteners on 6 in. centers.

D. Connections shall be made with a minimum of 2 in. space between duct and equipment collars, installed in line, and with 1 in. excess material folded so as not to interfere with airflow through connection.

E. Mechanically fastened and sealed, with specified duct sealant, at duct and equipment connections.

3.3 TEST OF DUCTWORK

A. Conduct duct leakage tests per SMACNA "HVAC Air Duct Leakage Test Manual" and per the requirements of the Energy Conservation Construction Code of New York State, for ductwork systems as indicated below. Positive pressure leakage testing is acceptable for negative pressure ductwork. The rate of air leakage (CL) must be less than or equal to 4.0 for rectangular ductwork and 2.0 for round ductwork, as determined by the equation in the code referenced above, which reads: $CL=F/P^{0.65}$ where F = measured leakage rate in CFM per 100 sq. ft. of duct surface, and P = static pressure of the test. When leakage above stated limits occurs, ascertain location of leaks and rebuild, repair, or seal the ductwork as required. Repeat tests as required to obtain allowable leakage rates. Prepare a report similar to that suggested by SMACNA and submit for review.

B. Leakage testing shall be witnessed by representatives from Cornell University.

C. Systems designed to operate at static pressures of 3.0" w.c. and below: All duct mains, duct sub-mains, duct branch mains, and duct risers shall be leak tested. If any of the duct sections fail the leakage test, the entire system shall be re-tested until it passes. Duct mains and sub-mains shall include all supply and return ductwork from an air handling unit, to the space(s) served. Branch ducts to terminal units, diffusers and grilles do not require testing, and pressure testing should be done prior to making the branch duct connections.

1. A duct main is defined as a duct containing the system's total airflow.

2. A duct sub-main is defined as a duct containing part of the system's airflow and serving two or more duct branch mains.

3. A duct branch main is defined as a duct serving two or more terminals.

4. A branch duct is defined as a duct serving a single terminal.

5. A terminal unit is defined as a VAV terminal.

D. Systems designed to operate in excess of 3-inches w.c.: The entire system shall be leak tested.

E. Provide test reports indicating pressure tests performed. Include date, section tested, test pressure and leakage rate.

F. Ductwork not required to be tested for leakage, shall be checked and guaranteed to meet the standards of the specified SMACNA Duct Seal Class A. All joints and connections on this ductwork shall be sealed using the approved ductwork sealant. Air balancing and testing shall be used to determine satisfactory operation of duct systems. Balancing reports indicating excessive leakage amounts shall be required to rebuild, repair or seal ductwork having excessive leakage.

3.4 INSTALLATION OF ROUND DUCTWORK

A. Use factory-fabricated couplings for joints.

B. After the joint is slipped together, sheet metal screws are placed 1/2 in. from the joint bead for mechanical strength.

C. Sealer is applied to the outside of the joint and covering the screw heads.

D. Flanged joints shall be made with neoprene rubber gaskets.

3.5 DUCT SEALING

A. Preparation:

1. Clean surfaces of dirt, oil, grease and loose of foreign matter that could impair adhesion, using soap and water or solvent.

2. Allow surfaces to dry completely before proceeding.

B. Installation of Sealant System:

1. Apply sealant system to duct joints, fasteners, and seams in accordance with manufacturer's instructions.

2. Apply sealant by brush, putty knife or caulk gun, to full coverage. Remove excess adhesive immediately.

3. Completely seal duct joint, fasteners and seams without voids, to a minimum 20 mil thick wet film.

4. Apply and store at ambient temperature of 40°F to 100°F; and protect from freezing until dry.

C. Field Quality Control:

1. Allow duct sealant system to cure a minimum of 72 hours before operating the system.

2. Do not apply external duct insulation or coatings until the joints have been inspected by the Owner's Representative.

3.6 TURNING VANES

A. Install only in square elbows.

B. Install as per latest SMACNA Standards.

C. Secure vane runners to duct with spot welding, riveting or sheet metal screws.

D. When installing in ductwork with internal insulation.

1. Install runners in ductwork inside insulation and bolt through insulation and duct sides, welding bolts to insure rigid installation. Provide build-outs for duct Velocity-Pressure classes above 2 in. w.g.

3.7 DAMPERS AND AIR CONTROL DEVICES

A. Provide volume dampers at all air outlets, diffusers, grilles and as noted on plans. Provide volume dampers at all low pressure supply, return and exhaust, branch ducts and as noted on the plans.

B. Provide dampers necessary to permit proper balancing of air quantities. Comply with code requirements for smoke and fire control. Prevent introduction of uncontrolled outside air into building through roof and wall openings.

C. When dampers are installed in acoustically lined ductwork, install with insulated "build-outs" per SMACNA.

D. Install fire and smoke dampers in accordance with "Fire and Smoke Dampers" Section and applicable codes.

E. Install all dampers furnished as part of "Building Management System" Section.

3.8 FLEXIBLE AIR DUCTS

A. "Air duct" applies to conduit or passageway for conveying air to or from heating, cooling, air conditioning or ventilating equipment but not including the plenum as defined in NFPA 90A. "Air connector" applies to conduit for transferring air between an air duct or plenum and an air terminal device or an air inlet or an air outlet as defined by the NFPA 90A.

B. For round to oval connections, provide round-oval flexible adapter.

C. Flexible air ducts and connectors shall be provided in fully extended condition, free from kinks.

D. Flexible air ducts and connectors shall not be used in systems with entering air temperatures in excess of 250°F.

E. Flexible air ducts and connectors shall use only the minimum length required to make the connection and shall be installed in the horizontal or vertical position. Flexible elbows are not acceptable. Do not exceed a maximum length of 36 in., fully extended.

F. Flexible air ducts and connectors shall use minimum 1/2 in. wide positive locking, steel worm drive clamp, or nylon plenum rated straps for joints and connections. One clamp or strap for the inside core liner and one clamp or strap for the outer jacketing. When non-metallic (nylon) straps are used, they should be listed and labeled to standard UL 181B. Fastener package should be marked UL 181 B-C.

G. Collars to which flexible duct is attached shall be beaded and a minimum of 2 in. in length. Wrap twice with UL 181 tape and secure with clamp or strap. Sleeves used for joining two sections of flexible duct shall be beaded and a minimum of 4 in. in length. The draw band shall be positioned behind the bead on the metal collar.

H. Outer vapor barrier and insulation shall be slid over inner core and collar, wrapped twice with UL 151 tape and secured with a clamp or strap.

I. Connections shall be per SMACNA "HVAC Duct Construction Standards - Metal and Flexible", Air Diffusion Council "Flexible Duct Performance and Installation Standards" and NAIMA Installation Standards.

J. Flexible duct shall be supported at manufacturer's recommended intervals, but no greater distance than 2'-6" on center and prior to all 90 degree bends. Maximum permissible sag shall be 1/2 in. per foot of support spacing. Provide a minimum of one hanger on each run of flexible duct.

K. A connection to rigid duct or equipment shall be considered a support joint. Long horizontal duct runs with sharp bends shall have additional supports before and after the bend approximately one duct diameter from the centerline of the bend.

L. Hanger or saddle material in contact with the flexible duct shall be of sufficient width to prevent any restriction of the internal diameter of the duct when the weight of the supported section rests on the hanger or saddle material. In no case shall the material contacting the flexible duct be less than 1-1/2 in. wide. Factory installed suspension systems integral to the flexible duct are an acceptable alternative hanging method when the manufacturer's recommended procedures are followed.

M. The hanger shall be strapped around the flexible duct and secured to the structure above. Hangers shall not be attached to other mechanical or electrical objects. Hangers may be attached to an approved trapeze. Ceiling grid shall not be used to fabricate a trapeze. Support hangers shall be installed horizontal. Screws shall not be used to penetrate the flexible duct to attach to the hanger.

N. Provide flexible duct connections and splices in accordance with manufacturer's recommended installation instructions.

O. Seal flexible duct connections with sealing materials listed and labeled in accordance with UL 181B. Mechanically secure connections with approved clamping materials.

3.9 DUCT CLEANLINESS AND CLEANING AFTER INSTALLATION

A. Duct Cleanliness:

1. All ductwork on the project shall meet the SMACNA Duct Cleanliness For New Construction Guidelines, "Advanced Level" of duct cleanliness for production, delivery, storage and installation of ductwork.

2. Prior to shipment to the jobsite, all duct ends and openings must be covered with a heavy duty, dual-ply, clear polyethylene protective film. Open ends are to be kept covered during transport, storage, and installation. As ductwork is installed at the job site, open ends are to be covered to maintain cleanliness.

3. The film must be securely affixed to protect against dirt and debris, and must be translucent to facilitate inspection of interior surfaces without removing the film. The film is have a elongation rating of 600% and a break strength of 13.1 lbs./in. The film shall contain no VOC's, and shall leave no residue on duct after removal.

4. Manufacturer: Ductmate Industries ProGuard (heavy duty grade clear).

B. Cleaning After Installation:

1. Interior surfaces shall be free of dust and debris prior to initial start up. Protect equipment which may be harmed by excessive dirt with filters, or bypass during cleaning. Provide adequate access into ductwork for cleaning purposes. Any cleaning of duct systems shall comply with recommendations of NAIMA and NADCA.

2. Clean external surfaces of foreign substances that might cause corrosion, deterioration of the metal, or where ductwork is to be painted.

3. Clean debris from system before fans are turned on.

4. Keep openings continuously closed during the construction period.

5. Pay damages resulting from dirt blown on painted or other finished surfaces.

6. Repair or replace damaged fan wheels, dampers, or other system parts damaged as a result of debris.

7. Clean system as many times as required until the entire system is dirt free.

3.10 DUCT SUPPORTS

A. Provide per SMACNA, same material as duct. Hanger bands to extend down sides and turn under bottom 2 in. Minimum two metal screws per hanger. Angle iron on larger duct spaced per building structural system but not greater than 8 ft. Provide extra support angles as required.

B. Provide additional supports as required to support reheat coils, air terminal units, filter enclosures, and any other duct mounted equipment independent from the associated ductwork system.

EXHIBIT I - DUCTWORK MATERIALS

SERVICE	MATERIAL	SPECIAL REQUIREMENTS
Supply, return, vent, relief, outside and exhaust	Lock forming quality, galvanized steel ASTM A653 and A924, galvaneal/paint grip if not insulated and exposed	Joints and features as called for
Accessories, dampers and air turns	Same material and gauge as parent duct	----------
Field constructed apparatus casings	Galvanized steel ASTM 525	Sealed airtight

END OF SECTION

SECTION 23 3713

REGISTERS AND DIFFUSERS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide labor, materials, equipment and services required for the complete installation designed in Contract Documents.

1.2 SUBMITTALS

A. Registers/Grilles/Diffusers: Submit product data including room schedule listing size, CFM, throw, direction of throw, accessories, finish, material type, color chart, pressure drop and noise criteria.

1.3 GENERAL REQUIREMENTS

A. Each manufacturer shall check noise level ratings for registers and diffusers to insure that the sizes selected will not produce noise to exceed N.C. - 24, measured at occupant level; notify Owner's Representative of problems prior to submittal.

B. Pressure drop, airflow and noise criteria selection is based on design equipment. Manufacturers not submitting design makes must provide written certification in front of submittal that equipment submitted has been checked against and performs equal to the design make.

C. Borders and frames shall be coordinated with materials and ceiling systems to integrate with architectural ceiling details and finishes scheduled.

D. Locations of ceiling mounted air terminal devices shall be coordinated with locations shown on architectural reflected ceiling plans.

E. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw and pressure drop. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

1.4 REQUIREMENTS FOR REGISTERS

A. General:

1. A register is defined as a grille plus a volume damper.

2. Registers shall be installed "sight-proof" where possible, i.e.: High wall register with horizontal blades inclined up, or along a wall with blades facing the wall.

3. Borders and frames shall be of the same material as register face unless specified otherwise.

B. Mounting Frames:

1. Provide with screw holes in register face punched and countersunk at factory, and mounting frame drilled and tapped to suit, unless otherwise noted. Sponge rubber gasket between frame and wall or ceiling for all surface mounted frames.

2. Frame shall be overlap type and shall be suitable for type of ceiling where register is to be installed.

C. Finishes:

1. Baked enamel (of colors as selected from the manufacturer's standard color chart) as scheduled, unless otherwise noted.

D. Design Equipment: Titus unless otherwise noted.

E. Manufacturers: Krueger, Titus, Price, Tuttle and Bailey, Nailor.

1.5 REQUIREMENTS FOR DIFFUSERS

A. General:

1. Provide four way blow unless otherwise noted.

2. Where manufacturer's size recommendations require duct sizes or connections differing from design, Contractor shall provide at no change in contract price.

3. Suitable for recessed mounting unless otherwise indicated.

4. Provide square to round neck transitions as required.

5. Provide sponge rubber gasket for all surface mounted frames.

B. Finishes:

1. Baked enamel (of colors as selected from the manufacturer's standard color chart), as scheduled.

C. Frame style shall be suitable for ceiling type in which diffuser is to be installed.

D. Design Equipment: Titus unless otherwise noted.

E. Manufacturers: Krueger, Titus, Price, Tuttle and Bailey, Nailor.

PART 2 - PRODUCTS

2.1 SUPPLY TYPES

A. Type 1 - (supply air grille):

1. Steel 20 gauge frame construction with double deflection capability and the front blades shall be parallel to the long dimension. Solid extruded aluminum air foil blades mounted in friction pivots for individual blade adjustment, spaced on 3/4 in. centers.

2. 1-1/4 in. wide flange with sponge rubber gasket.

3. Model: Titus 272-RL.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install equipment in strict accordance with manufacturer's instructions. Rough in or install per reflected ceiling plan or in location instructed by Owner's Representative.

B. Provide approved air extractors behind all duct mounted supply registers in exposed ductwork.

C. When the final connection to an exhaust or return grille is made, a 12 in. minimum height plenum box must be supplied to all grilles. Plenum dimensions shall match grille size. Paint inside of plenum box flat black. Provide 1 in. acoustical lining in plenum box. Oversize the plenum to account for the thickness of the lining.

D. Seal all supply and return registers, grilles and diffusers during construction operations to limit dust entering HVAC systems and ductwork. Seals may be removed just prior to testing and balancing, but not without the approval of the Owner's Representative.

END OF SECTION

SECTION 26 05 00

BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 ROUGHING

A. The Contract Drawings have been prepared in order to convey design intent and are diagrammatic only. Drawings shall not be interpreted to be fully coordinated for construction.

B. Due to small scale of Drawings, it is not possible to indicate all offsets, fittings, changes in elevation, interferences, etc. Make necessary changes in contract work, equipment locations, etc., as part of a contract to accommodate work to avoid obstacles and interferences encountered. Before installing, verify exact location and elevations at work site. **DO NOT SCALE** plans. If field conditions, details, changes in equipment or shop drawing information require an important rearrangement, report same to Owner's Representative for review. Obtain written approval for all major changes before installing.

C. Install work so that items both existing and new are operable and serviceable. Eliminate interference with removal of coils, motors, filters, belt guards and/or operation of doors. Provide easy, safe, and code mandated clearances at controllers, motor starters, valve access, and other equipment requiring maintenance and operation. Provide new materials, including new piping and insulation for relocated work.

D. Coordinate work with other trades and determine exact route or location of each duct, pipe, conduit, etc., before fabrication and installation. Coordinate with Architectural Drawings. Obtain from Owner's Representative exact location of all equipment in finished areas, such as thermostat, fixture, and switch mounting heights, and equipment mounting heights. Coordinate all work with the architectural reflected ceiling plans and/or existing Architecture. Mechanical and electrical drawings show design arrangement only for diffusers, grilles, registers, air terminals, lighting fixtures, sprinklers, speakers, and other items. Do not rough-in contract work without reflected ceiling location plans.

E. Before roughing for equipment furnished by Owner or in other Divisions, obtain from Owner and other Divisions, approved roughing drawings giving exact location for each piece of equipment. Do not "rough in" services without final layout drawings approved for construction. Cooperate with other trades to insure proper location and size of connections to insure proper functioning of all systems and equipment. For equipment and connections provided in this contract, prepare roughing drawing as follows:

1. Existing Equipment: Measure the existing equipment and prepare for installation in new location.

2. New Equipment: Obtain equipment roughing drawings and dimensions, then prepare roughing-in-drawings. If such information is not available in time, obtain an acknowledgement in writing, then make space arrangements as required with Owner's Representative.

1.2 EQUIPMENT AND MATERIAL REQUIREMENTS

A. Provide materials that meet the following minimum requirements:

1. Materials shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less, in accordance with NFPA 255.

2. All equipment and material for which there is a listing service shall bear a UL label.

3. Potable water systems and equipment shall be built according to AWWA Standards.

4. Gas-fired equipment and system shall meet AGA Regulations and shall have AGA label.

5. All electrical equipment and systems, as a whole, shall be tested and listed by an OSHA approved Nationally Recognized Testing Laboratory (NRTL) for the intended use in accordance with the applicable standards and have a physical label indicating such.

1.3 CONCEALMENT

A. **Conceal all contract work** above ceilings and in walls, below slabs, and elsewhere throughout building. If concealment is impossible or impractical, notify Owner's Representative before starting that part of the work and install only after their review. In areas with no ceilings, install only after Owner's Representative reviews and comments on arrangement and appearance.

1.4 CHASES

A. New Construction:

1. Certain chases, recesses, openings, shafts, and wall pockets will be provided as part of General Construction Trade. Mechanical and Electrical trades shall provide all other openings required for their contract work.

2. Check Architectural and Structural Design and Shop Drawings to verify correct size and location for all openings, recesses and chases in general building construction work.

3. Assume responsibility for correct and final location and size of such openings.

4. Rectify improperly sized, improperly located or omitted chases or openings due to faulty or late information or failure to check final location.

5. Provide 18 gauge galvanized sleeves and inserts. Extend all sleeves 2 in. above finished floor. Set sleeves and inserts in place ahead of new construction, securely fastened during concrete pouring. Correct, by drilling, omitted or improperly located sleeves. Assume responsibility for all work and equipment damaged during course of drilling. Firestop all unused sleeves.

6. Provide angle iron frame where openings are required for contract work, unless provided by General Construction trade.

B. In Existing Buildings:

1. Drill holes for floor and/or roof slab openings.

2. Multiple pipes smaller than 1 in. properly spaced and supported may pass through one 6 in. or smaller diameter opening.

3. Seal voids in fire rated assemblies with a fire-stopping seal system to maintain the fire resistance of the assembly. Provide 18 gauge galvanized sleeves at fire rated assemblies. Extend sleeves 2 in. above floors.

4. In wall openings, drill or cut holes to suit. Provide 18 gauge galvanized sleeves at shafts and fire rated assemblies. Provide fire-stopping seal between sleeves and wall in drywall construction. Provide fire stopping similar to that for floor openings.

1.5 PENETRATION FIRESTOPPING

A. Fire-Stopping for Openings Through Fire and Smoke Rated Wall and Floor Assemblies:

1. Provide materials and products listed or classified by an approved independent testing laboratory for "Penetration Fire-Stop Systems". The system shall meet the requirements of "Fire Tests of Penetrations Fire-Stops" designated ASTM E814.

2. Provide fire-stop system seals at all locations where piping, tubing, conduit, electrical busways/cables/wires, ductwork and similar utilities pass through or penetrate fire rated wall or floor assembly. Provide fire-stop seal between sleeve and wall for drywall construction.

3. The minimum required fire resistance ratings of the wall or floor assembly shall be maintained by the fire-stop system. The installation shall provide an air and watertight seal.

4. The methods used shall incorporate qualities which permit the easy removal or addition of electrical conduits or cables without drilling or use of special tools. The product shall adhere to itself to allow repairs to be made with the same material and permit the vibration, expansion, and/or contraction of any items passing through the penetration without cracking, crumbling and resulting reduction in fire rating.

5. Plastic pipe/conduit materials shall be installed utilizing intumescent collars.

6. Provide a submittal including products intended for use, manufacturer's installation instructions, and the UL details for all applicable types of wall and floor penetrations.

7. Fire-stopping products shall not be used for sealing of penetrations of non-rated walls or floors.

B. Acceptable Manufacturers:

1. Dow Corning Fire-Stop System Foams and Sealants.

2. Nelson Electric Fire-Stop System Putty, CLK and WRP.

3. S-100 FS500/600, Thomas & Betts.

4. Carborundum Fyre Putty.

5. 3-M Fire Products.

6. Hilti Corporation.

1.6 ACCESS PANELS

A. Provide access panels for required access to respective trade's work. Location and size shall be the responsibility of each trade. Access panels provided for equipment shall provide an opening not smaller than 22 in. by 22 in. Panels shall be capable of opening a minimum of 90 degrees. Bear cost of construction changes necessary due to improper information or failure to provide proper information in ample time. Access panels over 324 square inches shall have two cam locks. Provide proper frame and door type for various wall or ceiling finishes. Access panels shall be equal to "Milcor" as manufactured by Inland Steel Products Co., Milwaukee, Wisconsin. Provide General Construction trade with a set of architectural plans with size and locations of access panels.

1.7 CONCRETE BASES

A. Provide concrete bases for all floor mounted equipment. Provide 3,000 lb. concrete, chamfer edges, trowel finish, and securely bond to floor by roughening slab and coating with cement grout. Bases 4 in. high (unless otherwise indicated); shape and size to accommodate equipment. Provide anchor bolts in equipment bases for all equipment provided for the project, whether mounted on new concrete bases or existing concrete bases.

1.8 HVAC EQUIPMENT CONNECTIONS

A. Contractor is responsible for draining, filling, venting, chemically treating and restarting any systems which are affected by work shown on the Contract Documents unless specifically noted otherwise.

B. Provide final hot water, chilled and condenser water, drain, vent, oil line and gas connections to all equipment as required by the equipment. Provide final connections, including domestic water piping, wiring, controls, and devices from equipment to outlets left by other trades. Provide equipment waste, drip, overflow and drain connections extended to floor drains.

C. Provide for Owner furnished and Contractor furnished equipment all valves, piping, piping accessories, traps, pressure reducing valves, gauges, relief valves, vents, drains, insulation, sheet metal work, controls, dampers, as required.

D. Refer to manufacturer drawings and specifications for requirements of laboratory equipment and special equipment. Verify connection requirements before bidding.

1.9 ELECTRICAL EQUIPMENT CONNECTIONS

A. Provide complete power connections to all electrical equipment. Provide control connections to equipment. Heavy duty NEC rated disconnect ahead of each piece of equipment. Ground all equipment in accordance with NEC.

B. Provide for Owner furnished and Contractor furnished equipment all power wiring, electric equipment, control wiring, switches, lights, receptacles, and connections as required.

C. Refer to Manufacturer's drawings/specifications for requirements of laboratory equipment and special equipment. Verify connection requirements before bidding.

END OF SECTION

SECTION 26 05 01

BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.1 DESCRIPTION

A. The drawings are diagrammatic, unless detailed dimensioned drawings are included, and show only approximate locations of equipment, fixtures, panelboards, conduits, and wiring devices. Exact locations are subject to the approval of the Owner's Representative. The general run of electrical feeders, branch circuits, and conduits, indicated on the drawings, is not intended to be the exact routing. Exact routings of conduit shall suit the job conditions.

B. Circuit designations, in the form of "Home Runs" on branches, indicate the designation of the branch circuit, the size and the quantity of branch circuit conductors, and the panel board or interconnection box from which the branch circuit is served.

C. Make measurements at the site and in the building during construction for all systems installed as the work progresses in such a manner that the equipment, piping, vents, ducts, conduit, and boxes will fit in the space available. Maintain headroom and if in unfinished areas, be as neatly installed, as obscure and "out-of-the-way" as physically possible. Where more than one trade is involved in an area, space or chase, all shall cooperate and install their own work to utilize the space equally between them in proportion to their individual requirements. In general, ductwork shall be given preference except where grading of piping becomes a problem, followed by piping then electrical wiring. If, after installation of any equipment, piping, ducts, conduit, and boxes, it is determined that ample maintenance and passage space has not been provided, rearrange work and /or furnish other equipment as required for ample maintenance space.

D. Any changes in the size or location of the material or equipment supplied, which may be necessary in order to meet field conditions or in order to avoid conflicts between trades, shall be brought to the immediate attention of the Owner's Representative and approval received before such alterations are made.

1.2 QUALITY ASSURANCE

A. Electric equipment shall be installed in a neat and workmanlike manner. All methods of construction, details of workmanship, that are not specifically described or indicated in the contract documents, shall be subject to the control and approval of the Owner's Representative.

B. Equipment and materials shall be of the quality and manufacture indicated in their respective sections of the specifications. The equipment specified is based upon the acceptable manufacturers listed.

Equipment types, device ratings, dimensions, etc., correspond to the nomenclature dictated by those manufacturers. Where "or equal" is stated, equipment shall be equal in every way to that of the equipment specified and subject to approval. All equipment shall be tested at the factory. Unless specified elsewhere, standard factory inspection and operational tests will be acceptable.

1.3 SUBMITTALS

A. Submit product data for the following equipment, materials and products, including all fittings and accessories:

1. Conduit
2. Surface Raceway
3. Expansion Fittings
4. Cable Tray
5. Channel Support Systems
6. Conductors
7. Cables
8. Cable Termination and Splice Kits
9. Poke-Through Service Fittings
10. Terminal and Equipment Cabinets
11. Floor Boxes
12. Wiring Devices Including Dimmers
13. Telephone/Data Communication Outlets
14. Flashing, Sealing, Firestopping Materials
15. Salvageable Materials
16. Testing reports prior to energizing equipment and materials.

1.4 SALVAGEABLE MATERIALS

A. Salvageable materials will be reviewed and identified by the Owner. Items selected by the Owner shall be delivered to a selected location on the Owner's property by this contract in an equal condition to prior this work.

B. Items normally accepted as salvage by the Owner:

1. Transformers
2. Meters, meter sockets and test switches
3. Deadfront switchgear
4. Panelboards and covers
5. Circuit breakers
6. Disconnects (100 AMP and up)
7. Bus duct and apparatus
8. Adjustable speed drives
9. Motor starters
10. Luminaires

11. Fire alarm equipment
12. Nurse call and intercom
13. Motors above 1/2 HP and up
14. Environmental and automation control equipment
15. Telephones
16. Central clock system

PART 2 - PRODUCTS

2.1 MATERIALS

A. Conduit, Raceway and Tubing:

1. Electrical Metallic Tubing (EMT) shall be electro-galvanized steel with corrosion resistant zinc coating; UL listed.

   a. Acceptable Manufacturers:

      1) Republic Conduit
      2) Allied Tube and Conduit
      3) Wheatland Tube
      4) Approved equal

2. Flexible Metal Conduit (FMC) shall be constructed of one continuous length of electro-galvanized, spirally wound steel strip with interlocking convolutions and interior surfaces free from burrs and sharp edges.

   Shall be UL listed "flexible metal conduit" or "liquidtight flexible metal conduit" as required.

   a. Acceptable Manufacturers:

      1) Republic Conduit
      2) Allied Tube and Conduit
      3) Wheatland Tube
      4) AFC (American Flexible Conduit) Cable Systems

3. Surface Metal Raceway shall be .040 in. steel UL listed "Surface Metal Raceway".

   Use manufacturer's standard fittings designed to be used with the specific raceway.

   a. One-Piece Raceway:

1) Finish per architect.

2) Acceptable Manufacturers:

a) Wiremold "700" Series (Design Make)
b) Mono Systems
c) Approved equal

b. Two-Piece Raceways:

1) Finish per architect.

2) Duplex or special receptacles as specified in wiring devices.

3) Corners, turns, tees and elbows shall have suitable turning radius for the intended cable.

4) Provide divider in raceways utilized for power and communications. Utilize wire/cable clips 18 in. on center to hold in the conductors/cables.

5) Utilize rounded head screws/bolts for mounting.

6) Acceptable Manufacturers:

a) Wiremold 3000 (Design Make)
b) Mono Systems
c) Approved equal

B. Conduit Fittings:

1. Fittings for rigid metal conduit shall be fully threaded and shall be of the same material as the respective raceway system. Fittings for electrical metallic tubing shall be single screw indenter fittings for conduits up to 2 in. and double screw indenter fittings for conduits 2 in. and larger. Connectors shall also have insulated throat or plastic insulating bushing up to and including 1 in. size. For sizes 1-1/4 in. and larger, provide plastic insulating bushing. Die-cast, pressure cast fittings shall not be used. Fittings for rigid non-metallic conduit shall be solvent cemented in accordance with the manufacturer's instructions.

a. Acceptable Manufacturers:

1) O.Z. Gedney
2) Steel City
3) Thomas & Betts
4) Crouse-Hinds

5) Carlon

2. Expansion Fittings shall be watertight, combination expansion and deflection type designed to compensate for movement in any direction.
Fittings shall have flexible copper braid bonding jumpers, neoprene sleeve and stainless steel bands, use aluminum body fittings for rigid aluminum conduit.

a. Acceptable Manufacturers:

1) Crouse-Hinds, Type "XD"
2) O.Z./Gedney, Type "DX"
3) Approved equal

C. Wireway, Wire Trough, and Auxiliary Gutters:

1. Wireway and Wire Trough shall be hinged cover type wireway with provisions for full lay-in along the entire length of run. Wireway shall be steel, enclosed with gray enamel finish. Provide NEMA 1 units for interior/dry/clean locations and NEMA 12 for interior dry maintenance/shop/utility locations. Size to meet NEC fill requirements or larger as noted on Contract Documents. Provide knockouts along runs. Recess in wall where required for flush mounted equipment. Hinge shall be on the bottom of front face for horizontal mounting. Provide all covers, couplings, offsets, elbows, expansion joints, adapters, hold down straps, end caps, tees, pullboxes, hangers, reducers, supports, and other fittings to match and mate with wireways as required for complete system.

a. Acceptable Manufacturers:

1) Square D "Square Duct"
2) General Electric
3) Hoffman
4) Meco

D. Cable Trays:

1. Wire mesh cable tray constructed of electroplated zinc steel 5 mm minimum wire. Cable tray wire mesh shall be smooth and round to resist dirt and dust build-up and protect against sharp ends to prevent cable fraying.

Wire mesh shall have 4" or 8" width and 2" depth as indicated on the drawings with wire spacing to allow cabling to be routed out at any point on the cable tray without cutting the tray. Cable tray shall be supported 8ft on center with 1/2" thread rod, wall hangers, or equivalent supports. Provide steel channel/stiffener bars to support a minimum load of 75 pounds per linear foot.

a. Provide all necessary connectors, clamps, radius outlet, rod suspension, etc. as required to make a complete installation unless field-fabricated transitions and elbows are noted on drawings. Provide field-fabricated transitions per manufacturer's instructions and requirements. Deburr all cuts and edges. Provide exterior grounding strap at expansion joints, crossovers and all other locations where the cable tray continuity is interrupted.

b. Acceptable Manufacturers:

1) Legrand Cablofil CF54 series (basis of design)
2) Cooper Flex Tray
3) B Line

E. J-Hooks and Cable Retainers

1. 2" J-Hooks: Catalog No. CJ32H; J-hook wide base with cable retainer; 65-lb load capacity; hooks have smooth polypropylene edges to allow cables to slide easily; with [90° angled clip with 1/4" hole.

a. Acceptable Manufacturers:

1) Legrand Cablofil CJ32H (basis of design)
2) Southwire
3) B Line

F. Strut-Type Channel Raceways and Fittings:

1. Strut-Type Channel Raceways and Fittings shall be provided for racking of conduit, trapeze suspensions, equipment support, cable racks and panel racks. Channel shall be steel with electroplated zinc finish for interior dry locations. Provide necessary accessories such as bolts, screws, anchors, connection plates, and straps as required to perform the necessary functions. Wet location and exterior channel support systems shall be steel with hot dipped galvanized finish and stainless steel hardware as a minimum. Cut ends shall be touched up with suitable matching finish. Provide poured-in-place inserts for supporting channels at poured concrete walls and ceilings.

a. Acceptable Manufacturers:

1) Unistrut
2) Globe
3) Kindorf
4) B-Line

G. Low Voltage (600V or less) Conductors and Cables:

1. Conductors shall be insulated for 600 volts, unless otherwise noted, and shall be standard AWG and kcmil sizes. Conductors shall be 98% copper, thermal plastic or cross-linked polymer insulated, heat and moisture resistant. Conductors shall be stranded, except for conductors used for fire alarm system wiring. Conductor sizes No. 18 AWG and smaller shall be a solid single strand; No. 16 AWG and larger shall be multiple stranded. Minimum conductor size shall be #12 AWG except smaller sizes may be used for communications and special systems. Conductor sizes shall be as called for. Conductors shall be labeled with UL seal and be marked with the manufacturer's name, wire size and insulation type. Insulation for all 600 volt conductors shall be Type THHN/THWN-2 or Type XHHW-2, unless otherwise noted. All exterior and underground conductors shall be XHHW-2. Luminaire fixture wire shall conform to the latest Underwriters Laboratories requirements. Flexible cords and cables for general portable use shall be Type SO or SOOW or as noted. Cables for special use shall be of the type specified for the application.

a. Color Coding:

1) All circuits shall be color coded according to the following schedule.

	Three Phase 120/208V	**Three Phase 277/480V**
Ground	Green	Green
Neutral	White	Gray
A or L1	Black	Brown
B or L2	Red	Orange
C or L3	Blue	Yellow
Isolated EG	Green w/Yellow Tracer	Green w/Yellow Tracer

b. Acceptable Manufacturers:

1) General Cable (Brand of Prysmian Group)
2) Prysmian
3) South Wire
4) Okonite
5) Senator

2. Terminal Lugs and Connectors:

a. The lug shall be capable of continuous operation at the current rating of the cable it is used on. The lug shall be UL listed per UL 486A, using industry standard crimping tools and dies. Terminal lugs shall be solderless, pressure type with UL label for "CU/AL" conductor terminations. The lug shall be a closed-end compression (crimp) type, constructed of seamless, alloy suitable for copper and/or aluminum conductors to match the conductor. The lug shall be made with a chamfered inside end, for ease of conductor insertion. Both one and two hole lugs shall be NEMA sized for standard stud sizes and spacing.

   The lug shall be designed for use at the system voltage.

   1) Acceptable Manufacturers:

      a) 3M Scotchlok 30,000 and 31,000 Series
      b) Burndy
      c) O.Z./Gedney
      d) Thomas and Betts

b. The conductor connection shall be capable of continuous operation at the current rating of the cables it is used on. The connection shall be UL listed per UL 486A, using industry standard crimping tools and ides. The connector shall be an inline compression (crimp) type, constructed of seamless, tin-plated copper.
   The connector shall be constructed with chamfered inside-ends and with center cable stops. The connector shall be designed for use at the system voltage.

   1) Acceptable Manufacturers:

      a) 3M Scotchlok 10,000 and 11,000 Series
      b) Burndy
      c) O.Z./Gedney
      d) Thomas and Betts

c. "Split-bolt" Connectors shall be solderless type.

   1) Acceptable Manufacturers:

      a) Burndy
      b) Kearney
      c) O.Z./Gedney
      d) Thomas and Betts
      e) Anderson

d. "TWIST ON" Connectors shall be spiral steel spring type and insulated with vinyl cap and skirt.

1) Acceptable Manufacturers:

a) 3-M Company "Scotch-Lok"
b) Ideal "Wing-Nuts"
c) Approved equal

e. Aluminum joints shall utilize oxide inhibitors as recommended by the conductor manufacturer. Utilize pin type terminations where possible and coordinated with the clearances available. Provide insulating tape or insulating sealed cover for connectors/terminations.

H. Outlet Boxes, Device Boxes, Rings, and Covers:

1. Outlet Boxes having pryout openings, knockouts, threaded entries, or hubs in either the sides of the back, or both, for entrance of conduit or cable fittings, or cables, with provisions for mounting outlet box cover. Outlet boxes shall be galvanized steel, not less than 2-1/2 in. deep, unless restricted by the surroundings, 4 in. square or octagonal. Boxes and associated fittings, plates and devices shall be mechanically fastened (screwed), friction fitting is not acceptable. Outlet boxes exposed to moisture, surface mounted, exterior, wet or damp locations shall be cadmium cast alloy complete with external threaded hubs and gasketed screw fastened covers. Minimum box size shall be as indicated in the NEC for the conductors and devices installed. Boxes shall be approved for the environmental condition where they will be installed.

2. Conduit bodies providing access to interior of conduit or tubing system through one or more removable covers at junction or terminal point and listed in accordance with outlet box requirements.

3. Extension ring intended to extend sides of outlet box or device box to increase box, volume, or both

a. Acceptable Manufacturers:

1) Steel City
2) Raco
3) Appleton
4) Crouse Hinds

4. Telephone/Data Communications Outlet Boxes:

a. 4 in. x 4 in. outlet box with single gang plaster ring with cover plate suitable for indicated communications outlet and conduit routed to

accessible ceiling space / accessible corridor ceiling space cable tray. Cover plate shall match the receptacle cover type.

5. Pull and junction boxes shall be constructed of not less than 14 gauge galvanized steel with trim for flush or surface mounting in accordance with the location to be installed. Provide screw-on type covers. Boxes installed in damp or wet locations shall be of raintight construction with gasketed cover and threaded conduit hubs. In no case shall boxes be sized smaller than as indicated NEC for conduit and conductor sizes installed. Boxes shall be approved for the environmental condition of the location where they will be installed.

    a. Acceptable Manufacturers:

        1) Hoffman
        2) Keystone
        3) Approved equal

I. Terminal and Equipment Cabinets:

1. Terminal and equipment cabinets shall be code gauge galvanized steel with removable endwalls. Fronts shall be of code gauge steel, flush or surface type (as indicated) with concealed trim clamps, concealed hinges, flush lock, and grey baked enamel finish. Boxes and front shall be UL listed and shall be minimum 35 in. H x 24 in. W x 6 in. D. Provide removable insulated plywood terminal board mounted on inside back wall of cabinet.

    a. Acceptable Manufacturer:

        1) Square D "Mono-Flat"
        2) Approved equal

J. Wiring Devices:

1. Wiring Devices (toggle switches, key switches, receptacles, dimmers, occupancy sensors, etc.) shall be commercial grade as a minimum. Switch handle and receptacle face shall be as directed by the Architect. Receptacles connected to the emergency power system shall have a red colored face. Provide device cover plates of rounded nylon colored to match the device in finished areas and rounded raised (Steel City 450/460 series) only for surface mounted locations in unfinished areas. Provide neoprene gasketed cast aluminum/zinc box with hinged (for receptacle) rain tight cast aluminum/zinc lockable while in use cover with stainless steel hardware for devices designated "WP".

    a. Acceptable Manufacturers:

        1) Pass and Seymour

2) Hubbell
3) Leviton

2. Toggle/Snap Switches:

a. Units shall be quiet operation, quick make/quick break, rated for 20A/120-277V/1hp at 120/277V, 90° rear plug in termination with pig tail, with nylon/polycarbonate toggle, self grounding mounting screw clip plate (not staple), ground terminal and silver alloy contacts. Units shall meet latest Federal Specification WS-896, NEMA WD-1 and UL Test 20. Single pole units shall be Hubbell HBL1221, P&S 20AC1 or Leviton 1221-2. Provide two pole, three way, four way, illuminated handle, keyed, etc. type of the same quality and model.

b. Momentary Contact: Units shall be as indicated above (20A, 277V, nylon handle, side/back wired), three position, two circuit/three wire with spring return to center position, provide where indicated and as needed for proper system operation. Hubbell HBL 1557, P&S 1250, Leviton 1256 or approved equal. Provide keyed operation or pilot light where indicated. When used for lighting controls for vacancy sensor control, provide jumper across the circuit terminals.

3. Receptacles:

a. Provide receptacles where indicated on the drawings and where called for. Provide type receptacle as indicated and if not indicated then utilize general receptacle.

b. General Receptacle: Units shall be NEMA 5-20R, duplex, 20A, 125V, 90° rear plug in termination with pig tail with nylon face, indented brass contacts for three point connection, self grounding stainless steel mounting screw clip plate and green ground terminal. Shall meet requirements of Federal Specification W-C-596, NEMA WD-6 and UL 498.

1) Units shall have 0.036" brass thick contacts, 0.05" thick brass mounting strap, and be: Hubbell HBL5362, P&S 5362A or Leviton 5362.

c. Ground Fault Interrupting Receptacles: Units shall be as specified above for General Receptacle and have 5mA interrupting ground fault level, test/reset front buttons, full through feed capability, power off on reverse wired sensing, 10kA short circuit current rating, be tamper/weather resistant and in compliance with UL 943. Unit shall self-test function to periodically test the components automatically and indicate a failure

condition utilizing an LED. Shall be Hubbell GFR5362, P&S 2096TR or Leviton S7599TR.

d. Tamper Resistant Receptacles: Units shall be as specified above for General Receptacle and have protective shutters to prevent entry into the line or grounded front openings unless all plug prongs are present.

e. Surge Protected Receptacles: Units shall be as specified above for General Receptacle and have 240 joule energy/15,000A capacity, three modes of protection (line to neutral, line to ground and neutral to ground), 500V maximum clamping, LED indicator (operational, failure), blue color and UL 1449 compliant. Shall be Hubbell HBL5360SA, P&S 5352XSP or Leviton 5280.

f. Isolated Ground Receptacles: Units shall be as specified above for General Receptacle and have an orange color and electrically independent/isolated mounting strap and ground terminal. Shall be Hubbell IG5352, P&S IG5362 or Leviton 5362IG.

g. Surge Protected and Isolated Ground Receptacles: Units shall be as specified above for General Receptacle and the Surge Protected and Isolated Ground units above. The unit shall have an orange color.

h. Controlled Receptacle: To be utilized where a receptacle is automatically controlled. Units shall be as specified above for General Receptacle with suitable symbol on face. Shall be Hubbell DR20LA, P&S 26352CD or approved equal.

i. USB Power Receptacle: Units shall be as specified above for General Receptacle but have 0.040" zinc plated mounting strap, two 20A 125V outlets and two USB charging (5A minimum total, 5VDC, USB 2.0/3.0) outlets. Overall depth shall not exceed 1.7 in. Shall be Hubbell USB20 or approved equal.

j. Special Receptacles: provide other type receptacles as indicated herein or on the drawings. Such receptacles shall be Hubbell, P&S or Leviton highest grade available.

K. Flashing, Sealing, Fire-stopping:

1. Fire-Stopping for Openings Through Fire and Smoke Rated Wall and Floor Assemblies:

a. Provide materials and products listed or classified by an approved independent testing laboratory for "Through-Penetration Fire-Stop

Systems". The system shall meet the requirements of "Fire Tests of Through-Penetration Fire-Stops" designated ASTM E814.

b. Provide fire-stop system seals at all locations where piping, tubing, conduit, electrical busways/cables/wires, ductwork and similar utilities pass through or penetrate fire rated wall or floor assembly. Provide fire-stop seal between sleeve and wall for drywall construction.

c. The minimum required fire resistance ratings of the wall or floor assembly shall be maintained by the fire-stop system. The installation shall provide an air and watertight seal.

d. The methods used shall incorporate qualities, which permit the easy removal or addition of electrical conduits or cables without drilling or use of special tools. The product shall adhere to itself to allow repairs to be made with the same material and permit the vibration, expansion and/or contraction of any items passing through the penetration without cracking, crumbling and resulting reduction in fire rating.

2. Acceptable Manufacturers:

a. Dow Corning Fire-Stop System Foams and Sealants
b. Nelson Electric Fire-Stop System Putty, CLK and WRP
c. S-100 FS500/600, Thomas & Betts
d. Carborundum Fyre Putty
e. 3-M Fire Products

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA NEIS (National Electrical Installation Standard) latest edition.

B. Unless otherwise noted, wiring for all systems indicated in the contract documents shall consist of insulated conductors installed in raceways. Raceways shall be continuous from outlet box to outlet box and from outlet box to cabinet, junction or pull box. Secure and bond raceways to all boxes and cabinets so that each system of raceways is electrically continuous throughout. Unless otherwise indicated on the drawings, install all wiring in the following raceway system:

1. Wiring 600 Volts or Less in Dry Locations: EMT.

2. Wiring 600 Volts or Less in Dry Locations and Subject to Physical Damage: RMC.

3. Flexible metal conduit shall be used for final connection to all motors, final connection to rotating or vibrating equipment, final connections to dry type transformers and final connections to recessed lighting fixtures. Liquidtight flexible conduit shall be used in all wet or damp locations. Maximum length of flexible conduit shall be 36 in., except that from outlet boxes to lighting fixture maximum length shall be 6 ft. Provide green insulated equipment grounding conductor in all flexible metal conduit.

4. Surface metal raceway shall be used for surface runs in finished area where concealed conduit cannot be run or where specifically indicated on drawings.

C. Raceways:

1. Sized as indicated on the drawings. Where sizes are not indicated, raceways shall be sized as required by the National Electrical Code in accordance with the quantity, size, and type of the insulation conductors to be installed. Raceways shall be minimum 3/4 in. trade size for branch circuit wiring and minimum 1 in. trade size for all telephone, data, intercommunications, instrumentation, fire alarm, television and computer systems and for all branch circuit "Home Runs" to panelboards. Installed to provide adequate grounding between all outlets and the established electrical system ground.

2. Arranged in a neat manner for access and allow for access to work installed by other trades.

3. Install raceways square to the enclosure and terminate at enclosures without hubs with locknuts on both sides of enclosure wall. Install locknuts handtight, plus one-quarter turn more.

4. 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 ground bushings on 1-1/2 inch trade size and larger conduits terminated with locknuts. Install throat metal grounding bushings on service conduit.

5. Complete raceway installation before starting conductor installation.

6. Provide stub-ups through floors with coupling threaded inside for plugs, set flush with finished floor. Plug coupling until conduit is extended above floor to final destination or a minimum of 2 feet above finished floor. Wherever a cluster of four (4) or more raceways rise out of floor exposed, provide neatly formed 6 in. high concrete envelop, with chamfered edges, around raceways.

7. Installed with a minimum of bends and offsets. All bends shall be made without kinking or destroying the cross section contour of the raceway. Factory made bends are acceptable and should be considered for raceways larger than 2 in.

8. Make bends in raceway using large-radius performed ells except for parallel bends. Field bending must be in accordance with NFPA 70 minimum radii requirements. Provide only equipment specifically designed for material and size involved.

9. Conceal conduit within finished walls, ceilings, and floors unless otherwise noted, or where permitted by the Owner's Representative. All exposed raceways shall be painted to match existing adjacent surface as directed by the Architect. Install conduit parallel or perpendicular to building lines.

10. Support conduit within 12 inches of enclosure to which attached.

11. Seal raceway opening that penetrate rooms or walls with acoustical requirements on both sides of rooms or walls with acoustically rated putty or firestopping.

12. Differing Temperatures: For raceways routed between areas with differing temperatures (interior to exterior, walk in coolers/freezers, environmental chambers, etc.) install raceway as follows:

    a. Provide a thermal break, 4 in. minimum of stainless steel conduit within space wall/separation.

    b. Seal raceway penetration through the wall/separation.

    c. Provide a box on each side of the space wall/separation.

    d. Provide raceway interior sealant (duct seal or suitable foam) to provide a complete air barrier after conductors are installed.

    e. Mounting of raceway and boxes on equipment shall be coordinated and approved by the equipment manufacturer.

    f. Installed with exterior surfaces not less than 6 in. from any surface with normal operating temperature of 200°F or higher.

13. Expansion-Joint Fittings:

    a. Install in runs of aboveground PVC that are located where environmental temperature change may exceed 30 deg. F and that have straight-run length that exceeds 25 feet. Install in runs of aboveground RMC and EMT conduit that are located where environmental temperature change may exceed 100 deg. F and that have straight-run length that exceeds 100 feet.

    b. Install expansion fittings at locations where conduits cross building or structure expansion joints.

c. Install with position, mounting, and piston setting selected in accordance with manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

d. Installed such that no undue stress is placed on any electrical raceway due to the proper functioning of expansion joints.

14. Raceway installed in wet/damp locations or on exterior walls shall have a spacer manufactured for this purpose provided to maintain a space/void between the mounting surface and the raceway.

15. Do not install conduits within 2 inches of the bottom side of a metal deck roof.

16. 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.

17. 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. Ream inside of conduit to remove burrs. Bush where necessary.

18. Install pull wires in empty raceways. Provide polypropylene or monofilament plastic line with not less than 200 lb tensile strength.
Leave at least 12 inch of slack at both ends of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

19. Plugged at the ends of each roughed-in raceway with an approved cap or disc to prevent the entrance of foreign materials during construction.

20. Installed with UL approved rain-tight and concrete-tight couplings and connectors.

21. Raceways shall not be attached to or supported by wooden plug anchors or supported from mechanical work such as ductwork, piping, etc.

22. Raceways installed in concrete slabs shall be located so as not to affect structural integrity of slab, and such that conduit shall have a minimum of 1 in. of concrete cover on all sides. Obtain approval from the Owner's Representative prior to installing conduit larger than 1 in. trade size in concrete slabs. Raceways in slabs shall be for floor box use only, or routing vertically through.

23. Raceways installed below ground floor slab shall be encased in concrete with 3 in. minimum coverage on all sides. Where possible, install conduit directly below slab with concrete envelope poured monolithic with slab. Where this is not possible, support raceways and envelop maximum 5 ft. - 0 in. on centers from underside of structural slab by means of galvanized pipe hangers. Pipe hangers

shall be coated with asphalt mastic. Installation shall maintain integrity of waterproofing membrane.

24. If it is necessary to burn holes through webs of beams or girders, call such points to the attention of the Owner's Representative and receive written approval both as to location and size of hole before proceeding with work. All holes shall be burned no larger than absolutely necessary.

25. Become familiar with the general construction of the building and place sleeves, inserts, etc., as required. All penetrations through existing floors shall be core drilled and sleeved.

26. All raceways shall be supported adequately by malleable iron pipe clamps or other approved methods. In exterior or wet locations, supports shall allow not less than 1/4 in. air space between raceway and wall. Firmly fasten raceway within 3 ft. of each outlet box, junction box, cabinet or fitting. The following table lists maximum spacing between conditions, strength of supporting members, etc.

27. Furnish and install such supports at no additional cost to owner.

Conduit Trade Size	Type of Run	Horizontal Spacing in Feet	Vertical Spacing in Feet
1/2 in., 3/4 in.	Concealed	7	10
1 in., 1-1/4 in.	Concealed	8	10
1-1/2 in. and larger	Concealed	10	10
1/2 in., 3/4 in.	Exposed	5	7
1 in., 1-1/4 in.	Exposed	7	8
1-1/2 in. and larger	Exposed	10	10

28. Where raceways puncture roof, install pitch pockets as required in order that the roof warranty is maintained. Coordinate with representative of roofing material manufacturer.

29. At each flush mounted panelboard, terminal cabinet, control cabinet, etc., provide four (4) spare 3/4 in. raceways from panelboard, etc., to an area above the nearest accessible ceiling space. Make 90° turn above the ceiling, arranged for further continuation of raceway, and cap.

30. All interior conduit used for the following systems shall be color coded as follows:

    a. Red - Fire Alarm System

    b. Metallic (silver/grey) - Normal utility power

c. Yellow - Emergency Life Safety Branch

d. Purple - Emergency Optional Standby

D. Cable Trays:

1. Tray supports shall be hung using threaded, galvanized rod hangers, with rods extended through support steel and double nutted. Size support member within load rating of member section; and without visible deflection. Install cable tray level and straight.

2. Provide aluminum body expansion connectors at building expansion joints. Minimum 4 in. movements, greater if expansion movement conditions warrant. Provide aluminum body expansion connectors every 100 ft. for outdoor installations. Minimum 4 in. movement, greater if expansion movement conditions warrant.

3. Provide external grounding strap at expansion joints, crossovers and at other locations where tray continuity is interrupted.

4. Provide necessary clamps, rod suspension, wall brackets, trapeze hangers, etc., as required to make a complete job, coordinate with the manufacturer. Bends to be made in field per manufacturer instructions.

5. Provide conduit to tray fitting at each conduit entrance to tray.

6. Install divider in trays as called for.

7. Install fire stop wall frames around cable tray at penetrations through fire rated walls, and where called for. Seal these openings with pliable fire resistant sealant.

E. Outlet Boxes:

1. Consider location of outlets shown on drawings as approximate only. Study architectural, process piping, mechanical, plumbing, structural, roughing-in, etc., drawings and note surrounding areas in which each outlet is to be located. Locate outlet so that when fixtures, motors, cabinets, equipment, etc., are placed in position, outlet will serve its desired purpose. Where conflicts are noted between drawings, contact Owner's Representative for decision prior to installation. Comply with the NEC relative to position of outlet boxes in finished ceilings and walls.

2. Prior to installation, relocate any outlet location a distance of 5 ft. in any direction from location indicated on drawings if so directed by the Owner's Representative. Prior to completion of wall construction, adjust vertical height of

any outlet from height indicated if so directed by Owner's Representative. The above modifications shall be made at no additional cost to the Owner.

3. Provide boxes in wiring and raceway systems wherever required for pulling of wires, making connections, and mounting of devices or fixtures. Outlet boxes shall be sized to accommodate the wiring, splices and device(s) to be installed in accordance with the NEC.

4. Saw-cut opening for boxes recessed in masonry walls in center of cell of masonry block, and install box flush with surface of wall. Box shall have extra-deep type raised tile covers or shall be 3-1/2 in. deep boxes with square corners and dimensions to accommodate conductors installed. Prepare block surfaces to provide a flat surface for a raintight connection between box and coverplate or supported equipment and box, whether installed indoors or outdoors.

5. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

6. Locate boxes so that cover or plate will not span different building finishes. Install a device cover plate over each and every outlet indicated on drawings. Do not install plates until painting, cleaning and finishing of surfaces surrounding the outlet are complete. Install single one-piece multi-gang covers over multi-gang devices.

7. Where outlets at different mounting heights are indicated on drawings adjacent to each other (due to lack of physical space to show symbol on drawings), install outlets on a common vertical line.

8. Where switch outlets are shown adjacent to strike side of door, locate edge of outlet box approximately 3 in. from door frame.

9. Support boxes in recessed ceilings independent of ceiling tiles and ceiling grid.

10. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for purpose.

11. Fasten junction and pull boxes to, or support from, building structure. Do not support boxes by conduits.

12. Floor outlet boxes shall be installed flush with finished floor, adjust level and tile as required. Where finished floor is terrazzo, provide boxes specifically designed for installation in terrazzo. Where floors are to receive carpet or flooring material, coordinate with appropriate trade and provide insert. Rectangular covers shall be parallel and perpendicular with the building or, if used, floor tile/floor joints/pattern. Coordinate cover type with the flooring and device type.

13. Outlet boxes installed in plaster, gypsum board or wood paneled hollow cavity walls shall be installed flush with raised plaster covers or raised tile covers. Boxes shall be mechanically fastened and supported by two (2) adjacent structural members (studs) with cross brackets (Garvin Industries Model BMB or approved equal).

14. Surface ceiling mounted outlet boxes shall be minimum 4 in. square, 1-1/2 in. deep, galvanized sheet metal.

15. Surface wall mounted outlet boxes shall be cast type boxes.

16. Do not install aluminum boxes, enclosures, or fittings in contact with concrete or earth.

17. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to ensure a continuous ground path.

18. Seal openings and knockouts in back and sides of boxes and enclosures with acoustically rated putty for boxes and enclosures in areas of walls with acoustical requirements. Provide gaskets for wallplates and covers.

19. Seal openings and knockouts in back and sides of boxes and enclosures in areas of walls with lead shielding requirements.

F. Wiring Methods:

1. Conductors shall not be installed until raceway system, including all outlets, cabinets, bushings and fittings, is completed. Verify that all work of other trades which may cause conductor damage is completed. Use only U.L. approved cable lubricants when necessary. Do not use mechanical means to pull conductors No. 8 or smaller.

2. In general, conductors shall be the same size from the last protective device to the load.

3. Wiring systems shall be properly grounded and continuously polarized throughout, following the color-coding specified. Connect branch circuit wiring at panelboards, as required, in order to provide a "balanced" three-phase load on feeders.

4. Provide insulated green ground conductor in each branch circuit.

5. All feeder connections shall be made to bus and other equipment using solderless, pressure type terminal lugs.

6. Branch circuits connected to a 20A circuit breaker shall be sized as indicated except for lengths exceeding 75 ft. For circuits longer than 75 ft. to 100 ft. utilize No. 10 AWG conductors (line, neutral and ground) and for circuits from 100 ft. to 150 ft. utilize No. 8 AWG (line, neutral and ground) unless otherwise indicated. Conduit size shall be modified in accordance with the NEC.

7. For splices and taps, No. 10 AWG and smaller, use solderless "twist on" connectors having spiral steel spring and insulated with a vinyl cap and skirt.

8. For splices and taps, No. 8 and larger, use insulated solderless set screw AL/CU or hydraulically compressed sleeve fittings suitable for the intended use.

9. Use cast connections for ground conductors.

10. Provide minimum 6 in. of spare/slack of each conductor in each junction or pull box and termination.

11. Make all splices and connections in accessible boxes and cabinets only.

12. Cover uninsulated splices, joints, and free ends of conductor with rubber and friction tape of PVC electrical tape. Plastic insulating caps may serve as insulation. Heat shrink sleeves shall be acceptable for crimp type splices.

13. On termination at branch circuit outlets, leave a minimum of 8 in. free conductor for installation of devices and fixtures.

14. Feeder conductors shall be continuous from point of origin to load termination without splice. If this is not practical, contact the Owner's Representative and receive written approval for splicing prior to installation of feeder(s). Where feeder conductors pass through junction and pull boxes, bind and lace conductors of each feeder together. For parallel sets of conductors, match lengths of conductors as near equal as possible.

15. Branch circuit conductors installed in panelboards, and control conductors installed in control cabinets and panels shall be neatly bound together using "Ty-Raps" or equal.

16. Provide conduit seals and explosion proof devices as indicated on the plans and as dictated by the NEC for all hazardous locations indicated on the drawings.

17. Lighting fixtures, detectors, etc., in mechanical equipment, boiler and pump rooms shall be installed with exposed wiring after equipment, ductwork, piping, etc., are in place. In general, lighting shall be as located on the drawings; where conflicts exist, locate lights for best distribution.

18. Fire proof tape all medium voltage cables in handholes, man holes, building entrance and junction/pull boxes.

19. Medium voltage cables shall be installed, terminated and tested by trained and qualified personnel with a minimum of 5 years' experience. Training shall be for all types of installations and for the specific types of splices/terminations. Installation shall be in accordance with the cable manufacturer and IEEE. Provide circuit tagging with engraved phenolic plate attached with UV resistant tie wrap indicating source, circuit # and date installed with 3/16 in. test.

20. Provide cable/conductor vertical support in accordance with the NEC.

21. The following systems are permitted to be installed in cable tray in compliance with the NEC:

    a. Communication cable.

    b. Security cable.

G. Receptacles:

1. Ground opening shall be up for vertical installation and on the left for horizontal installation.

H. Toggle Switches:

1. Switches shall be installed in accessible locations near room/space entryway(s).

2. Provide lighted handle switches in mechanical rooms, elevator pits, electric rooms, etc.

3. Switches shall have neutral pulled through the box even if not used.

I. Junction and Pull Boxes:

1. Install junction and pull boxes in readily accessible locations. Access to boxes shall not be blocked by equipment, piping, ducts and the like. Provide all necessary junction or pull boxes required due to field conditions and size as require by the National Electrical Code.

J. Equipment Mounting Heights: Coordinate with architectural interior and exterior elevations.

1. Unless otherwise noted, mount devices and equipment at heights measured from finished floor to device/equipment centerline as follows:

a.	Toggle switches (up position "on")	46 in.
b.	Wall lighting controls (dimmer, digital switch, etc.	46 in.
c.	Receptacle outlets (long dimension vertical, ground" pole farthest from floor)	18 in.
d.	Receptacle outlets above counters	8 in. above counters
e.	Receptacle outlets, above hot water or steam baseboard heaters. Do not install receptacle outlets above electric baseboard heaters	30 in.
f.	Receptacle outlets, hazardous areas; also for refrigerators	48 in.
g.	Receptacle outlets, weatherproof, above-grade	24 in.
h.	Telephone outlets	18 in.
i.	Telephone outlets, wall mounted	46 in.
j.	Fire alarm manual stations	46 in.
k.	Fire alarm combination audio/visual and standalone visual device (entire strobe lens at heights indicated)	80 in. to bottom of the notification device
l.	Standalone fire alarm audio device	90 in. (min) to 96 in. (max)
m.	Distribution panelboards, to top of backbox	72 in.
n.	Terminal cabinets, control cabinets, to top of backbox	72 in.

o.	Disconnect switches, motor starters, enclosed circuit breakers.	48 in.

2. Where structural or other interferences prevent compliance with mounting heights listed above, consult Owner's Representative for approval to change location before installation.

K. Hangers and Supports:

1. Provide steel angles, channels and other materials necessary for the proper support and erection of motor starters, distribution panelboards, large disconnect switches, large circuit breakers, pendant mounted lighting fixtures, etc.

2. Panelboards, disconnect switches, circuit breakers, cabinets, large pull boxes, adjustable speed drives, cable support boxes and starters shall be secured to the building structure and not supported from conduits. Small panelboards, etc., as approved by Owner's Representative, may be supported on walls. Racks for support of conduits and heavy electrical equipment shall be secured to building construction by substantial structural supports.

L. Identification:

1. Provide engraved lamicoid identification nameplates on switchboards, main service disconnects, transfer switches, motor control centers and on all panelboards using designation shown in panelboard schedule.

   Include voltage, phase, equipment served, voltage source to panel or equipment.

2. Provide engraved lamicoid identification nameplates for each circuit breaker in the main distribution panel listing the panelboard or equipment connected to each device.

3. Provide engraved lamicoid identification nameplates on all items of equipment including individual circuit breaker enclosures and disconnect switches, listing the equipment connected to the particular device provided under Specification Section 262000, including, but not limited to: starters, disconnect switches, adjustable speed drives, circuit breakers, etc. Include voltage, phase, equipment served, voltage source to panel or equipment.

4. Provide complete type written directory for each panelboard listing room number, function, etc., for each circuit breaker. Directory shall be placed in a plastic clear sleeve in the interior of the panelboard door. Provide type written updated panelboard directories for existing panelboards affected by this work.

5. Nameplates shall be engraved black, with white core, with Helvetica medium 3/16 in. lettering. 1/8 in. lettering is acceptable where space of 3/16 in. is not available.

6. Identify junction and pullboxes for particular service and circuit such as power, emergency power, lighting, fire alarm, telephone, interphone, public address, nurse call, etc. using stencil lettering on cover.

7. Where voltage exceeds 600V provide permanent signage indicating "DANGER - HIGH VOLTAGE - KEEP OUT". Provide signage at each electrical room indicating "DANGER - ELECTRICAL ROOM". Utilize adhesive backed, yellow background, block lettering signage at door.

8. Using adhesive backed printed tape label (white background, black lettering) all receptacle and switch coverplates, power poles, etc. listing panel designation and circuit number. Tape shall be attached to outside of receptacle or switch coverplates.

M. Spare Parts:

1. Deliver to Owner and obtain receipt for spare parts including key switches, fuses, etc.

3.2 TESTS

A. Branch circuits shall be tested during installation for continuity and identification and shall pass operational tests to determine that all circuits perform the function for which they are designed. For all feeder and exterior branch circuit wiring rated 600 volts or less, provide 1,000 volt "Megger" insulation test prior to energizing feeders. Use a 1,000-volt motor driven megger for all tests. Test voltage shall be applied until readings reach a constant value, and until three (3) equal readings, each one (1) minute apart, are obtained. Minimum megger reading shall be 45 megohms for feeder conductors. Document test results and submit for approval prior to energizing conductors.

END OF SECTION

SECTION 26 05 26

GROUNDING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide grounding system equal to or exceeding the requirements of NEC and as indicated in the contract documents. Raceway system which includes metal conduit, wireways, pullboxes, junction boxes, busway, wire ways, cable trays, enclosures, motor frames, etc., shall be made to form a continuous, conducting permanent ground circuit of the lowest practical impedance to enhance the safe conduction of ground fault currents and to prevent objectionable differences in voltage between metal nonload current carrying parts of the electrical system.

B. Provide solid grounding of building structures and electrical and communications systems and equipment. It includes basic requirements for grounding for protection of life, equipment, circuits and systems. Types of grounding systems include the following:

1. Electrical Service and Transformer Grounding
2. Building Grounding
3. Equipment Room Ground Terminal Bar
4. Electrical Equipment Grounding
5. Surge Protection Device (SPD) Grounding
6. Telecommunications Grounding
7. Equipotential Grounding Systems
8. Underground Distribution Grounding
9. Common Ground Bonding with Lightning Protection System

1.2 QUALITY ASSURANCE

A. All methods of construction, details of workmanship, that are not specifically described or indicated in the contract documents, shall be subject to the control and approval of the Owner's Representative. Equipment and materials shall be of the quality and manufacture indicated in their respective sections of the specifications. The equipment specified is based upon the acceptable manufacturers listed. Equipment types, device ratings, dimensions. etc., correspond to the nomenclature dictated by those manufacturers. Where "or equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval. All equipment shall be tested at the factory. Unless specified elsewhere, standard factory inspection and operational tests will be acceptable.

B. Electrical Components, Devices and Accessories: Listed and labeled as defined in the NEC by Nationally Recognized Testing Laboratory (NRTL) and marked for intended use.

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

1.3 REQUIREMENTS

A. Grounding conductors, bonding conductors, jumpers, grounded conductors, etc. shall be sized in accordance with the NEC.

B. Equipment and materials shall be installed in accordance with the manufacturer's recommendations.

1.4 SUBMITTALS

A. Provide submittals for the following:

1. Ground rods and connectors.

2. Ground bars.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Conductors:

1. Exposed grounding components such as bars, straps, cables, flexible jumpers, braids, shunts, etc., shall be bare copper unless otherwise indicated.

2. Grounding conductors in raceway with 600V circuiting shall be insulated to match the circuit conductors with green color.

3. Grounding conductors used with system voltage greater than 1000V shall be bare unless otherwise indicated.

4. Grounding conductor size shall be as indicated or as required by the NEC whichever is larger, stranded, soft drawn or soft annealed copper, unless otherwise indicated. Sizing shall take into account circuit voltage drop.

5. Acceptable Manufacturers:

a. Same make as for 600 volt conductors.

B. Ground Rods:

1. Provide solid copper or copper clad steel cylindrical rods, 3/4 in. minimum diameter and minimum 10 ft. long with pointed end. Provide units suitable for extension connection when ground rods longer than 10 ft. are indicated.

2. Acceptable Manufacturers:

    a. Copperweld
    b. Erico
    c. Burndy
    d. Approved equal.

C. Connectors, Clamps and Terminals:

1. Mechanical connectors and clamps shall be made of copper alloy or silicon bronze. Solderless compression terminals shall be copper, long-barrel, NEMA two bolt. Bolts and washers (Belleville) shall be of comparable material or stainless steel.

    a. Acceptable Manufacturers:

        1) Burndy
        2) Hubbell Anderson Corp.
        3) Thomas & Betts
        4) Approved equal

2. Exothermic Welds:

    a. Provide exothermic welds designed for size and type of intended cable, rods, structure, etc. Solder prohibited for connections, except for medium and high voltage cable metallic tape shields (utilize mechanical and solder).

    b. Acceptable Manufacturers:

        1) Erico "Cadweld"
        2) Burndy "ThermOweld"
        3) Approved equal

3. Pipe Clamp:

    a. Pipe clamp for bonding to pipe type electrode (water pipe, etc.) shall be a suitably sized copper alloy clamp.

    b. Acceptable Manufacturers:

        1) Burndy GAR-BU
        2) O-Z Gedney Type CG
        3) Burndy "Durium"
        4) AFL Global "Everdur"
        5) Approved equal

4. Flexible Strap:

   a. Flexible grounding straps shall be of braided high conductivity copper with two hole connector. Strap shall have equal to or greater than ampacity of the system it is bonding to. Strap shall provide flexibility in all directions when installed properly.

   b. Acceptable Manufacturers:

      1) Burndy
      2) OZ Gedney
      3) Approved equal

5. Electrostatic Floor Bonding:

   a. Listed grounding kit for bonding ESD carpet, vinyl, rubber and epoxy floor coverings and coatings to ground with the following components:

      1) 1 in. wide copper grounding tape.

      2) Heavy gauge stainless steel ground termination plates with double sided conductive tape and 20 in. long lead wire with a #10 terminal ring at the end.

      3) Acceptable Manufacturers:

         a) Ground Zero Electrostatics Inc. "Zerostat" Floor Termination and Grounding Kits.

D. Ground Bars

1. Provide ground bars where indicated. Ground bars shall be:

   a. 98% conductive copper, minimum.

   b. 4 in. x 1/4 in. thick minimum with length as indicated with minimum 36 in. for electric room/MDF and all other minimum of 24 in.

   c. Standard NEMA bolt hole patterns with maximum quantity of lug locations. Spacing of 1-1/8 in. apart.

2. Bar shall be mounted to an accessible wall location with galvanized steel hardware and 2000V rated insulators. Mounting shall be suitable for full complement of cabling.

3. Unit shall conform to EIA/TIA standards.

4. Acceptable Manufacturers:

   a. Erico
   b. Newton Instrument
   c. Burndy
   d. Harger

PART 3 - EXECUTION

3.1 INSTALLATION

A. Grounding Conductors:

1. Provide grounding conductor(s) with all power circuits. Conductor shall be sized as indicated or as required by the NEC as a minimum and shall be terminated on the equipment, device, enclosure, etc. grounding terminal. Conductor size shall be for the entire length unless approved by the Engineer where oversized for voltage drop.

2. Conductors above grade to ground electrodes (water piping, structural column, etc.) and to equipment (service entrance, ground bars, ground halos, etc.) shall be installed in metallic conduit with ends bonded to the conduit.

3. Grounding conductors shall be installed to have a minimum radius of 3 in.

4. Grounding conductors in a raceway system shall be terminated/bonded to each box, cabinet, enclosure, etc. through which it passes or terminates.

5. Grounding conductors routed with underground circuits shall be bonded to each ground electrode and metallic cable support system within the raceway system including pull and access locations.

6. Stranded conductors penetrating vapor barriers, foundations, slab on grade and water stop membranes shall have the interstitial spaces between strands filled with solder 4 in. beyond the membrane each side. The conductor shall be sealed to the membrane with a manufacturer approved method.

B. Raceway Systems:

1. All metal supports, cable trays, messenger cables, frames, sleeves, brackets, braces, etc. for the raceway system, panels, switches, boxes, starters controls, etc., which are not rigidly secured to and in contact with the raceway system, or which are subject to vibration and loosening, shall be bonded to the raceway system.

2. Termination of rigid conduit at all boxes, cabinets, and enclosures shall be made up tightly with a double locknut arrangement and a bushing, bushings being of the insulated type. Utilize grounding bushings as specified elsewhere in these specifications.

3. Conduit which runs to or from boxes, cabinets, or enclosures having concentric or eccentric knockouts which partially perforate the metal around the conduit and hence impair the continuity of system ground circuits shall be provided with bonding jumpers connected between a grounding type bushing/locknut on the conduit and a ground bus or stud inside the box, cabinet, or enclosure and attached thereto.

4. Conduit expansion joints and telescoping sections of metal raceways shall be provided with bonding jumpers sized in accordance with the NEC.

C. Ground Rods:

1. Ground rods shall be driven vertically the full length plus 24 in., minimum.

2. Ground rods shall be located in virgin soil or loamy compacted soil.

D. Connectors Clamps and Terminals:

1. Connectors utilized above grade in dry accessible locations shall be mechanical or exothermic type.

2. Connectors in damp locations, below grade or if not indicated shall be exothermic type.

3. Clean the area near the connecting surfaces prior to any connection to ensure effective contact. Cleaning shall be to the bare metal. Wire brush area if needed to remove rust scale paint, dirt, etc. to expose bare metal.

4. Exothermic connections shall be installed in accordance with the manufacturer's recommendations and tested with heavy blow of a five pound sledge.

E. Flexible Strap:

1. Flexible straps shall be used when bonding vibrating/moveable equipment, with expansion fittings and where recommended by the manufacturer.

2. Sufficient slack shall be provided to compensate for the anticipated vibration, movement and expansion.

F. Primary Electrical Equipment/Systems:

1. Transformers:

a. Primary voltages including those above 600 volts.

b. Provide a minimum of two #4/0 bare ground conductors from the transformer pad electrodes or building main ground bar to the transformer enclosure ground stud/pad/terminals.

c. Provide a #4/0 bare ground conductor from each lightning arrester to the transformer enclosure ground stud/pad/terminals.

d. For exterior pad mounted transformers, provide a bonding conductor sized in accordance with the NEC from the transformer neutral terminal to the ground stud/pad/terminals.

e. Connect system primary and secondary circuit grounding conductors to the transformer enclosure ground stud/pad/terminals.

2. Metal Enclosed/Metal Clad Switchgear:

a. Equipment includes metal enclosed/metal clad switch units, switch and fuse units, auxiliary units, metering units, air circuit breaker units, etc. these shall be effectively grounded in accordance with requirements described herein and the manufacturers recommendations.

b. Provide two (2) #4/0 ground conductors from the equipment ground bus to the ground bar or one (1) #4/0 ground conductor from the equipment ground bus to the building ground bar for every two (2) compartments in a continuous line-up equipment, whichever is the greater number.

c. Connect system circuit grounding conductors to the equipment ground bus.

3. Cabling:

a. All medium and high voltage cable shielding shall be bonded to the local ground system in all buildings, switchgear, transformers, manholes containing splicing/connectors, etc. Suitable terminations, connectors, splices, etc. should be used to expose the cable shield for grounding.

b. The grounding conductors contained in the interstices of interlocked armor cable shall be connected to the ground bus at every equipment termination point and to each other and to system ground; ground at every splice location.

c. The grounding conductor contained in raceway systems shall be connected to the ground bus at every equipment termination point and to each other and to system ground; ground at every splice location.

G. Secondary Electrical Systems:

1. The neutral (grounded) conductor of each low voltage, single and/or polyphase system or distribution system, except special isolated double insulated systems, shall be solidly connected to ground at the transformer neutral bushing, or at the main secondary switchgear to the system ground, and shall be sized for current carrying capacity, not to be less than as required by the NEC. Ground connection shall be to the building grounding system, building steel, building water service, building concrete reinforcement and as indicated.

2. Provide equipment grounding conductor, green colored insulation, with phase conductors, to primary side of all transformers rated 600 volts or less circuited to the enclosure and secondary neutral bushing, to all electrical utilization and distribution equipment; insulation shall be same type as phase conductors. Transformer enclosures shall be bonded to the primary and secondary circuit grounding conductor.

3. Equipment grounding conductors shall extend from the point of termination back to the ground bus of the source panelboard, switchboard, transformer, or switchgear.

H. Equipment Grounding:

1. Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch circuit conductors.

2. Surge Protection Device (SPD) Ground Conductor Installations: Extend SPD dissipation ground conductors to local equipment ground bus and to common grounding electrode conductors. Size conductors per SPD manufacturer recommendations and the NEC.

I. Communications Rooms:

1. For each building communications room or closet provide one (1) wall mounted ground bar bonded to the main building ground bar or electrical service ground with insulated #2 AWG conductor.

2. Local cable trays, equipment racks, etc. shall be bonded to the ground bar with insulated #6AWG minimum.

J. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors in conduit from building's main service equipment or grounding bus to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes using a bolted clamp connector or by bolting a lug-type connector to a pipe flange using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor or sleeve to conductor at each end.

2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.

3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

K. Underground Distribution:

1. Manholes and Handholes: Provide a driven ground rod through opening in the floor/bottom with 4 in. exposed. If necessary due to the site conditions, install the ground rod prior to manhole/handhole installation and provide a #1/0AWG bare conductor from the ground rod with an exothermic connection in the manhole/handhole. Seal the opening with waterproof nonshrinking grout.

2. Bond exposed parts within manhole/handhole such as inserts, pulling rings, cable racks, ladders and cable shields to the ground rod with #2AWG bare conductor minimum. Conductors shall be neatly installed around the perimeter of the unit and support 3 ft. on center with non-corrosive support and hardware.

3.2 GROUND TERMINAL BUS INSTALLATION

A. Install ground terminal bar in rooms where shown on the drawings. Mount bar 18 in. above finished floor by anchors and bolts using 1-1/2 in. long insulated spacer between bar and wall. Use a minimum of two (2) supports 18 in. on center. Connect all grounding electrode system conductors, system enclosure ground bus, and other indicated electrode systems to the terminal bar.

B. Label grounding conductors terminated to bus for equipment, location, electrode, etc served.

3.3 TESTS

A. Test the building ground system before backfilling to ensure continuity and determine system resistance value.

B. Testing procedure shall be a fall of potential type with a moving auxiliary electrode in accordance with IEEE Standard 142 and reviewed/approved by the Engineer. Sufficient test points shall be taken for accurate resistance value.

C. Make resistance measurements in dry weather, no earlier than 48 hours after rainfall. Provide tabulated test results indicating distance between rods and resistance readings on a plotted graph.

D. Test each ground electrode system separately prior to connection to the system or main building ground bar. Test each system ground electrode system a second time after backfilling has occurred and all final connections (building steel, water service, etc.) have been made.

E. Soil type, date, time, meter manufacturer/model number, person performing the test, test witnesses and most recent rainfall shall be noted in test submittal.

END OF SECTION

SECTION 262000

ELECTRIC DISTRIBUTION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide electric distribution equipment as indicated on the Contract Documents and as specified herein.

1.2 QUALITY ASSURANCE

A. All methods of construction, details of workmanship, that are not specifically described or indicated in the contract documents, shall be subject to the control and approval of the Owner's Representative. Equipment and materials shall be of the quality and manufacture indicated in their respective sections of the specifications. The equipment specified is based upon the acceptable manufacturers listed. Equipment types, device ratings, dimensions, etc., correspond to the nomenclature dictated by those manufacturers. Where "or equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval. All equipment shall be tested at the factory. Unless specified elsewhere, standard factory inspection and operational tests will be acceptable.

B. Installation shall be in accordance with NFPA-70 (National Electrical Code), National Electrical Safety Code (NESC), state codes, local codes, and requirements of authority having jurisdiction.

C. Equipment shall be designed, manufactured, assembled, and tested in accordance with the latest revisions of applicable published ANSI, NEMA, UL and IEEE Standards.

1.3 SUBMITTALS

A. Submit the following product data/information:

1. Manufacturer and equipment type.

2. Standard catalog information sheet.

3. Detailed shop drawings indicating plan, elevation, end and isometric views. Top and bottom conduit areas shall be clearly shown and dimensioned on the drawings.

4. Single-line diagram.

5. Complete Bill of Materials.

6. All relevant ratings including, but not limited to, voltage, current, interrupting and withstand.

7. Overcurrent Device Information. Model number, available settings, setting ranges, capabilities, etc.

8. Submit available and final settings, programming and adjustments.

B. Submit product data and information for the following equipment, materials, products, etc.:

1. Circuit Breakers

C. Test Reports

1. Submit type written test report for all testing indicated herein.

PART 2 – PRODUCTS

2.1 CIRCUIT BREAKERS

A. Circuit breakers shall be molded case constructed using glass reinforced insulating material. Current carrying components shall be completely isolated from the handle and the accessory mounting area.

B. Circuit breakers shall have a toggle operating mechanism with common tripping of all poles which provides quick-make, quick-break contact action. The circuit-breaker handle shall be over center, be trip free, and reside in a tripped position between on and off to provide local trip indication. Circuit-breaker escutcheon shall be clearly marked on and off in addition to providing international I/O markings. Equip circuit breaker with a push-to-trip button, located on the face of the circuit breaker to mechanically operate the circuit-breaker tripping mechanism for maintenance and testing purposes. Single pole 15 and 20 ampere circuit breakers shall be UL listed as "Switching Breakers" at 120V ac or 277 V ac and carry the SWD marking. Lugs shall be mechanical, rated for 60/75° AL/Cu.

C. Thermal Magnetic Circuit Breakers: Inverse time current element for low level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit breaker frame sizes 250A and larger.

D. Adjustable, Instantaneous Trip Circuit Breakers – Magnetic trip element with front mounted, field adjustable trip setting.

E. Key Interlock Kit: Externally mounted to prohibit circuit breaker operation; keying shall follow sequence indicated on drawings.

F. Handle Padlocking Device: Fixed attachment, for locking circuit breaker in on or off position.

G. Ground-Fault Circuit Interrupter (GFCI) circuit breakers shall be quick-make, quick-break, thermal-magnetic, Class A, 6 milliampere ground fault sensing and trip indicating, and multipole breakers shall have common trip. The ground fault circuit breakers shall not occupy any more space than a standard breaker of the same number of poles.

H. Ground Fault Equipment Protector (GFEP) circuit breakers shall be utilized for electric heating equipment and where indicated. These shall be quick-make, quick-break, thermal-magnetic, Class B, 30 milliampere ground fault sensing and trip indicating, and multipole breakers shall have common trip. The ground fault circuit breakers shall not occupy any more space than a standard breaker of the same number of poles.

I. Arc-Fault Circuit Interrupter (AFCI) circuit breakers shall be quick-make, quick-break, thermal-magnetic, and trip indicating, and multipole breakers shall have common trip. Sensor shall recognize the unique current or voltage signatures associated with arcing faults and efficiently interrupt the circuit to reduce fire hazards. Sensor shall detect persistent low current arcing faults down to 5 amps with associated mitigation of fire hazards in the cords connected to the outlets.

J. Dual Function Circuit Breakers shall provide both GFCI and AFCI protection. Circuit breaker shall have the same electrical requirements as the individual devices listed above.

K. Arc Flash Energy Mitigation: Provide the following arc flash energy mitigation system for all circuit breakers 1200A and larger.

1. Zone Selective Interlocking: Equipment with a main and/or distribution circuit breaker with a frame rating of 1200A and more shall have zone selective interlocking. The circuit breakers shall be solid state trip type and connected with cabling for communications between. In the event of a short circuit/ground fault condition if the main and distribution breaker both sense the condition then any time delays shall remain active. If the main senses a short circuit/ground fault condition but not any of the distribution breakers then the main breaker tripping time delays should be overridden for a quicker trip operation. The system shall be fully wired and tested by a factory authorized/trained technician.

L. Listed combination of coordinated circuit breakers shall be verified by the equipment manufacturer utilizing published data sheets. Confirmation listings shall be submitted.

M. Ratings shall be as indicated in the Contract Documents.

N. Enclosed circuit breakers shall be molded case, thermal-magnetic type, ratings as noted, with overcenter, trip-free, toggle-type operating mechanism, quick make/quick break action and positive handle indication. Multiple pole breakers shall be common trip type. Each circuit breaker shall have a permanent trip unit containing individual thermal and magnetic trip elements in each phase.

Provide provisions for padlocking in the "off" position. Breakers shall be calibrated for operation in an ambient temperature of 40°C and shall be suitable for mounting and operating in any position. Breakers shall have removable lugs, UL listed for copper and aluminum conductors. Breakers shall be installed in NEMA 1 general purpose, surface enclosures, unless otherwise noted. UL listed as suitable for use as service equipment.

1. Manufacturers: Subject to compliance with Contract Documents, the following manufacturers are acceptable:
   a. Square D
   b. Eaton Corporation
   c. ABB
   d. Siemens

PART 3 - EXECUTION

3.1 INSTALLATION

A. Receive, inspect, handle, store, and install equipment as per NEMA published bulletins.

B. Visually inspect physical and mechanical conditions, anchorage, alignment, and grounding. Verify the equipment is clean and perform specific inspections and tests recommended by the manufacturer.

C. Secure covers to enclosures and tighten all bolts to manufacturer recommended torques to reduce noise generation. Remove shipping bolts, blocking and wedges.

D. Construct concrete bases and anchor floor mounted equipment according to manufacturer's written instructions. Concrete base shall be 4 inch nominal thickness and extend 3 inches on all sides, with 6" x 6", #6 reinforcing wire mesh centered and doweled into floor. Coordinate size and location of concrete bases with actual equipment provided. Cast anchor bolts inserts into bases. Concrete, reinforcement, and framework requirements are specified with concrete. Locate base to provide adequate clearances for proper ventilation.

E. Tighten electrical connectors and terminals according to manufacturer's published torque tightening values.

F. Ground equipment per the NEC and Section 260526.

G. Dry-Type Transformers:

1. Install wall mounted transformers level and plumb with wall brackets fabricated by transformer manufacturer. Coordinate installation of supports with actual transformer provided.

2. Provide flexible connections at all conduit and conductor terminations and supports to eliminate sound and vibration transmissions to the building structure.

H. Molded Case Circuit Breakers:

1. Visually inspect that equipment nameplate data are as described in the specifications and shown on the drawings. Inspect physical and mechanical condition, and anchorage, alignment, grounding, and clearances.

2. Verify that the unit is clean and operate the breaker to ensure smooth operation. Inspect bolted connections for high resistance using a low resistance ohmmeter or by calibrated torque-wrench method in accordance with manufacturer's published data.

3. Inspect operating mechanism, contacts, and chutes in unsealed units.

4. Provide pad lockable branch circuit breaker device to hold circuit breaker in the closed position, but not prevent overcurrent protection, for all branch circuits serving fire alarm controls panels, emergency lighting and life safety branch circuits.

3.2 FIELD QUALITY CONTROL

A. Dry-Type Transformers:

1. Measure resistance at each winding, tap, and bolted connection.

2. Perform insulation-resistance tests winding-to-winding and each winding-to-ground. Apply voltage according to manufacturer's published data. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.5. Calculate polarization index: the value of the index shall not be less than 1.0.

3. Perform turns-ratio tests at all tap positions. Test results shall not deviate by more than one-half percent from either the adjacent coils or the calculated ratio. If test fails, replace the transformer.

4. Verify correct secondary voltage, phase-to-phase and phase-to-neutral, after energization and prior to loading.

5. Record transformer secondary voltage at each unit for at least 48 hours of typical occupancy period. Adjust transformer taps to provide optimum voltage conditions and secondary terminals. Optimum is defined as not exceeding nameplate voltage plus 5 percent and not being lower than nameplate voltage minus 3 percent at maximum load conditions. Submit recording and tap settings as test results.

B. Molded Case Circuit Breakers (Electronic Trip):

1. Breakers shall be tested with secondary current injection utilizing a minimum of three (3) different points on each of the phase and one for ground fault overcurrent curves. Phase test points shall be at instantaneous, short time and long time portions of the curve. The tested points shall be plotted on the TCC curves utilizing the final settings with the coordination study. Each breaker shall be tested to prove proper operation at the specific settings.

3.3 IDENTIFICATION

A. Identify all items of equipment as described in Section 260501. Identification shall be provided for switchboards, panelboards, transformers, motor starters, disconnect switches, enclosed circuit breakers, switchboard main/distribution breakers, surge suppression devices, control panels, etc.

B. Switchboards and panelboards shall have a label indicating name/tag ID, feeder source, conductor color convention and for service entrance locations the available short circuit current.

C. Provide a permanent label on service equipment containing the following information:

1. Nominal system voltage.

2. Available fault current at the service overcurrent protective device.

3. The clearing time of service overcurrent protective device based on the available fault current at the service equipment.

4. The date the label was applied.

3.4 ELECTRICAL LOAD TEST

A. Conduct a load test prior to request for final payment and comply with the following:

1. Energize maximum normal light and power load for a period of two hours when scheduled.

2. Record voltage at service and at each panel.

3. Measure current in each phase of all feeders.

4. Adjust transformer taps as directed by engineer after review of report.

5. Provide and install all necessary metering equipment.

6. Owner's Representative or Site Representative shall witness the test.

7. Before final acceptance specified test shall be completed to the satisfaction of the Owner's Representative who shall be sole judge of the acceptability of such tests and who may direct the performance of such additional tests as deemed necessary in order to determine the acceptability of the systems, equipment, material and workmanship. Additional tests required by the Owner's Representative shall be provided at no additional cost. Protective equipment shall be actuated in a manner that clearly demonstrated their workability and operation.

3.5 CLEANING

A. At the completion of the project, while equipment is de-energized, it shall be thoroughly cleaned to a shipped condition using methods in accordance with the manufacturer's recommendations. Utilize vacuum for cleaning and not compressed gas.

3.6 SPARE PARTS

A. Deliver loose equipment to the Owner and obtain receipt for fuses, keys to panelboards, etc.

END OF SECTION

SECTION 27 21 00

LOCAL AREA NETWORK SYSTEM

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide labor, materials, equipment, services, etc. for a complete functional Local Area Network (LAN) and related work as required in the Contract Documents.

B. The systems to be provided shall be for a switched LAN environment. The system shall hereafter be referred to as the Data Network System.

C. Basic Intent:

1. Located throughout the building as shown on the drawings, are places where computers and associated equipment are intended to be placed and connected to the network for the purposes of utilizing common resources.

2. The telecommunications rooms for the data network in the building(s) are located as shown on the drawings.

3. Located in various other places are additional Telecommunication Rooms. It is intended that these be connected with the Main Telecommunication Room by a fiber optic cable backbone and 25 pair copper backbone cables. From each of these locations, data cable is to be run to the data jacks where computer equipment is connected.

4. Fiber connector housings shall be used as termination points for all fiber optic cabling. Provide backbone cabling between telecommunication rooms as indicated.

5. Patch panels shall be used as termination points for all data cables. Fiber connector housings shall be used as termination points for all individual fiber cables in telecommunication rooms.

D. Description of System:

1. The system shall include the items listed below, as described herein and as indicated on the Contract Documents:

a. Data network shall be compatible with existing network configuration and characteristics.

b. Campus service to the building(s).

c. Building Main Distribution Frame (MDF) for service entrance and distribution.

d. Intermediate Distribution Frame (IDF) as indicated for cabling distribution.

e. Backbone wiring from entrance facility to the MDF and from MDF to the IDFs.

f. Complete raceway system (cable tray, J hooks, conduit) for cabling distribution as noted on Construction Drawings.

g. Grounding of all racks, raceway and equipment.

h. Power for the telecommunication rooms.

1.2 TELECOMMUNICATION ROOMS

A. Each telecommunication room shall be furnished with 3/4 in. plywood backboard, from 6" above finished floor to 8'-6" above finished floor on all walls, with the plywood backboard painted with two (2) coats of grey fire-resistant paint (UL/ASTM Class A), all surfaces.

1. ANSI/TIA/EIA Telecommunications Building Wiring Standards.

2. IEEE Telecommunications Standards.

3. BICSI Methods Manuals.

4. NFPA 70: NEC

1.3 QUALITY ASSURANCE

A. Work shall be as specified herein and it shall be neat and orderly installation. All methods of construction, details of workmanship that are not specifically described or indicated in the contract documents, shall be subject to the control and approval of the Owner's Representative.

B. Unless specified elsewhere, standard factory inspection and operational tests will be acceptable.

C. Installation shall be accordance with NFPA 70 (National Electrical Code), TIA/EIA, IEEE, IEC, state codes, local codes, and requirements of the Authority Having Jurisdiction.

D. Equipment shall be designed, manufactured, assembled, and tested in accordance with the latest revisions of applicable published ANSI, NEMAIEC, TIA/EIA and IEEE Standards.

E. Each item shall be NRTL tested and listed.

F. The system provider must:

1. Provide equipment from manufacturers for which they maintain a contract, distributorship, are an agent, or other formal arrangement for which documentation can be produced showing authority to sell and service the equipment in this territory.

2. Demonstrate that they have successfully installed these systems, utilizing their standard products, for a period of five (5) years.

3. Maintain adequate spare parts inventory to provide both normal and emergency service.

4. Employ service technicians who are trained in accordance with the systems manufacturer's recommendations.

5. Own and demonstrate proficiency in the use of the required test equipment, tools, etc. for the proper installation, set-up, testing and maintenance of the system. If requested, must provide a listing of tools and/or equipment and where appropriate, certifications in the proper training and use of the tools and/or equipment.

6. Any system being extended or connected to an existing system shall be tested for full functionality prior to beginning work and at the completion.

G. Contractor Qualifications:

1. The cable installer shall provide documentation and references from three (3) similar installations installed within the previous two (2) years within a 60 mile radius.

2. Contractor shall be trained through the Panduit certification for horizontal cabling and Corning Network of Preferred Installers (NPI) for fiber cabling.

1.4 SUBMITTALS

A. Provide the following in a single clear and organized submittal. Package shall be submitted as specified in:

1. Manufacturers catalog sheets, specifications and installation instructions for all system components.

2. Detailed description of system operation.

3. Itemized list of all features and functions.

4. Dimensioned drawings of all system control cabinets and layouts for all equipment rooms.

5. Wiring diagrams showing typical connections for equipment.

6. Contractor certification and qualifications.

7. Riser diagrams showing all components, devices and interconnecting cable types.

8. List of three (3) installations of equivalent or larger systems that have been installed within the past two (2) years and have been operating satisfactorily for a minimum of one (1) year.

9. Warranty information.

10. System test reports.

11. Calibration of Cat 6A test sets. Calibration shall be completed once per year with certification of calibration provided.

12. Provide scaled elevation and plan drawings indicating walls, data racks, patch panels, wire management, cable trays, power strips, door swing, etc. for each cable closet/room.

1.5 SYSTEM DESCRIPTION

A. Provide a complete and fully operational state of the art Local Area Network (LAN) system as described herein and indicated on the contract documents. Include any and all interface equipment to supply a complete network with complete equipment connections necessary to form a complete "turnkey" network system as outlined in these specifications.

B. The complete system shall include, but is not limited to, the following:

1. Equipment Room build-out.
2. Telecommunications Room build-out.
3. Equipment cabinets and racks.
4. Wire management.
5. Horizontal cabling.
6. Fiber optic backbone cabling.
7. Modular jacks, backboxes and faceplates.
8. Terminations and testing.

9. Raceways, pathways, cable tray, sleeves, pull boxes.
10. Firestopping.

C. Owner shall provide the network electronics and patch cables.

1.6 WARRANTY

A. All cable plant parts shall be warranted to the owner for a period of twenty-five (25) years as a complete end-to-end system.

B. Warranties shall commence upon final acceptance of the system.

C. Contractor to submit Cat 6A cable records to Panduit for warranty. Warranty shall be from Panduit and cover 25 years.

D. Contractor to submit fiber cable records to Corning for warranty. Warranty shall be from Corning and cover 25 years.

PART 2 - PRODUCTS

2.1 HORIZONTAL CABLE

A. Augmented Category 6A UTP Cable:

1. Initially, the manufacturer shall perform qualification tests on each cable. These tests shall be performed in accordance with the latest revision of ANSI/TIA/EIA 568-C.2 standard prior to shipment.

2. Date of Manufacture: Cable shall be a maximum of one (1) year old, from date of manufacture when installed.

3. Cable shall be plenum rated, 4 pair, 100 OHM, 23 AWG.

4. Cable shall meet all requirements of FCC 68, the latest revision of the TIA/EIA 568B-C.2 and Addenda.

5. Cable shall have green colored thermoplastic jacket with overall diameter not to exceed .24 in. x .24 in.

6. Pulling tension shall be rated for 25 pounds minimum.

7. Cable shall be able to withstand a minimum bend radius of 1.2 in. at -20ºC without insulation cracking.

8. Cable shall be color coded in accordance with the latest revision of the TIA/EIA T568B polarization sequence.

9. Cable shall not exceed maximum length of 90 meters.

10. Provide a printed report documenting testing based on ANSI/TIA 568-C.2 tested at 500 MHz. Testing parameters as follows:

    a. Less than 21.0 ohm per 100 m DC resistance.

    b. Return loss > 10.0 dB/100m at 500 MHz.

    c. Insertion loss < 43.8 dB/100m at 500 MHz.

    d. Near end cross talk (NEXT) > 26.7 dB at 500 MHz.

    e. Power Sum - near end cross talk (PS-NEXT) > 23.8 dB at 500 MHz.

    f. Attenuation to cross talk ration far end (ACRF) > 10.2 dB at 500 MHz.

    g. Power sum - attenuation to cross talk ratio (PS-ACRF) > 7.2 dB at 500 MZz.

    h. DC resistance unbalance between any two (2) conductors of any pair shall not exceed 3%.

    i. The capacitance unbalance of any pair to ground shall not exceed 65.6 pF per 100 meters.

    j. Delay < 490 ns at 100MHz.

    k. Delay skew < 44 ns at 100MHz.

    l. Cable shall be ANSI/TIA/EIA-568-C.2 augmented Category 6 (Cat 6A) compliant. The cable shall be tested and characterized by the manufacture to 500 MHz.

11. Acceptable Manufacturers:

    a. Panduit
    b. Prysmian / General Cable
    c. CommScope (Cornell Site-Specific)

2.2 PATCH PANELS

A. UTP Cable Patch Panels:

1. All panels should consist of a faceplate, mounting, hardware, isolation bushings, connector assemblies and labels for all ports.

2. Provide patch panels in each enclosure or rack to which the cable is to be terminated.

3. Patch panels shall be mounted in standard 19 in. racks/cabinets.

   a. Contractor shall provide Panduit CJ6X88TG for Cat 6A terminations 48-port patch panels having wiring configuration specified with insulation displacement connectors on the back and 8P8C universal modular jacks on the front. No substitutions allowed.

   b. Contractor shall provide quantity of patch panels to terminate all UTP cable. There shall be a minimum of 25% spare capacity for future installation.

4. Jacks shall be Panduit CJ6X88TG for Cat 6A terminations, T568A only. No substitutions allowed.

5. Panels shall have factory labels for each port.

6. All cables are to be terminated per EIA/TIA 568A standards and dressed in a neat workmanship way. Match the Owner's standard configuration.

7. Modular jacks shall be mounted on PC boards to offer low insertion and NEXT loss.

8. Provide grounding screw assembly with serrated head screw and manufacturer recommended connection to the associated rack.

9. Shall exceed EIA/TIA-568, UL1863 and FCC Part 68 performance specified.

10. Acceptable Manufacturers:

    a. Panduit T568A 48-position patch panel.

2.3 OUTLETS AND CONNECTORS

A. UTP Outlets/Connectors:

1. Physical Specifications:

   a. Shall be 8 position connector compatible with the cable characteristics.

   b. Shall be modular and snap-in to user configurable faceplates for future retrofits meeting durability requirements specified in the latest revision of the CEI/IEC standard.

c. Shall be IDC type suitable for eight 22-24 AWG wires with a gas-tight connection.

d. Each contact surface shall have at a minimum, copper alloy with 50 micro-inches gold over nickel and a minimum contact force of 100g.

e. Conductors shall be separated and aligned internally by jack comb.

f. Shall have easy to read 568A/B color scheme to prevent termination errors.

g. Wired in accordance with TIA/EIA polarization sequence specified in Patch Panel section of this specification.

h. Transmission characteristics shall meet the requirements for the UTP cabling specified.

i. Minimum durability shall be 1000 connecting cycles.

2. Acceptable Manufacturers:

a. Panduit CJ6X88TG** (** denotes color)

2.4 COLOR CODING

A. Cable outer jacket shall follow the color coding scheme as follows. Jacket color shall be continuous.

B. Copper Cable:

1. Data Communication, Voice Communication, and Wireless Network:

a. Category 6A - Green (Preferred)

1) Blue (if green is not available)

2.5 CABLE MANAGEMENT

A. All racks are to be provided with cable management hardware to insure a neat, functional system when complete. Racks shall as a minimum, include the following:

1. PVC construction; duct fingers to manage cabling; color to match enclosure.

B. All racks shall have 8 in. wide vertical full height cable management, including cover, front and rear, on both sides of the rack.

C. All racks shall have 2RU space horizontal full width cable management, front and rear, above and below each patch panel and piece of equipment.

D. Cabinets shall have 1RU space horizontal panels, front and rear, above and below each patch panel and piece of equipment.

E. All data distribution frame plywood backboards shall be provided with vertical and horizontal wire management with capacities to house all possible future cabling and patch cords for a neat and orderly installation.

F. Acceptable manufacturers:

1. Panduit

2.6 LABELING

A. General:

1. Labeling system and structure shall match the Owners existing. System shall provide as built final conditions for each cable, port, panel, rack, etc. and utilize MS Excel or approved equal documentation. Provide electronic copy of labeling documentation to the Owner nearing completion of construction to support the service activation phase; provide a minimum of 2 weeks prior to required activation time. It shall also be included as part of the O & M.

2. Each label shall contain the Telecommunication Room designated, the room number and the port number in the room. Verify color of label and size of font prior to completion. Provide samples as requested.

3. Labels shall correspond to the room/names/numbers upon completion of the project. Contractor shall not necessarily utilize existing room/names/numbers or those indicated on the blueprints.

4. Label each rack and patch panel with 1 in. high lettering, black on white, adhered electronically printed plastic type label with labels at top, bottom, front and back.

5. Firestop used in vertical riser and horizontal conduit sleeves penetrating ceilings and floors shall be labeled. Provide and install labeling at each penetration including penetration type with UL listing used, material used, date of install, and name of installer.

6. Cables pulled for future use shall be labeled as such.

B. Patch Panel

1. Individually label all patch panel ports. Port numbers shall match opposite end outlet/port number.

C. Outlets

1. Individually label all patch panel ports. Labels shall be installed in a workman-like manner and fit completely in the recessed area of the labeled location.

2. Contractor shall utilize adhered labels at poke-thru locations and any other locations that do not have a label location.

D. Cable

1. Copper

a. Specifically label cables at each termination point indicating the building, destination room, rack number, panel number and port number.

2.7 UTP CABLE TESTER

A. Contractor shall utilize Fluke DSX 5000 tester or approved equal. Provide adapters for specified cables.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Cable:

1. Provide horizontal UTP cable to each communication outlet jack from respective equipment/telecommunications room patch panel as called for on contract drawings.

2. Provide single-mode fiber optic cable to each fiber jack from respective equipment/telecommunications room as called for on contract drawings.

3. All risers, and wiring concealed in walls or soffits, shall be installed in metal conduits.

4. All cable above accessible ceilings shall be installed in cable tray. If a J-hook system is called for on the contract drawings it shall be spaced such that supports are 3 ft. O.C.

a. If a J-hook style system is provided it shall be for 30 cables or fewer. Greater than 30 cables must be within a cable tray system.

5. Provide wire management and Velcro cable wraps every 24 in. throughout closets.

6. Wiring/cabling shall be installed in accordance with the manufacturer's recommendations. If the manufacturer recommends larger wire sizes, they shall be provided. However, smaller sizes or lower cable categories are not acceptable.

7. All Contract Documents are schematic. The system supplier shall incorporate their wiring requirements on the system drawings. The Contractor in conjunction with the system manufacturer shall be responsible for complete wiring requirements and conduit sizes.

8. Install UTP cable in accordance with latest revision of TIA/EIA 568 standards.

9. The Contractor shall be responsible for replacing all cables that do not pass required bandwidth and throughput tests.

10. All raceways and closets shall be installed in accordance with latest revision of TIA/EIA-569.

11. All cables shall be labeled in accordance with latest revision of TIA/EIA 606 and these specifications.

12. All horizontal cables shall be terminated in patch panels at the distribution frames, and at the UTP jack at the telecommunications outlet.

13. Maximum length shall be 90 meters.

B. Terminations:

1. All terminations shall be made by a manufacturer's trained representative.

2. Use termination kits for fiber and UTP that are approved by the manufacturer of the cable.

3. All backbone cable shall be terminated in a fiber connector housing and all connections between horizontal and backbone cables shall be through cross connect cable.

C. Equipment and Devices:

1. Install all devices where shown on drawings. Provide all necessary conduit outlet boxes, junction boxes, supports, etc. Verify all required box sizes with the system supplier and coordinate with bending radius needs. All devices shall be modular for future moves and changes.

2. Install all equipment in specified 19 in. racks/cabinets leaving minimum 30 in. of access space on sides and back of rack and 36 in. in front of rack.

3. Provide all power outlets required for system operation but not shown on plans.

D. Raceways:

1. Minimum size raceway shall be 1 in.

2. Minimum backbox size for telecommunications outlet locations shall be two-gang with raised cover; no single-gang boxes allowed.

3. Provide no greater than 180° in bends or 100 linear feet without pull box in any raceway.

4. No flexible conduit raceways allowed unless explicitly approved by CIT.

E. Data Network Ground System:

1. Provide grounding system for all equipment rooms and telecommunication rooms as called for in Specification Section 260526.

3.2 TESTING

A. Copper Cable: System supplier shall channel test end-to-end each permanent link connection using latest 500 MHz for Cat 6A 1000 Mbps IEEE testing procedure. Tester must conform to the latest standards at the time of testing not time of bid and be Fluke DTX-5000 with latest software version, or approved equal. Testing shall be performed by a technician trained with the specific testing equipment.

B. Replace any cables and connectors that do not meet or exceed standards referenced and stated herein and then tested. Testing shall be end-to-end / port-to-port for each cable.

C. Test equipment shall be in good condition and working order, calibrated within one year of its use and utilize leads without twisting and kinks. Unit calibration shall be in accordance with Level III Field Tester per ANSI/TIA 1152.

D. A representative of the end-user will select a random sample of 5% of the installed links. The representative (or his authorized delegate) shall test these randomly selected links. The results obtained shall be compared to the data provided by the installation contractor. If more than 2% of the sample results differ in terms of the pass/fail determination, the

installation contractor under supervision of the end-user representative shall repeat 100% testing at no additional cost. Cables and connectors that do not pass shall be replaced and retested until acceptable results are obtained.

E. Test Reporting:

1. The field testing shall be accurately documented for submission, inclusion in O&M Manuals and for Owner future use.

2. Test reports shall include data directory table cross-referencing room numbers and cable numbers with the test report. Post copies of directory at telecommunications room location.

3. Report shall utilize electronic Windows based documenting with a hard and electronic copy provided to the Owner.

4. The report documentation for each cable test shall include the following as a minimum:

   a. Project name.

   b. Test equipment manufacturer and model number, and last calibration date.

   c. Date and time of the test.

   d. Patch panel identification.

   e. Cable identification.

   f. Cable type.

   g. Pass/Fail: Pass indicating meeting or exceeding the identified criteria or standard (whichever more stringent) for all parameters. Fail indicating test not meeting identified criteria for one or more parameters.

   h. Test pass criteria.

   i. Cable length.

   j. Propagation delay and attainable bandwidth.

   k. List of tested parameters with test and allowable values. Any failed parameters shall be noted or highlighted.

5. Test reports shall be submitted to Panduit for the horizontal cabling warranty.

END OF SECTION

SECTION 28 13 00

SECURITY AND ACCESS CONTROL SYSTEMS

PART 1 - GENERAL

1.1 SYSTEM DESCRIPTION

A. Card Access Systems

1. Wireless: Schlage AD400 – is comprised of an AD400 lockset, PIM400-1501 RSI wireless access point, LP-1501, communication wiring with power over Ethernet, and must be installed with an eight-cell battery pack. Every PIM must be installed with an external antenna. The series of AD400 installed must support a secure credential. Cornell IT policies must be adhered to when attaching devices to the University network.

1.2 SYSTEM OPERATION AND PERFORMANCE

A. System operation and performance shall include, but not be limited to, the following features:

1. Proper activation of door hardware when a valid credential is presented.

2. Appropriate shunting of the alarm upon exit from secured space.

3. Video signal being transmitted over IP.

4. Alarm initiation.

5. Trouble initiation.

6. Activation of alarm notification.

7. Activation of trouble notification.

8. Activation of fire safety functions.

9. Total supervision, monitoring of abnormal conditions in the system. 1

10. Activation of off-premise signals that are sent to the HDS via the Bosch Central Station (existing non-Access It! supported systems) or Ethernet (Access It! supported systems).

B. Activation of the fire alarm system shall cause the following:

1. Electric door hardware located on egress doors to lose power and allow egress/ingress where required by fire code.

2. Electrical door hardware mounted to a fire door must close and latch upon activation of the fire alarm system.

3. Delayed egress device must deactivate.

C. Activation of any security device producing an alarm or trouble shall cause, but not be limited to:

1. Transmission of the alarm or trouble signal to the Building ISC(s).

2. Transmission of the selected alarm or trouble signal to the Head-End Database Server (HDS).

3. Indication of the alarm or trouble condition at the computer monitor display at the CW, CPW, and HDS shall include the alarm or trouble description, time/date, building controller, device, input/output, priority code.

D. Activation of any card access device shall cause, but not be limited to:

1. Transmission of the data signal to the Building ISC(s) and HDS.

2. Indication of the data signal including the alarm or trouble description, time/date, building controller, device, input/output, card, and priority code by the computer monitor display at the CW and HDS.

E. Items C and D above define normal operations. In the event of a communication failure between an ISC and the HDS, these signals will be stored and forwarded to the HDS when the communication is restored.

1.3 CONTRACTOR REQUIREMENTS

A. The Contractor providing the security and access system shall be certified NICET Level II, and per Article 6d of the New York State General Business Law.

1.4 IDENTIFICATION

A. Provide lettered identification plates on the following equipment, components, and accessories (Note: Lettered identification plates shall be approved by Cornell University's Planning, Design and Construction Department prior to installation):

1. Building Intelligent System Controllers (ISCs);

2. Control Modules;

3. Interface Modules;

4. Remote Power Supplies.

B. Provide Lettered "Dyno 100" labels on system devices.

1. The label shall indicate the address and must be located on the device or adjacent to the device if this is not practical.

2. Cabling and devices terminating at the control equipment shall be appropriately labeled with the proper device number or device description. Terminal blocks that are active shall be labeled with their appropriate landing site on the terminal board.

C. Identification Plates and Labels shall be as follows:

1. DRIs shall be labeled DRI–UVWX, where U indicates its respective ISC numeral; and V is the ISC's respective buss, a value from 1 to 4; where WX are values from 01 to 32.

2. Devices shall be labeled UVWXYZ, where U indicates its respective ISC numeral; and V is the ISC's respective buss, a value from 1 to 4; WX indicates its respective panel, values from 01 to 32; Y indicates the input or output terminals, a value of 1 for input and 0 for output; and Z indicates its respective input or output terminal, a value from 1 to 4.

3. Examples:

a. DRI-2305 is the fifth Dual Reader Interface served from the third buss of the second Intelligent System Controller in the building.

b. Device #230503 is the device on the third output of the fifth panel served from the third buss of the second Intelligent System Controller in the building.

1.5 MISCELLANEOUS REQUIREMENTS

A. Equipment shall be mounted in a manner consistent with the ability to work around such equipment, and to perform the normal duties required in that area without coming into contact with the control equipment. Control equipment shall be mounted at a convenient height for future servicing.

B. Power transformers shall be mounted in such a way that shall prevent their disengaging, either by vibration, gravity, or an individual unplugging them.

C. Equipment enclosures shall have locking mechanisms that are left locked. Two keys shall be provided. One key shall be supplied to the Building's Coordinator, and the other key must be supplied to Cornell Campus Police.

1.6 WARRANTY

A. Cornell University Department of Planning, Design and Construction's (PDC) Sr. Electrical Engineer, and the Cornell Police shall approve security systems designs. Coordinate the approval process with the Department of Planning, Design and Construction's Project Manager on capital projects and the Sr. Electrical Engineer on non-capital projects.

B. A final test of the respective security and card access equipment and hardware shall be performed prior to considering the installation to be "complete." Cornell's Sr. Electrical Engineer and Campus Police shall be notified two weeks prior to the completion of the installation of a tentative testing date. On that date, a full system test will be performed according to these guidelines.

C. The Campus Police will give a pass or fail to the system after the test has been completed. When a portion of the system fails during the test, that portion, or the entire test will be tested again. The extent of the retest shall be up to the discretion of Cornell's Sr. Electrical Engineer and Campus Police.

D. Cornell's Planning, Design and Construction Department shall accomplish the initial setup programming prior to the installation. A completed "Installation Checklist" for the facility shall be delivered and accepted by Cornell University's Sr. Electrical Engineer prior to the installation of the system and the actual system programming.

E. Cornell University's building coordinator, for the building implementing the security and access measures, shall supply Cornell University's Sr. Electrical Engineer with the information pertaining to the population residing within, and the traffic patterns and times of operation therein.

F. A warranty shall be provided for labor/workmanship and on hardware included in the installation, for a period of one (1) full year from the date of completion.

PART 2 - PRODUCTS

2.1 CONDUIT, WIRE AND BOXES

A. Communication conductors shall be shielded twisted pairs; #22 AWG (minimum) stranded copper between the ISC and each downstream device. Manufactured by Belden, model #6541FE or equivalent.

B. Low-voltage power conductors shall be unshielded twisted pairs; #18 AWG (minimum) stranded copper between the power supplies and each downstream device. Manufactured by Belden, model #6342FE, or equivalent.

C. Security and Card Access circuits and wiring shall be installed in a separate and independent conduit system from other system circuits.

D. System wiring, circuits, and conductors shall be color coded and identified by number at termination points (i.e., control panels, remote annunciators, etc.) and splice points (i.e., junction boxes, splice boxes, etc.).

E. Junction and splice boxes containing card access system wiring, circuits, and conductors shall have black covers and marked "SECURITY" in ¾" (three-quarter inch) white letters.

2.2 POWER REQUIREMENTS

A. Provide 120VAC power to the system power supply locations. Where available, provide a dedicated emergency power circuit. This power supply shall be permanently labelled at all equipment it feeds.

B. Provide 12VDC power supply for card access boards, and 24VDC power for other devices (crash bar, door hardware). Negative Reference of these power supplies shall not be used as an earth ground

C. Power supplies for door hardware shall be located in the same enclosure as the RIM serving that door or in adjacent enclosures at the same secure location previously approved by ACP and FMOPS alarm techs.

D. Power supply characteristics must be per hardware manufacturer's specification.

E. Varying voltage supplies should be kept separate from each other.

F. Panel power supplies must be kept independent of all other components and should be connected to the power supply monitor on the panel where available.

G. Locking hardware should be directly wired to a distribution board; never a series.

H. Battery backup is required for all intrusion, video surveillance and card access systems must be replaced a minimum of every 3 years.

I. The Contractor shall provide power calculations, including load capability and maximum load per power supply, to Cornell Facilities Engineering during the submittal process and at the completion of the project.

J. Basis of Design:

1. LNL-OLSACTXP2

2.3 DOOR HARDWARE

A. Refer to Division 8 for responsibilities.

B. New door installations, opening hardware must conform to the current Americans with Disabilities Act guidelines; either lever set, flip paddle, panic paddle or crash bar hardware is acceptable.

C. Hinges on reverse beveled doors shall be non-removable pins (NRP).

2.4 ELECTRONIC LOCKING HARDWARE

A. Refer to Division 8 for responsibilities. Division 26 shall coordinate electrical requirements with Division 8 specifications and plans.

B. Use of magnetic locking hardware, electric strikes and standalone keypad locks is not permitted without obtaining an exemption from FM Operations Lock Shop Technician, CUPD Access Control and the Director of Risk Management.

C. Electronic hardware in the building shall use one standard voltage. Applications shall operate on 24VDC voltage. Deviations from this voltage are unacceptable without prior written consent by the University's FM Operations Fire/Alarms & Security Technician and FM Operations Lock Shop Technician. Existing electronic hardware that is not feasible to replace is an acceptable reason to deviate from this voltage. In applications where the latch bolt of the locking mechanism can be accessed from the outside of the door, a latch guard, or astragal, must be installed over the locking mechanism to prevent retraction of the latch bolt, allowing release of the door to an open condition.

D. Electronic locking hardware must be installed in a fail-secure configuration.

E. Delayed egress devices must release to an unlocked position on any fire alarm activation where required by local fire or building codes.

F. Fail-Safe operation will be permitted only in instances where dictated by local fire or building codes.

G. On fire rated doors, latch retraction mechanisms must release to latched position and magnetic door hold open devices must release upon receipt of a signal from the building fire alarm system.

H. For electric strike configurations, the strike must be installed in a flush-mounted configuration, properly adjusted to allow the anti-tamper mechanism on the lever set to be engaged. Surface-mount configuration will be allowed where warranted by the door configuration (i.e. concrete filled jamb) or by the hardware configuration (i.e. mechanical crash-bar).

2.5 INTELLIGENT SYSTEM CONTROLLERS (ISCs)

A. General

1. The project is responsible to pay the costs associated with providing the dedicated TCP/IP network connection to each ISC location. Request for data must be submitted by the end user or Project Manager at a minimum of two weeks prior to installation. Request should include project account number and monthly billing number. Access Control Program to provide VLAN information.

2. Use of existing or single Intelligent System Controller (ISC) is preferred. Multiple ISCs are acceptable when specifically requested by the customer or approved in design by the CUPD Access Control Project Management team.

3. The integrated system including equipment, components, and accessories shall be UL listed for the purpose for which the equipment, components, and accessories are used.

B. Enclosures

1. Enclosures shall be of the 22 ga. heavy-gauge, galvanized steel, dead-front construction with keyed, lockable panel cover type.

2. FM Operations Fire/Alarms & Security Group must approve panel locations. High Security installations shall have ISC's installed inside the high security space or be located in another secured location and have unique cabinet locks where the ACC is in possession of the keys.

3. All panels must have tamper switches on the enclosure wired to the cabinet tamper inputs on the controller board.

C. Intelligent System Controller Modules:

1. Host communications shall be direct wire TCP/IP, flash memory for real-time updates, with a minimum of 16MB onboard memory expandable to 64MB. The TCP/IP is over Ethernet at a minimum of 100mbps.

2. Supports up to eight different card formats, with issue code support for both Wiegand and magnetic formats.

3. Will support at least 64 readers or 32 downstream devices, and minimum 100,000 cardholders, 255 access levels, 255 Holidays with grouping, 255 time zones, each with 6 time intervals.

4. Alarm Masking, Individual shunt times, available 6-digit pin code.

5. Two dedicated inputs for tamper and power failure status.

6. Manufacturer: Access It! LP-2500, Access It! LP-1502 or Access It! LP-1501. (Use the Access It! LP-1501 only for Schlage AD400).

2.6 IDENTIFICATION

A. Provide lettered phenolic identification plates on the following equipment, components, and accessories as noted below:

1. Building Intelligent System Controllers (ISCs)

2. Control Modules

3. Interface Modules

4. Remote Power Supplies

5. Provide computer-generated adhesive labels on system devices (Brady, Dymo, P-Touch). The label shall indicate the address and must be located on the device or adjacent to the device if this is not practical.

B. Cabling and devices terminating at the control equipment shall be appropriately labeled with the proper device number or device description. Terminal blocks that are active shall be labeled with their appropriate landing site on the terminal board.

C. System Labeling and Identification

1. The description in the notes field of the Access It! access control system shall indicate the location of the ISC's, DRI's, power supplies, PIM's, SRI's, and Video devices and include the date of installation.

2. The location shall include the room number and geographic location in the room itself.

D. Identification Plates and Labels shall be as follows:

1. ISCs shall be labeled ISC–U, where U is a value from 1-9.

2. DRIs shall be labeled DRI–UVWX, where U indicates its respective ISC numeral; and V is the ISC's respective buss, a value from 1 to 4; where WX are values from 01 to 32.

3. Devices shall be labeled UVWXYZ, where U indicates its respective ISC numeral; and V is the ISC's respective buss, a value from 1 to 4; WX indicates its respective panel, values from 01 to 32; Y indicates the input or output terminals, a value of 1 for input and 0 for output; and Z indicates its respective input or output terminal, a value from 1 to 4.

4. Examples

   a. ISC-2 is the second Intelligent System Controller in the building.

   b. RIM-2305 is the fifth Dual Reader Interface served from the third buss of the second Intelligent System Controller in the building.

   c. Device #230503 is the device on the third output of the fifth panel served from the third buss of the second Intelligent System Controller in the building.

PART 3 - INSTALLATION

3.1 CABLE AND RACEWAY SYSTEMS

A. Provide communication system requirements for a fully operational card access system.

B. Installations shall be performed to the current code requirements.

C. Cables shall be routed in raceway systems. Free air, plenum rated cable is not acceptable.

D. Raceway systems shall be installed in a concealed manner; they shall be brought in above an accessible ceiling and fished inside the walls. Surface raceway systems are permitted where ceilings are inaccessible and walls cannot be fished.

E. Cabling shall be run in such a fashion so as to be kept at least 18" away from electric or data lines. In the event that a cable must cross over the path of an AC line, the cable must cross the path at a 90-degree angle to the AC line, thus keeping EMF interference to a minimum. Cabling must be kept at least 18" away from fluorescent lighting ballasts. Wiring installed in door frame components shall be installed to protect from damage and allow for future repairs or upgrades.

F. Cornell University Facilities Engineering (FE) must approve any deviations in wire, raceway systems, or raceway hardware.

G. Raceways shall be run from the field device to the head-end termination point in a professional manner, utilizing conduit, beam clamps, wire ties or other devices where necessary. In areas where the raceways are to be run above the drop ceiling, conduits shall be routed together where possible. Routing shall be in a workmanlike manner, with raceways mounted so as not to interfere with the servicing of other building infrastructure systems in the future. Electrical work shall conform to the latest local codes and the National Electric Code (NEC).

H. Specifications for Ethernet cabling:

1. All cable should comply with CIT cabling standards, be full copper and a minimum rating of CAT6A. CCA (Copper Clad Aluminum) cabling shall not be used.

2. All cabling should adhere to current NFPA and NEC requirements for power over Ethernet.

I. Communication conductors shall be shielded twisted pairs; a minimum 24 AWG./2- pair stranded copper between the ISC and each downstream device. Manufactured by Belden, model #9842 or equivalent.

J. Adequate conductors shall be provided to allow for all functions the equipment is capable of providing regardless of use at the time of installation.

K. Low-voltage power conductors shall be unshielded twisted pairs; a minimum 18 AWG./4-conductor stranded copper between the power supplies and each downstream device. Manufactured by Belden, model #9157, or equivalent.

L. System wiring, circuits, and conductors shall be identified by number at termination points (i.e., control panels, remote annunciators, etc.) and splice points (i.e., junction boxes, splice boxes, etc.).

M. Junction and splice boxes containing card access system wiring, circuits, and conductors shall have blue covers.

3.2 MOUNTING REQUIREMENTS

A. Equipment shall be mounted per manufacturer installation instructions and in a manner consistent with the ability to work around such equipment, and to perform the normal duties required in that area without coming into contact with the control equipment.

B. Control equipment shall be mounted at a convenient height for future servicing. Control equipment shall be mounted in such a way that shall prevent their disengaging, by either vibration, gravity, or an individual unplugging them.

C. Control equipment shall have at least 4 inches of clearance from any non-system component or structure, unless mounted adjacent to another access control panel.

D. Power transformers shall be mounted in such a way that shall prevent their disengaging, by either vibration, gravity, or an individual unplugging them.

E. Existing Equipment shall not be connected to, modified, or otherwise tied into without approval from FMOPS Alarm Techs prior to installation start.

3.3 SYSTEM PROGRAMMING – CARD ACCESS

A. Cornell's Access Control Program (ACP) will perform the initial setup programming prior to the installation.

1. Facilities Fire Alarms & Security Technician or a Access It!-certified installer will perform all required wiring and terminations on the board prior to ACP configuration.

2. ACP will perform initial setup programming to include:

a. ISC configuration and labeling.

b. Device hardening.

c. User/Password configuration

d. Creation of the device instance in the access control software.

e. Creation or modification of the Emergency Response access level using the following naming convention (EMERGENCY RESPONSE – Segment Name).

3. Facilities Fire Alarms & Security Technician or a Access It!-certified installer will:

a. RIM (reader interface module) configuration and labeling.

b. Initial test Time Zones and Access Levels.

c. Initially name devices: Facility Name, Room number, Room purpose, compass direction of installation, Interior or Exterior

B. The building/unit access control coordinator (ACC), for the building implementing the security and access measures, shall supply CUPD Access Control Project manager with the information pertaining to the desired theory of operations for the space including population residing within, and the traffic patterns and times of operation therein.

If it is determined that the authorized ACC's are failing to comply with policies or misusing the system, their privileges may be revoked.

C. The security system installer is responsible for initial alarm programming and commissioning for intrusion devices with approval and collaboration of Cornell Police Telecommunications and CUPD Crime Prevention.

3.4 TESTING, COMMISSIONING AND ACCEPTANCE

A. A final test of the respective security and card access equipment and hardware shall be performed prior to considering the installation "complete". In the case of a new building or renovation, this shall be done prior to building occupation.

B. As-Builts shall be provided to FMOPS Alarm Group prior to commissioning

C. Installation's project and/or construction manager shall schedule a systems commissioning with the Access Control Project Management team, Security Contractor/Installer, and Electrical contractor, preferable to have the actual installing employee on site if possible, when applicable, two weeks prior to the completion of the installation of a tentative testing date. On that date, a full system test will be performed according to these guidelines.

D. The CUPD Access Control Project Management team will give a commissioning report to the project manager after the test has been completed. When a portion of the system fails during the test, that portion, or the entire system will be tested again. The extent of the retest shall be up to the discretion of Access Control Project Manager.

E. If occupation occurs prior to Access Control commissioning, the Cornell Project Manager is responsible for obtaining CUPD approval and building occupants must be notified of potential security risks (by flier, email via the Unit/College department).

3.5 WARRANTY

A. A warranty shall be provided for labor/workmanship and on hardware included in the installation, for a period of one (1) full year from the date of completion.

3.6 PROJECT CLOSE OUT

A. At completion of the project, the Contractor shall provide the Cornell Project Manager with a complete set of security system "As-Built" drawings that includes, but is not limited to, the following information prior to the closeout of the project.
The project manager will ensure these documents are delivered to Facilities Inventory Group for archiving.

1. Head end equipment location and interface panel locations.

2. Power supply locations.

3. Battery calculations.

4. Device locations.

5. Circuit breaker locations: Include power panel and circuit numbers.

6. Complete system riser diagram that depicts all wiring, components, and interconnections. Include locations and labeling

END OF SECTION