

MYRON TAYLOR JANE FOSTER ELEVATOR MODERNIZATION 2026

Project Manual & Specifications

May 15, 2026

Owner

**Cornell University
Ithaca, New York 14853**

Architect

**Peterson Guadagnolo Consulting Engineers PC
476 East Brighton Avenue
Syracuse, New York 13210**

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END OF DOCUMENT

INSTRUCTIONS TO BIDDERS

Project: Myron Taylor Jane Foster Elevator Modernization 2026

Owner: Cornell University
Ithaca, New York 14853

Architect: Peterson Guadagnolo Consulting Engineers PC
476 East Brighton Avenue
Syracuse, New York 13210

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 10:00AM, July 1, 2026, in Room 102C of Humphreys Service Building or via Zoom at:

<https://cornell.zoom.us/j/99113274857?pwd=TbhtKVCKxxgLIJJRA7CE7fzNa6gkd7.1&from=addon>

A Pre-bid walkthrough will follow and will meet at: G26 Hughes Hall; 241 Campus 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 **2:00PM on July 21, 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 sixty (60) 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 five (5) calendar days from the date of issuance of written authorization to proceed and shall achieve substantial completion of the project no later than January 14, 2027.
 - 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

**MYRON TAYLOR JANE FOSTER
ELEVATOR MODERNIZATION 2026**

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 May 15, 2026, as prepared by Peterson Guadagnolo Consulting Engineers PC, 476 East Brighton Avenue, Syracuse, New York 13210, 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 five (5) calendar days after date of issuance of written notice to proceed and to achieve substantial completion of the project no later than January 14, 2027.
- 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 ____.

Addendum No. ___ dated ____.

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 sixty (60) 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: _____

GENERAL CONDITIONS

FOR

**MYRON TAYLOR JANE FOSTER
ELEVATOR MODERNIZATION 2026**

**CORNELL UNIVERSITY
ITHACA, NEW YORK**

GENERAL CONDITIONS

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		Construction Contract Change Order Request
		Construction Contract Change Order Summary
B		Final Release
C		Guarantee
D	Form I	MWBE Utilization Plan
	Form II	Summary of Bid Activity with MBE and WBE Subcontractors and Vendors
	Form III	Workforce Report
E		Labor Rate Breakdown
F		Stored Materials Invoicing Documentation
G		Contractor Performance Evaluation

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:

<u>COMBINED SINGLE LIMIT</u>	
\$ 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.

1. 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.

2. 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.
3. 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.A.3
- 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 \$5,000,000 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 (Tami Norman) 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.

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**

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**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

Corporation or Business Name_____
Day of _____ 20__

By: _____

Title: _____

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GUARANTEE

Date: _____

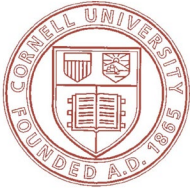
In accordance with plans and specifications and the terms and conditions of our contract with Cornell University dated _____, we hereby guarantee the _____ as found in the specifications for _____, Ithaca, New York to be free
(Project Title)
from defects in materials and workmanship for the period of ____ 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 <i>(List your firm if also MBE or WBE)</i>	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:

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.

General Contractor, Subcontractor, Sub-Subcontractor, or Vendor	Trade	Dollar Value of SubContract or Purchase Order	MBE, WBE, or N/A	% of Total Contract
TOTALS		0		0

**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:		Award Status		Date of Elimination
		Date	Amount	Date	Amount	

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

OFFICER OF FIRM:
Name and Title:

Signature:

Date:

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		Hours Male	Hours Female	Male	Female	Male	Female
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MONTHLY PROJECT TOTALS		0	0	0	0	0	0	0	0	0	0	0	#DIV/0!	0	0	0	0		

NOTE: The Prime Contractor shall provide a single monthly report inclusive of all subcontractor information for the project.

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

* Bodily 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:

CONTRACTOR:

SUBCONTRACTOR:

CONTRACT NO.

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.

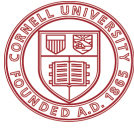
4 Transfer of Title

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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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 complete 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-Built's, 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

**MYRON TAYLOR JANE FOSTER
ELEVATOR MODERNIZATION 2026**

**CORNELL UNIVERSITY
ITHACA, NEW YORK**

MAY 15, 2026

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1.7	OBSTACLES, INTERFERENCE AND COORDINATION.....	4
1.8	EQUIPMENT ARRANGEMENTS.....	4
1.9	EXISTING EQUIPMENT, MATERIALS, FIXTURES, ETC.	5
1.10	EXAMINATION OF PREMISES, DRAWINGS, ETC.....	5
1.11	STAND DOWN DATES	7
1.12	WORKING HOURS.....	8
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1.0	GENERAL.....	1
1.1	RELATED DOCUMENTS	1
1.2	SUMMARY	1
1.3	SELECTION AND PURCHASE	1
1.4	SUBMITTALS	2
1.5	COORDINATION.....	2
1.6	LUMP SUM AND UNIT PRICE ALLOWANCES.....	2
1.7	ADJUSTMENT OF ALLOWANCES.....	3
2.0	PRODUCTS – NOT USED	3
3.0	EXECUTION	3
3.1	EXAMINATION	3
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1.2	DEFINITIONS.....	1
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1.4	PRODUCTS LIST	2
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1.6	PROCEDURES.....	3
1.7	EQUIVALENTS – APPROVED EQUAL	3
1.8	CONTRACTOR'S OPTIONS.....	4
1.9	SUBSTITUTIONS.....	6
1.10	COMPARABLE PRODUCTS	7
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1.12	ARCHITECT'S DUTIES	8
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1.4	PRE-INSTALLATION MEETING(S).....	4
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1.0	GENERAL.....	1
1.1	DESCRIPTION.....	1
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3.0	EXECUTION	1
3.1	EXISTING CONDITION PHOTOGRAPHS.....	1
3.2	PROGRESS PHOTOGRAPHS	1
3.3	FINAL COMPLETION PHOTOGRAPHS	1
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1.0	GENERAL.....	1
1.1	DESCRIPTION.....	1
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1.5	SAMPLES AND MOCK-UPS	4
1.6	QUALITY ASSURANCE AND QUALITY CONTROL SUBMITTALS.....	5
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1.10	RECORD SUBMITTALS	11
1.11	RESUBMISSION REQUIREMENTS	11
1.12	ARCHITECT'S DUTIES	12
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1.1	DESCRIPTION	1
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1.4	ASBESTOS	3
1.5	LEAD	3
1.6	SITE VISITS	3
1.7	CONFINED SPACE	4
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3.0	EXECUTION – NOT USED	4
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1.1	DESCRIPTION	1
1.2	RELATED SECTIONS	1
1.3	SUBMITTALS	1
1.4	JOB SITE ADMINISTRATION	1
1.5	CLEARING, SITE PREPARATION AND SITE USE	2
1.6	SPOIL AND BORROW	2
1.7	NOISE AND VIBRATION	3
1.8	DUST CONTROL	3
1.9	PROTECTION OF THE ENVIRONMENT	3
1.10	TEMPORARY RE-ROUTING OF PIPING AND DUCTWORK	4
1.11	HAZARDOUS OR TOXIC MATERIALS	4
1.12	DISPOSAL OF WASTE MATERIAL AND TITLE	5
2.0	PRODUCTS – NOT USED	5
3.0	EXECUTION – NOT USED	5
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1.1	SPILL PREVENTION	1
1.2	SPILL CONTROL PROCEDURES	1
1.3	SPILL REPORTING AND DOCUMENTATION	4
2.0	PRODUCTS – NOT USED	5
3.0	EXECUTION – NOT USED	5

SECTION 01 41 00	REGULATORY REQUIREMENTS	1
1.0	GENERAL	1
1.1	PERMITS AND LICENSES	1
1.2	INSPECTIONS	1
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1.4	OWNER'S REQUIREMENTS	2
2.0	PRODUCTS – NOT USED	2
3.0	EXECUTION – NOT USED	2
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1.1	INTENT OF CONTRACT DOCUMENTS	1
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1.4	OWNER AGREEMENTS	4
1.5	INDUSTRY STANDARDS	4
1.6	ABBREVIATIONS AND ACRONYMS	5
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1.3	CONTROL OF OFF-SITE OPERATIONS	2
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1.5	OWNER'S REPRESENTATIVE	3
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3.0	EXECUTION – NOT USED	3
SECTION 01 45 29	TESTING LABORATORY SERVICES	1
1.0	GENERAL	1
1.1	DESCRIPTION	1
1.2	QUALIFICATIONS OF LABORATORY	1
1.3	LABORATORY DUTIES	2
1.4	LIMITATIONS OF AUTHORITY OF TESTING LABORATORY	3
1.5	CONTRACTOR'S RESPONSIBILITIES	3
2.0	PRODUCTS – NOT USED	3
3.0	EXECUTION – NOT USED	3

SECTION 01 45 33	CODE	REQUIRED	SPECIAL	INSPECTIONS	AND	
		PROCEDURES				1
1.0	GENERAL					1
1.1	REQUIREMENTS					1
1.2	DEFINITIONS					1
1.3	QUALIFICATIONS					2
1.4	SUBMITTALS					2
1.5	PAYMENT					2
1.6	OWNER RESPONSIBILITIES					2
1.7	CONTRACTOR RESPONSIBILITIES					2
1.8	LIMITS ON AUTHORITY					3
2.0	INSPECTIONS AND TESTING					3
3.0	DOCUMENTATION					4
3.1	RECORDS AND REPORTS					4
3.2	COMMUNICATION					4
3.3	DISTRIBUTION OF REPORTS					4
3.4	FINAL REPORT OF SPECIAL INSPECTIONS					5
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1.1	DESCRIPTION					1
1.2	REQUIREMENTS OF REGULATORY AGENCIES					1
2.0	PRODUCTS					1
2.1	MATERIALS, GENERAL					1
2.2	TEMPORARY FIRST AID FACILITIES					1
2.3	TEMPORARY FIRE PROTECTION					2
2.4	CONSTRUCTION AIDS					4
2.5	SUPPORTS					4
2.6	TEMPORARY ENCLOSURES					4
2.7	TEMPORARY WATER CONTROL					5
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2.9	PERSONNEL, PUBLIC AND EMPLOYEE PROTECTION					9
2.10	ACCESS ROADS AND PARKING AREAS					9
2.11	PROJECT IDENTIFICATION AND SIGNS					9
2.12	SECURITY					9
2.13	FIELD OFFICES					9
3.0	EXECUTION					10
3.1	PREPARATION					10
3.2	GENERAL					10
3.3	REMOVAL					10

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1.0	GENERAL.....	1
1.1	DESCRIPTION.....	1
1.2	REQUIREMENTS OF REGULATORY AGENCIES.....	1
2.0	PRODUCTS.....	1
2.1	MATERIALS, GENERAL	1
2.2	TEMPORARY ELECTRICITY, LIGHTING AND WATER	1
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2.4	TEMPORARY HEAT AND VENTILATION.....	3
2.5	TEMPORARY CONTRACTOR TELEPHONE SERVICE	4
2.6	TEMPORARY SANITARY FACILITIES	4
3.0	EXECUTION	4
3.1	REMOVAL	4
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1.0	GENERAL.....	1
1.1	DESCRIPTION.....	1
1.2	RESPONSIBILITY.....	1
2.0	PRODUCTS – NOT USED	1
3.0	EXECUTION – NOT USED	1
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1.0	GENERAL.....	1
1.1	DESCRIPTION.....	1
1.2	SUBMITTALS	1
1.3	PLAN AND IMPLEMENTATION GENERAL REQUIREMENTS	1
1.4	PERFORMANCE STANDARDS	2
1.5	EROSION AND SEDIMENT CONTROL PLAN COMPONENTS	2
1.6	INSPECTIONS	3
2.0	PRODUCTS – NOT USED	3
3.0	EXECUTION – NOT USED	3

SECTION 01 66 00	STORAGE AND PROTECTION	1
1.0	GENERAL.....	1
1.1	DESCRIPTION.....	1
1.2	TRANSPORTATION AND HANDLING	1
1.3	ON-SITE STORAGE.....	1
1.4	CAMPUS SITE / BOOKBANK DRIVE STORAGE	2
1.5	PROTECTION.....	3
1.6	PROTECTION AFTER INSTALLATION	4
2.0	PRODUCTS – NOT USED	5
3.0	EXECUTION – NOT USED	5
SECTION 01 73 29	CUTTING, PATCHING AND REPAIRING.....	1
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1.1	DESCRIPTION.....	1
1.2	SUBMITTALS	2
1.3	QUALITY ASSURANCE	2
1.4	WARRANTIES	4
2.0	PRODUCTS.....	4
2.1	MATERIALS.....	4
3.0	EXECUTION	5
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3.2	PREPARATION	5
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3.4	CLEANING	7
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2.0	PRODUCTS – NOT USED	4
3.0	EXECUTION – NOT USED	4
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3.0	EXECUTION – NOT USED	2

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1.1	DESCRIPTION.....	1
1.2	FORM OF SUBMITTALS	1
1.3	CONTENT OF MANUAL	2
1.4	MANUAL FOR MATERIALS AND FINISHES	3
1.5	MANUAL FOR EQUIPMENT AND SYSTEMS	4
1.6	SUBMITTAL REQUIREMENTS.....	6
1.7	INSTRUCTIONS OF OWNER'S PERSONNEL.....	6
1.8	OPERATING INSTRUCTIONS	7
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3.0	EXECUTION – NOT USED	7
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1.1	DESCRIPTION.....	1
1.2	SUMMARY	1
1.3	DEFINITIONS.....	1
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1.5	WARRANTY REQUIREMENTS.....	2
1.6	SUBMITTAL REQUIREMENTS.....	3
1.7	SUBMITTALS REQUIRED	4
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1.2	MAINTENANCE OF DOCUMENTS AND SAMPLES.....	1
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1.4	SUBMITTAL.....	6
2.0	PRODUCTS – NOT USED	6
3.0	EXECUTION – NOT USED	6

SECTION 01 11 00 SUMMARY OF WORK

1.0 GENERAL

1.1 DESCRIPTION

A. Work to be Done

This project will update the Myron Taylor Jane Foster Hall elevator systems that are past their effective life.

1. Remove and discard the existing elevator controller, tank/pump units, hydraulic cylinders, hoistway limit switches and wiring, travelers, car and hall fixtures, door operators, and elevator interior finishes, then replace with new.
2. New elevators shall be provided with required Phase 1 recall and Phase 2 firefighter service.

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 reseeded, 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.
- L. Parking may be made available for staging at Bookbank Drive or other pre-determined area for the duration of the project. The Contractor will be responsible for fencing, securing and maintaining the designated area. All vehicles at Bookbank Drive, or other predetermined areas, must be registered with Transportation Services.

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 be 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 (Tami Norman) 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.

3. All work is to be conducted in such a manner as to cause a minimum degree of interference with the Campus' operation and academic schedule. Prior to the commencement of each phase, submit Shutdown / Demo action plans that clearly describe the steps required to safely shut down utilities, systems and infrastructure that are within the work area (or effecting the work area); and those outside the work area and within approximately 25 feet of the work area limits, as approved by the Owner. The Shutdown / Demo action plan shall identify the shut off point(s) for each utility, system and infrastructure as well as the secondary shut off point(s) to account if the primary points fail or are otherwise inaccessible. To identify shutoff points, trace each utility, system and infrastructure in the presence of the campus representative from the work area to the shutoff points and place clear label on same indicating what the shutoff point is and what it effects and whether it is the primary or secondary shut off. The Shutdown / Demo action plan shall describe the shutdown procedure, identify tools and material required for shutdown, sequence of activities required for proper shutdown, the name of the person(s) or trade(s) deemed competent to perform each activity in the shutdown sequence and names and telephone numbers of the campus staff required to provide access to shut off points, assist in the shut off or perform portions of the shutdown activities. Additionally, the plan will address the Contractor's plan for maintaining MEP to adjacent occupied areas, inclusive of planned tie-in points for any and all necessary, temporary infrastructure, alarming, monitoring etc. Submit the Shutdown / Demo action plan for review and approval at least two weeks prior to fieldwork in the work area. Fieldwork shall not begin until the Shutdown / Demo action plan is reviewed. Contractor is to assign and include a competent crew, knowledgeable of each unique system involved (i.e. Mechanic, Electrician, Sheet metal, Plumber, Controls, IT, etc.). Field investigation is to include any and all necessary ladders, scaffold, temp lighting, cutting tools, photos, labels, PPE, etc. needed to properly locate, access and label shut off points. The University is explicitly requesting heightened awareness and an earnest mitigation of impact. This requirement supplements all other contractual obligations, and requires the dedication of *no less than* an aggregate 40 hours.

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. **Stand-Down Dates** (No construction work and no deliveries on site):

- a. Commencement Weekend
 - Friday, May 28, 2027
 - Saturday, May 29, 2027
 - Sunday, May 30, 2027
- b. Reunion Weekend
 - Thursday, June 10, 2027
 - Friday, June 11, 2027
 - Saturday, June 12, 2027
 - Sunday, June 13, 2027

2. **Restricted Work Dates** (delivery & demolition restrictions but otherwise work as usual):

Friday, May 28, 2027	Commencement weekend- deliveries and work outside fence stop at noon
Thursday, Friday June 10-11, 2027	Reunion guest arrivals- no work outside fence; no demo or utility work inside fence
Friday, June 10, 2027	Reunion weekend- deliveries and work outside fence stop at noon

3. **Student and Campus Life**

Residence Halls Open –

August 17, 2026

- ❖ No deliveries, no hauling materials into or out of the project site.
- ❖ All work to be contained to the fenced area of the project site.

4. **Courses Study Time & Final Exams:** * See below. While future dates are unknown at this point, the Contractor shall assume these general timeframes for the duration of the project.

- December 4, 2026 – December 6, 2026 – Study Period
- December 7, 2026 – December 18, 2026 – Finals
- April 29, 2027 – April 30, 2027 – Study Period
- May 3, 2027 – May 14, 2027 - Finals

* Contractor shall assume that the “Study Time and Final Exam” periods are accurate for the University, but that the Owner has specific exam times falling within these periods. Contractor should assume 80 hours wherein a no noise restriction applies to be used at the discretion of the Owner, but falling within the “Study Time and Final Exam” Periods noted above. Specifically, this means that absolutely no construction noise may be transmitted by virtue of this project to the lecture halls, tutorial rooms, classrooms, library, etc. during the to-be-determined 80 hour period. The Owner will provide information relative to the specific times and locations no less than two weeks in advance of scheduled exams at the Contractor’s request. The 80 hours are to be included with no right to claim for additional cost or time or delays to construction schedule.

1.12 WORKING HOURS

- A. Normal work hours are **6AM-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 21 00 ALLOWANCES

1.0 GENERAL

1.1 RELATED DOCUMENTS

- A. This Section describes Allowances to be carried in the Base Bid by the Contractor.
- B. Drawings and general provisions of the Contract, including General Conditions and other Division 01 Specification Sections, apply to this Section.
- C. The Specification Section containing the pertinent requirements of materials and methods to achieve the Work described herein. Selected materials and equipment are specified in the Contract Documents by allowances.

1.2 SUMMARY

- A. Definition: An allowance is an amount determined by the Owner or calculated by the Contractor based on given quantities and stated on the Bid Proposal Submission Form.
- B. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to the Contractor. Items covered by these allowances shall be supplied for such amounts and by such persons as the Owner may direct. All uses of the allowances will require the prior written approval of the Owner via a Field Change Authorization.
- C. Types of Allowances may include:
 - 1. Lump Sum Allowance
 - 2. Unit Price Allowance

1.3 SELECTION AND PURCHASE

- A. At the earliest practical date after award of the Contract, advise the Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work. The Contractor shall provide the Owner fourteen (14) calendar days minimum notification of date.
- B. At the Owner's request, the Contractor shall obtain proposals for each allowance for use in making final selections. The Contractor shall include recommendations that are relevant to performing the Work.
- C. The Contractor shall purchase products and systems selected by the Architect and Owner from the designated supplier.

1.4 SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.
- B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- C. Submit time sheets and other documentation to show labor hours and cost for installation of allowance items that include installation as part of the allowance.
- D. Coordinate and process submittals for allowance items in the same manner as for other portions of the Work.

1.5 COORDINATION

- A. Coordinate related work and modify or adjust adjacent work as necessary to ensure that Work affected by each accepted allowance is complete and fully integrated into the Project.
- B. The Contractor shall include the dollar value of each scheduled allowance number as a separate line item in the Schedule of Values and identify each allowance with Section number 01 21 00.
- C. The Owner shall provide the Contractor with a Field Change Authorization prior to proceeding with the Work of an allowance.

1.6 LUMP SUM AND UNIT PRICE ALLOWANCES

- A. Allowances shall include cost to the Contractor of specific products and materials ordered by the Owner or selected by the Architect under allowance and shall include applicable taxes, freight, and delivery to the Project site.
- B. Included as part of each allowance are miscellaneous devices, accessory objects or similar items incidental to or required for a complete installation whether or not mentioned as part of the allowance.
- C. Unless otherwise indicated, Contractor's cost for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by the Owner or selected by the Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.
- D. Unused Materials: Return unused materials purchased under an allowance to the manufacturer or supplier for credit to the Owner, after installation has been completed and accepted.
 - 1. If requested by the Owner, retain and prepare unused materials for storage by the Owner. Deliver unused material to Owner's storage space as directed.

1.7 ADJUSTMENT OF ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts and scope of work, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
 - 1. Include installation costs in purchase amount only where indicated as part of the allowance.
 - 2. Prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
 - 3. Submit substantiation of a change in scope of work, if any, claimed in Change Order related to unit-cost allowance.
 - 4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, or overhead and profit. Submit claims in accordance with General Conditions, Article 4, Section 4.02 - Claims for Extra Work – Changes in Work within twenty-one (21) days of receipt of Field Change Authorization authorizing Work to proceed. The Owner will reject claims submitted later than twenty-one (21) days after such authorization.
 - 1. Do not include Contractor's or Subcontractor's indirect expenses in the Change Order cost amount unless it is clearly shown that the nature or extent of Work has changed from what could have been foreseen from information in the Contract Documents.
 - 2. No change to Contractor's indirect expenses is permitted for selection of higher or lower priced materials or systems of the same scope and nature as originally indicated.

2.0 PRODUCTS – NOT USED

3.0 EXECUTION

3.1 EXAMINATION

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

- A. Allowance No. 1

Allowance: Include the sum of fifty thousand dollars (**\$50,000**) for the work of remediation of cylinder well hole and re-drilling of cylinder well hole, if necessary. The Contractor shall submit itemized billing with backup for all activities that will be charged against the allowance.

*****END OF SECTION 01 21 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
- 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. Subcontractors as appropriate to the agenda
 6. Suppliers as appropriate to the agenda
 7. 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
 - 7. Post-Construction or Post-Renovation Asbestos survey, reference Section 01 35 29.
 - 8. Owner audio/visual
 - 9. Owner furnishings and fixed equipment
- 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 COORDINATION DRAWINGS

- A. The Contractor shall coordinate and manage the preparation and submittal of coordinated layouts of the mechanical, electrical and fire protection systems and equipment for all areas; drawn at a scale not less than 1/4" per foot showing on both plan and elevation including but not limited to all equipment, ducts, pipe sleeves, piping including plumbing and, sprinkler system, lighting, special supports and other items contained within the space. Show mechanical and electrical services as well as architectural and structural features drawn to scale. Provide electronic record of each coordination drawing submitted in TIFF and PDF formats to the Owner. Provide coordination drawings for all corridors, laboratories, offices, mechanical rooms, boiler room, shafts, tunnels, and all congested areas. Copies of coordination drawings shall be distributed to all trades to assure a complete, coordinated installation of work within the space available.
- B. Submittal and review of coordination drawings will be required thirty (30) days prior to commencement of fabrication and/or installation of any work item.
- C. Prepare and submit coordinated layouts of the mechanical and electrical systems and equipment for all areas; drawn at a scale not less than 3/8 inch = 1 foot (1:32) showing on both plan and elevation including but not limited to all equipment, ducts, pipe sleeves, piping including plumbing and, sprinkler system, lighting, special supports and other items contained within the space. Show mechanical and electrical services as well as architectural and structural features drawn to scale. Provide copies of each coordination drawing submitted. Provide coordination drawings for all spaces, including but not limited to, corridors, laboratories, offices, mechanical rooms, boiler room, shafts, tunnels, and other areas. Copies of coordination drawings shall be distributed to all trades to assure a complete, coordinated installation of work within the space available.
 - 1. Show architectural, structural and other adjacent work requiring coordination with services. Show items, including but not limited to, access doors, ceiling grids, ceiling construction, structural decks and framing, fixtures, devices, and other adjacent work coordinated with services and architectural layouts shown on Drawings.
 - 2. Prepare plans, sections, elevations, and details as needed to describe relationship of various systems and components. Supplement plan drawings with section drawings where required to adequately represent the Work.
 - 3. Include room names and numbers of each space.
 - 4. Coordinate the addition of trade-specific information to the coordination drawings by multiple entities in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
 - 5. Contract drawings are diagrammatic. Exact location of receptacles, light fixtures, exit signs, fire alarm devices, and other devices shall be coordinated with the Architectural Drawings and shall not be scaled from locations indicated on the Mechanical and Electrical Drawings. Coordinate modifications in layout as necessary to complete the Work in accordance with the design intent.
 - 6. Coordinate modifications in layout and components necessary to ensure maintenance accessibility and prevent conflict between each portion of the Work.

7. Maintain maximum headroom at all locations. Unless indicated otherwise, all mechanical and electrical systems and associated components are to be installed as tight to underside of structure as possible.
8. Indicate functional and spatial relationships of components of architectural, structural, mechanical, plumbing, fire protection, electrical systems, communications systems, security systems, and other portions of the Work. Drawings shall indicate dimensions, to avoid interference with existing conditions, structural frame, ceilings, partitions, services, and other portions of the Work. Where conflicts occur with placement of materials of various portions of the Work, Contractor shall be responsible to resolve conflicts and coordinate the available space to accommodate each portion of the Work. Adjustments resulting from coordination shall be initialed and dated by the entity(s) affected by the adjustments.
9. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
10. Show location and size of access doors and access panels required for access to concealed dampers, valves, and other controls.
11. Indicate required installation sequences.
12. Indicate dimensions, elevations, and alignments shown on the Drawings. Specifically note dimensions, elevations, and alignments that appear to be in conflict with submitted equipment and minimum clearance requirements and notify Architect. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
13. Indicate suspended ceiling heights and show locations of visible ceiling-mounted devices relative to acoustical ceiling grid.
14. Indicate locations of fire-rated partitions, smoke partitions, and other required barriers.
15. Plenum Space: Indicate sub-framing for support of ceiling and wall systems, mechanical and electrical equipment, toilet partitions, overhead-mounted equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components and notify Architect.
16. Exposed Ceiling Construction: In addition to other indicated information, show fully-dimensioned locations of all items exposed at ceiling space. Indicate alignment requirements and centerline locations of light fixtures, ducts, piping, conduit, and other services. Show dashed outline locations of laboratory casework, shelving, and other items that extend 7 feet or more above the floor.
17. Mechanical and Electrical Rooms: Provide coordination drawings for mechanical and electrical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment. Indicate paths of egress from rooms. Indicate paths for equipment removal from rooms. Indicate clear areas required for access and maintenance.

18. Structural Penetrations: Indicate scheduled and requested penetrations and openings required for all disciplines. Request un-scheduled penetrations and openings where Contractor has reviewed, analyzed, and coordinated all possible routing options and structural penetrations are only feasible option to accommodate indicated ceiling heights. Refer to the drawings for general guidelines and request confirmation by Architect for structural penetrations.
 19. Mechanical and Plumbing Work: Show dimensioned locations, sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, accessories, and support systems. Show locations of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
 20. Electrical Work: Show electrical distribution, systems, equipment, and runs of vertical and horizontal conduit 1-1/4 inches (32 mm) in diameter and larger. Show light fixture, exit light, emergency battery pack, smoke detector, fire alarm, and other device locations. Show panel board, switch board, switchgear, transformer, bus way, generator, and motor control center locations. Show location of pull boxes and junction boxes, dimensioned from column center lines. Show lighting control systems. Show cable tray layouts including vertical and horizontal offsets and transitions, clearances for access above and to side of cable trays, and vertical elevation of cable trays above the floor or bottom of ceiling structure.
 21. Fire Suppression System: Show locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
 22. Refer to individual Sections for additional Coordination Drawing requirements for work in those Sections.
 23. Contractor Sign-Off: Contractor and each entity performing portions of the Work shall sign and date coordination drawings.
 24. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit. Review of coordination drawings shall not reduce Contractor's responsibility for final coordination of installation and maintenance clearances of systems and equipment with existing conditions and each portion of the Work.
- D. Submittal and review of coordination drawings will be required before work can start in any given area of the building.

1.8 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 Contract 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.

1.9 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.

1.10 RECORD SUBMITTALS

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

1.11 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.

1.12 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.

1.13 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. AWP's 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*****

Cornell University Limited Pre-Renovation Asbestos Survey Report

Performed for the
Myron Taylor Jane Foster (2021A)
Elevator Modernization 2026
Cornell University Ithaca, New York Campus



Prepared for:
Mr. Chad Loomis, PE - Principal
Peterson Guadagnolo Consulting Engineers PC
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Prepared by:

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www.delta-eas.com
Delta Project No. 2026.210.001
PGPC Project No. 950001

Field work performed by: Thomas Ferro, May 6th, 2026

Report prepared by: Thomas Ferro

Report reviewed by: Stephen Prislupsky

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1.0 INTRODUCTION:

Delta Engineers, Architects, Land Surveyors, & Landscape Architects, DPC (Delta) was contracted by Peterson Guadagnolo Consulting Engineers PC to perform a Pre-Renovation Asbestos Survey at the Myron Taylor Jane Foster Addition (Building 2021A) located on the Cornell University Ithaca, New York Campus. This survey is being performed in support of the upcoming Elevator Modernization 2026 Project. This Survey addressed accessible suspect building materials present in the project renovation areas.

The initial stage of the survey included a review of existing sample information for the building from previous sampling efforts by Delta and other Cornell Consultants. Bulk sample results through previous sampling efforts have been incorporated into this Survey and associated Survey Report where applicable.

On May 6th, 2026, Delta NYS DOL Asbestos Certified Inspector Thomas Ferro met with the Cornell Project Manager Tami Norman and conducted a walkthrough of the renovation areas to identify the various accessible suspect materials present. Based on a visual inspection of the affected areas / associated accessible suspect materials, along with a review of the 90% Construction Drawing Set dated April 3, 2026, and a review existing sample information for the building, a total of twenty-nine (29) bulk samples were collected representing thirteen (13) separate suspect homogenous building materials. Fourteen (14) of the samples collected were non-friable organically bound (NOB) representing seven (7) homogenous materials. The remaining fifteen (15) samples collected were friable Non- NOB's representing six (6) homogenous materials.

The accessible suspect homogenous building materials identified and sampled in the affected project renovation areas included the following:

Homogenous

Area (HA)	Suspect Building Material
01	Top Coat Wall Plaster
02	Base Coat Wall Plaster
03	Single Coat Wall Plaster
04	Ceiling System Sheetrock
05	Ceiling System Joint Compound
06	Gray 12" x 12" Floor Tile
07	Mastic from Gray 12" x 12" Floor Tile
08	Mastic from non-suspect 6" Vinyl Cove Base
09	1' x 2' Hole-Pattern Ceiling Tile
10	Tar Coating on Concrete Walls
11	Gray Epoxy Flooring
12	Grout / Mudset from 1' x 2' Stone Wall Tile
13	Elevator Cab Carpet Mastic

Specific information required by 12 NYCRR Part 56-5.1, (f) – “Building/Structure Asbestos Survey Information” to be included in this pre-renovation report is as follows:

- 1) Building Name/Address: Myron Taylor Jane Foster Addition (Building 2021A)
514 College Avenue
Cornell University Ithaca Campus
City of Ithaca, NY 14853
- 2) Owner's Name/Address: Cornell University
Humphreys Service Building
Ithaca, NY 14853
- 3) Owner's Agent: Mr. Chad Loomis
Peterson Guadagnolo Consulting Engineers PC
- 4) Survey Performed By: Delta Engineers, Architects, & Surveyors
860 Hooper Road
Endwell, NY 13760
- 5) Certified Inspectors: Thomas Ferro, Certificate No. 26-6IU5N-SHAB
- 6) Date of Survey: May 6th, 2026
- 7) Laboratory: America Science Team New York, Inc.
117 East 30th Street, New York, NY 10016

2.0 ASBESTOS SURVEY AND SAMPLING PROCEDURES AND METHODS:

2.1 Survey requirements

Requirements to perform Pre-Demolition/Pre-Renovation Asbestos Surveys are based on the following State and Federal Regulations.

Occupational Safety and Health Administration (OSHA): OSHA survey requirements and sampling protocols are included in 29 CFR Part 1910.1001(j)(2) & (j)(8) and 29 CFR Part 1926.1101(k),(5):

29 CFR Part 1910.1001(j)(2), Installed Asbestos Containing Material: Employers and building owners are required to treat installed TSI and sprayed on and troweled-on surfacing materials as ACM in buildings constructed no later than 1980 for purposes of this standard. These materials are designated "presumed ACM or PACM", and are defined in paragraph (b) of this section. Asphalt and vinyl flooring material installed no later than 1980 also must be treated as asbestos-containing. The employer or building owner may demonstrate that PACM and flooring material do not contain asbestos by complying with paragraph (j)(8)(iii) of this section.

29 CFR Part 1910.1001(j)(8), Criteria to rebut the designation of installed material as PACM:

1910.1001(j)(8)(i) - At any time, an employer and/or building owner may demonstrate, for purposes of this standard, that PACM does not contain asbestos. Building owners and/or employers are not required to communicate information about the presence of building material for which such a demonstration pursuant to the requirements of paragraph (j)(8)(ii) of this section has been made. However, in all such cases, the information, data and analysis supporting the determination that PACM does not contain asbestos, shall be retained pursuant to paragraph (m) of this section.

1910.1001(j)(8)(ii) - An employer or owner may demonstrate that PACM does not contain asbestos by the following:

1910.1001(j)(8)(ii)(A) - Having a completed inspection conducted pursuant to the requirements of AHERA (40 CFR 763, Subpart E) which demonstrates that no ACM is present in the material; or

1910.1001(j)(8)(ii)(B) - Performing tests of the material containing PACM which demonstrate that no ACM is present in the material. Such tests shall include analysis of bulk samples collected in the manner described in 40 CFR 763.86. The tests, evaluation and sample collection shall be conducted by an accredited inspector or by a CIH. Analysis of samples shall be performed by persons or laboratories with proficiency demonstrated by current successful participation in a nationally recognized testing program such as the National Voluntary Laboratory Accreditation Program (NVLAP) or the National Institute for Standards and Technology (NIST) or the Round Robin for bulk samples administered by the American Industrial Hygiene Association (AIHA) or an equivalent nationally-recognized round robin testing program.

1910.1001(j)(8)(iii) - The employer and/or building owner may demonstrate that flooring material including associated mastic and backing does not contain asbestos, by a determination of an industrial hygienist based upon recognized analytical techniques showing that the material is not ACM.

29 CFR Part 1926.1101(k)(5), Criteria to rebut the designation of installed material as PACM:

1926.1101(k)(5)(i) - At any time, an employer and/or building owner may demonstrate, for purposes of this standard, that PACM does not contain asbestos. Building owners and/or employers are not required to communicate information about the presence of building material for which such a demonstration pursuant to the requirements of paragraph (k)(5)(ii) of this section has been made. However, in all such cases, the information, data and analysis supporting the determination that PACM does not contain asbestos, shall be retained pursuant to paragraph (n) of this section.

1926.1101(k)(5)(ii) - An employer or owner may demonstrate that PACM does not contain more than 1 percent asbestos by the following:

1926.1101(k)(5)(ii)(A) - Having a completed inspection conducted pursuant to the requirements of AHERA (40 CFR Part 763, Subpart E) which demonstrates that the material is not ACM; or

1926.1101(k)(5)(ii)(B) - Performing tests of the material containing PACM which demonstrate that no ACM is present in the material. Such tests shall include analysis of bulk samples collected in the manner described in 40 CFR 763.86. The tests, evaluation and sample collection shall be conducted by an accredited inspector or by a CIH. Analysis of samples shall be performed by persons or laboratories with proficiency demonstrated by current successful participation in a nationally recognized testing program such as the National Voluntary Laboratory Accreditation Program (NVLAP) or the National Institute for Standards and Technology (NIST) or the Round Robin for bulk samples administered by the American Industrial Hygiene Association (AIHA) or an equivalent nationally-recognized round robin testing program.

1926.1101(k)(5)(iii) - The employer and/or building owner may demonstrate that flooring material including associated mastic and backing does not contain asbestos, by a determination of an industrial hygienist based upon recognized analytical techniques showing that the material is not ACM.

EPA National Emissions Standard for Hazardous Air Pollutants (NESHAPs): (NESHAPs) regulates asbestos under “40 CFR Part 61, Subpart M - National Emission Standard for Asbestos”. Subpart M regulates demolition and/or renovation of “facilities” that may contain asbestos-containing materials (ACMs). “Facilities,” as defined by NESHAPs, includes any institutional, commercial, public, industrial, or residential structure or building, *except* residential buildings having four or fewer units. ACMs are defined in NESHAPs as materials containing more than 1 percent asbestos. Section 61.145 states:

61.145 Standard for demolition and renovation.

(a) Applicability. To determine which requirements of paragraphs (a), (b), and (c) of this section apply to the owner or operator of a demolition or renovation activity and prior to the commencement of the demolition or renovation, thoroughly inspect the affected facility or part of the facility where the demolition or renovation operation will occur for the presence of asbestos, including Category I and Category II nonfriable ACM.

It should be noted that 40 CFR Part 1 Subpart M, NESHAPS has no cut-off date exempting survey requirements.

New York State Department of Labor (NYS DOL): Guidelines followed for the inspection are those established by the NYS DOL’s Industrial Code Rule 56 (Cited as 12 NYCRR Part 56, as amended, adopted January 11, 2006; effective September 5, 2006). The specific survey, sampling and reporting requirements included in 12 NYCRR Part 56-5.1(e) – “Building/Structure Asbestos Survey Requirements” include:

56-5.1 Asbestos Survey Requirements for Building/Structure Demolition, Renovation, Remodeling and Repair

(a) Asbestos Survey Required. An owner or an owner’s agent, except the owner of one and two-family dwellings who contracts for, but does not direct or control the work, shall cause to be conducted, an asbestos survey completed by a licensed asbestos contractor using inspectors certified in compliance with Section 56-3.2(d), to determine whether or not the building or structure, or portion(s) thereof to be demolished, renovated, remodeled, or have repair work, contains ACM, PACM or asbestos material. This asbestos survey shall be completed and submitted as indicated in Subdivision (g) of this Section, prior to commencing work. All such asbestos surveys shall be conducted in conformance with the requirements of Subdivision (e) of this Section.

(b) **Exemptions to Asbestos Survey Requirements:** The asbestos survey required by this Subdivision (a) of this Section shall not be required for the following classes of buildings or structures:

- (1) An agricultural building;
- (2) Buildings or structures for which original construction commenced on or after January 1, 1974;
- (3) A structure certified in writing to be structurally unsound by a licensed Professional Engineer, Registered Architect, Building Inspector, Fire Inspector or other official of competent jurisdiction. (See Section 56-11.5)

(c) **Building/Structure Demolition.** If a building/structure asbestos survey is not required or performed per Subdivision (b) of this Section, and the building/structure is certified to be unsound or slated for contracted demolition, the building/structure shall be assumed to contain asbestos, and shall be demolished per this Part, unless the building/structure is adequately certified to be free of asbestos containing material. Acceptable documentation for certification shall be a previous thorough building/structure asbestos survey, abatement records or other documentation acceptable to the Commissioner or his or her representative.

(d) **Responsibility to Comply.** No exemption to the requirement to conduct an asbestos survey shall exempt any person, asbestos contractor, property owner or business entity from the inspection or asbestos survey requirements of EPA, OSHA, and any other applicable section of this Part.

(e) **Building/Structure Asbestos Survey Requirements.** The asbestos survey shall include a thorough inspection for and identification of all PACM, suspect miscellaneous ACM, or asbestos material throughout the building/structure or portion thereof to be demolished, renovated, remodeled, or to have repair work. The required inspection shall be performed by a certified asbestos inspector, and, at a minimum, shall include identification of PACM, suspect miscellaneous ACM or asbestos material by all of the following methods:

- (1) The review of building/structure plans and records, if available, for references to asbestos, ACM, PACM, suspect miscellaneous ACM or asbestos material used in construction, renovation or repair; and
- (2) A visual inspection for PACM and suspect miscellaneous ACM throughout the building/structure or portion thereof to be demolished, renovated, remodeled, or repaired. For the purpose of this Part, all PACM and suspect miscellaneous ACM visually assessed shall be treated and handled as ACM and shall be assumed to be ACM, unless bulk sampling is conducted as per this Section, standard EPA and OSHA accepted methods, including multi-layered systems sampling protocols; the subsequent analyses are performed by a laboratory that meets the requirements of Section 56-4.2 of this Part; and the analyses satisfies both ELAP and federal requirements, including multi-layered sample analyses, to document non-asbestos containing material.

(f) **Building/Structure Asbestos Survey Information.**

(1) The asbestos survey shall, at a minimum, identify and assess with due diligence, the locations, quantities, friability and conditions of all types of installations at the affected portion of the building/structure relative to the ACM, suspect miscellaneous ACM, PACM or asbestos material contained therein. The following list is not inclusive of all types of ACMs, it only summarizes typical

ACMs. The certified asbestos inspector is responsible for identification and assessment of all types ACM, PACM, suspect miscellaneous ACM and asbestos material within the affected portion of the building/structure:

PACM

(i) Surfacing Treatments:

- (a) Fireproofing;
- (b) Acoustical Plaster;
- (c) Finish Plasters; and
- (d) Skim Coats of Joint Compound.

(ii) Thermal System Insulation:

- (a) Equipment Insulation;
- (b) Boiler, Breeching, Boiler Rope, Duct, or Tank Insulation, Cement or Mortar Used for Boilers and Refractory Brick;
- (c) Piping and Fitting Insulations including but not limited to, Wrapped Paper, Aircell, Millboard, Rope, Cork, Preformed Plaster, Job Molded Plaster and coverings over fibrous glass insulation.

SUSPECT MISCELLANEOUS ACM

(i) Roofing and Siding Miscellaneous Materials:

- (a) Insulation Board;
- (b) Vapor Barriers;
- (c) Coatings;
- (d) Non-Metallic or Non-Wood Roof Decking
- (e) Felts;
- (f) Cementitious Board (Transite);
- (g) Flashing;
- (h) Shingles; and
- (i) Galbestos.

(ii) Other Miscellaneous Materials:

- (a) Dust and Debris;
- (b) Floor Tile;
- (c) Cove Base;
- (d) Floor Leveler Compound;
- (e) Ceiling Tile;
- (f) Vermiculite Insulation
- (g) Gaskets, Seals, Sealants (including for condensate control);
- (h) Vibration Isolators;
- (i) Laboratory Tables and Hoods;
- (j) Chalkboards;
- (k) Pipe Penetration Packing or Other Firestopping Materials
- (l) Cementitious Board;
- (m) Electrical Wire Insulation;
- (n) Fire Curtains;
- (o) Fire Blankets;
- (p) Fire Doors;
- (q) Brakes and Clutches;
- (r) Mastics, Adhesives and Glues;

- (s) Caulks;
- (t) Sheet Flooring (Linoleum);
- (u) Wallpaper;
- (v) Drywall;
- (w) Plasterboard
- (x) Spackling/Joint Compound;
- (y) Textured Paint;
- (z) Grout;
- (aa) Glazing Compound; and
- (ab) Terrazzo.

(2) All ACM, PACM, suspect miscellaneous ACM, or asbestos material reported under Paragraph (1) of this Subdivision shall include the location of the materials, an estimate of the quantities, types, friability and condition of the identified materials to be treated and handled as ACM. For the purpose of this Part, all PACM and suspect miscellaneous ACM visually assessed shall be treated and handled as ACM and shall be assumed to be ACM, unless bulk sampling is conducted as per this Section, standard EPA and OSHA accepted methods, including multilayered systems sampling protocols; the subsequent analyses are performed by a laboratory that meets the requirements of Section 56-4.2 of this Part; and the analyses satisfies both ELAP and federal requirements, including multi-layered sample analyses, to document non-asbestos containing material.

(3) The building/structure asbestos survey shall also include the building/structure name, address, the building/structure owner's name and address, the name and address of the owner's agent, the name of the firm performing the asbestos survey and a copy of the firm's current asbestos handling license, the names of the certified inspector(s) performing the survey and a copy of the current asbestos handling certificate for each inspector utilized, the dates of the asbestos survey, a listing of homogeneous areas identifying which ones are ACM, all laboratory analyses reports for bulk samples collected, and copies of the appropriate certifications for the laboratory used for analysis of samples taken during the asbestos survey.

(g) Transmittal of Building/Structure Asbestos Survey Information. One (1) copy of the results of the building/structure asbestos survey shall be immediately transmitted by the building/structure owner as follows:

- (1) One (1) copy of the completed asbestos survey shall be sent by the owner or their agent to the local government entity charged with issuing a permit for such demolition, renovation, remodeling or repair work under applicable State or local laws.
- (2) The completed asbestos survey for controlled demolition (as per Subpart 56-11.5) or pre-demolition asbestos projects shall also be submitted to the appropriate Asbestos Control Bureau district office.
- (3) The completed asbestos survey shall be kept on the construction site with the asbestos notification and variance, if required, throughout the duration of the asbestos project and any associated demolition, renovation, remodeling or repair project.

(h) Removal Required. If the building/structure asbestos survey finds that the portion of the building/structure to be demolished, renovated, remodeled, or have repair work contains ACM,

PACM, suspect miscellaneous ACM assumed to be ACM, or asbestos material, which is impacted by the work, the owner or the owner's agent shall conduct, or cause to have conducted, asbestos removal performed by a licensed asbestos abatement contractor in conformance with all standards set forth in this Part. All ACM, PACM, suspect miscellaneous ACM assumed to be ACM, or asbestos material impacted by the demolition, renovation, remodeling or repair project shall be removed as per this Part, prior to access or disturbance by other uncertified trades or personnel. No demolition, renovation, remodeling or repair work shall be commenced by any owner or the owner's agent prior to the completion of the asbestos abatement in accordance with the notification requirements of this Part. For multi-phased work, the access restriction for uncertified trades or personnel applies to each intermediate portion of the entire project. Upon completion of the intermediate portion of the asbestos project, other trades or personnel may access that portion of the work site.

For demolition projects that are exempt from asbestos survey requirements due to being structurally unsound, the demolition is considered an asbestos project and shall proceed as per Section 56-11.5.

(1) All building/structure owners and asbestos abatement contractors on a demolition, renovation, remodeling, or repair project, which includes work covered by this Part, shall inform all trades on the work site about PACM, ACM, asbestos material and suspect miscellaneous ACM assumed to be ACM at the work site.

(i) **Bidding.** Bids may be advertised and contracts awarded for demolition, remodeling, renovation, or repair work, but no work on the current intermediate portion of the project shall commence on the demolition, renovation, remodeling or repair work by any owner or agent prior to completion of all necessary asbestos abatement work for the current intermediate portion of the entire project, in conformance with all standards set forth in this Part.

(j) **Unidentified and Unassessed Asbestos.** When any construction activity, such as demolition, remodeling, renovation or repair work, reveals PACM or suspect miscellaneous ACM that has not been identified by the asbestos survey per this Part, or has not been identified by other inspections as per current OSHA or EPA requirements, all activities shall cease in the area where the PACM or suspect miscellaneous ACM is found and the Asbestos Control Bureau shall be notified by telephone by the building/structure owner or their representative, followed with a written notice in accordance with the notification requirements of this Part. Unassessed PACM or suspect miscellaneous ACM shall be treated and handled as ACM and assumed to be ACM, unless proven otherwise by standard EPA and OSHA accepted methods, including multi-layered systems sampling protocols; subsequent analyses performed by a laboratory that meets the requirements of Section 56-4.2 of this Part; and the analyses satisfies both NYS ELAP and federal requirements, including multi-layered sample analyses, to document non-asbestos containing material.

2.2 Sample Analysis

Bulk sample analysis was performed by American Science Team New York Inc., an independent laboratory approved/accredited by the NYS Department of Health (ELAP), the American Industrial Hygiene Association (AIHA), and the National Voluntary Laboratory Accreditation Program (NVLAP).

Samples collected during the course of this survey fell into one of two categories. The first category includes non-friable organically bound (NOB) materials. These materials are those which have an organic binder in their matrix and include items such as floor tiles, sheet flooring, mastics, glazings, caulks and roofing materials. The second category includes non-NOB “friable” materials including parging, sheetrock, joint compound, wall insulations, and wallboard.

Analysis of all “NOB” materials was initially performed by Polarized Light Microscopy (PLM) following the New York State Department of Health ELAP 198.6 Gravimetric Reduction Methodology. If a given sample was reported as non-asbestos following this analysis, it was then analyzed by Transmission Electron Microscopy (TEM) following the NYS DOH ELAP 198.4 Methodology.

Analysis of all “non-NOB” materials was performed by Polarized Light Microscopy (PLM) following the EPA 600/M4/82/020 and the NYS DOH ELAP 198.1 Methodologies.

2.3 Materials not sampled

There were several materials present at the site which were not considered “suspect” by the inspector and were not sampled. These included various fiberglass, foam, vinyl, silicone, wood/cellulose products and concrete/cinder block/brick components. All countertop and tabletops were observed to be non-suspect. The fume hood was non-suspect stainless steel. No mastics were observed on the countertops or tabletops. All shelving and wall standards were observed to be mechanically fastened. All wiring was observed to be non-suspect vinyl wire wrap.

3.0 SURVEY FINDINGS AND CONCLUSIONS

3.1) Myron Taylor Jane Foster Elevator Modernization 2026 Project Pre-Renovation Asbestos Survey, Non-Asbestos Materials – Based on results reported for samples collected during this Survey of accessible suspect materials present in the Myron Taylor Jane Foster Elevator Modernization 2026 Project Renovation Areas, the following were identified as non-asbestos:

Homogenous

Area (HA)	Non-Asbestos Material
01	Top Coat Wall Plaster
02	Base Coat Wall Plaster
03	Single Coat Wall Plaster
04	Ceiling System Sheetrock
05	Ceiling System Joint Compound
06	Gray 12" x 12" Floor Tile
07	Mastic from Gray 12" x 12" Floor Tile
08	Mastic from non-suspect 6" Vinyl Cove Base
09	1' x 2' Hole-Pattern Ceiling Tile
10	Tar Coating on Concrete Walls
11	Gray Epoxy Flooring
12	Grout / Mudset from 1' x 2' Stone Wall Tile
13	Elevator Cab Carpet Mastic

3.2) Myron Taylor Jane Foster Elevator Modernization 2026 Project Pre-Renovation Asbestos Survey, Asbestos Containing Materials – Based on results reported for samples collected during this Survey of accessible suspect materials present in the Myron Taylor Jane Foster Elevator Modernization 2026 Project Renovation Areas, **None** were identified as being **Asbestos-Containing**:

3.3) Myron Taylor Jane Foster Elevator Modernization 2026 Project Pre-Renovation Asbestos Survey, Non-Suspect Materials: Non-suspect materials observed to be present within the Myron Taylor Jane Foster Elevator Modernization 2026 Project Renovation Areas included the following:

- All accessible piping was observed to either un-insulated or covered with non-suspect fiberglass / foam.
- All ductwork was observed to be either un-insulated or covered with non-suspect fiberglass.
- All accessible electrical wiring & elevator control wiring was observed to be non-suspect vinyl coated.
- Vinyl Cove Base.
- All non-suspect elevator wall panels were observed to be mechanically fastened.

- No suspect core materials were observed to be present in the elevator cab and Hoistway doors.
- No suspect core materials were observed to be present in the room man-doors.
- No spray-on fireproofing was observed to be present in the elevator shaft.

4.0 INACCESSIBLE AREAS

Renovation spaces and areas which were visible and accessible were inspected and sampled as a part of this survey. Inaccessible areas such as wall chases/interstitial wall space, hard ceiling plenum spaces, and enclosed pipe chases could not be inspected without select demolition. Based on the fact that the building was occupied at the time of the survey, the inaccessible areas were not included as a part of this survey. Any materials encountered in those areas not accessible shall be assumed ACM until tested.

As stated above, this survey was limited to only those spaces / areas and associated accessible suspect materials present in the Myron Taylor Jane Foster Elevator Modernization 2026 Project Renovation Areas.

APPENDIX A

Asbestos Bulk Sample Report Form

Client: Peterson Guadagnolo Consulting Engineers PC	PGPC Project No.: 950001	Delta Proj. No.: 2026.210.001
Project: Cornell Myron Taylor Jane Foster Elevator Modernization 2026 Project Pre-Renovation Asbestos Survey	Date Sampling Performed: 05/06/2026	Asbestos Inspector: Thomas Ferro
	Date of Report: 05/13/2026	Number of Samples Collected: 29
	Laboratory: AmeriSci Labs	No. of Samples Analyzed: PLM - 29 / TEM - 14

Asbestos Bulk Sample Report Form

Sample Number	HA*	Floor	Bulk Sample Description / Details	Material Type	Asbestos Type	PLM Result % Asbestos	TEM Result % Asbestos
2026.210.001 - 01A	01	Bsmt	Top Coat Plaster, Wall, Room L0068	Surfacing	ND	ND	NA
2026.210.001 - 01B	01	Bsmt	Top Coat Plaster, Wall, Room L0068	Surfacing	ND	ND	NA
2026.210.001 - 02A	01	Bsmt	Base Coat Plaster, Wall, Room L0068	Surfacing	ND	ND	NA
2026.210.001 - 02B	01	Bsmt	Base Coat Plaster, Wall, Room L0068	Surfacing	ND	ND	NA
2026.210.001 - 02C	01	Bsmt	Base Coat Plaster, Wall, Room L0068	Surfacing	ND	ND	NA
2026.210.001 - 03A	01	1	Single Coat Plaster, Wall, 10045 @ Call Buttons	Surfacing	ND	ND	NA
2026.210.001 - 03B	02	2	Single Coat Plaster, Wall, 20045 @ Call Buttons	Surfacing	ND	ND	NA
2026.210.001 - 03C	02	3	Single Coat Plaster, Wall, 30045 @ Call Buttons	Surfacing	ND	ND	NA
2026.210.001 - 04A	02	Bsmt	Sheetrock, Ceiling, Room L0066	Miscellaneous	ND	ND	NA
2026.210.001 - 04B	02	Bsmt	Sheetrock, Wall, Room L0068	Miscellaneous	ND	ND	NA
2026.210.001 - 05A	02	Bsmt	Joint Compound, Ceiling, Room L0066	Miscellaneous	ND	ND	NA
2026.210.001 - 05B	02	Bsmt	Joint Compound, Wall, Room L0068	Miscellaneous	ND	ND	NA
2026.210.001 - 06A	02	Bsmt	Grey 12" x 12" Floor Tile, Room L0068	Miscellaneous	ND	ND	ND

Client: Peterson Guadagnolo Consulting Engineers PC	PGPC Project No.: 950001	Delta Proj. No.: 2026.210.001
Project: Cornell Myron Taylor Jane Foster Elevator Modernization 2026 Project Pre-Renovation Asbestos Survey	Date Sampling Performed: 05/06/2026 Date of Report: 05/13/2026 Laboratory: AmeriSci Labs	Asbestos Inspector: Thomas Ferro Number of Samples Collected: 29 No. of Samples Analyzed: PLM - 29 / TEM - 14

Asbestos Bulk Sample Report Form

Sample Number	HA*	Floor	Bulk Sample Description / Details	Material Type	Asbestos Type	PLM Result % Asbestos	TEM Result % Asbestos
2026.210.001 - 06B	03	Bsmt	Grey 12" x 12" Floor Tile, Room L0068	Miscellaneous	ND	ND	ND
2026.210.001 - 07A	03	Bsmt	Mastic from HA 06A	Miscellaneous	ND	ND	ND
2026.210.001 - 07B	03	Bsmt	Mastic from HA 06B	Miscellaneous	ND	ND	ND
2026.210.001 - 08A	03	Bsmt	Mastic from 6" Black Cove Base, Room L0068	Miscellaneous	ND	ND	ND
2026.210.001 - 08B	03	Bsmt	Mastic from 6" Black Cove Base, Room L0068	Miscellaneous	ND	ND	ND
2026.210.001 - 09A	03	Bsmt	2' x 2' Holed Ceiling Tile, Room L0068	Miscellaneous	ND	ND	ND
2026.210.001 - 09B	03	Bsmt	2' x 2' Holed Ceiling Tile, Room L0068	Miscellaneous	ND	ND	ND
2026.210.001 - 10A	04	Bsmt	Tar Coating, Wall, Room 10066	Miscellaneous	ND	ND	ND
2026.210.001 - 10B	04	Bsmt	Tar Coating, Wall, Room 10066	Miscellaneous	ND	ND	ND
2026.210.001 - 11A	04	Bsmt	Grey Epoxy, Floor, Room 10066	Miscellaneous	ND	ND	ND
2026.210.001 - 11B	04	Bsmt	Grey Epoxy, Floor, Room 10066	Miscellaneous	ND	ND	ND
2026.210.001 - 12A	04	Grd.	Grout / Mud Set from 1' x 2' Stone Wall Tiles @ G0045 Call Buttons	Miscellaneous	ND	ND	NA
2026.210.001 - 12B	04	Grd.	Grout / Mud Set from 1' x 2' Stone Wall Tiles @ G0045 Call Buttons	Miscellaneous	ND	ND	NA

Client: Peterson Guadagnolo Consulting Engineers PC	PGPC Project No.: 950001	Delta Proj. No.: 2026.210.001
Project: Cornell Myron Taylor Jane Foster Elevator Modernization 2026 Project Pre-Renovation Asbestos Survey	Date Sampling Performed: 05/06/2026	Asbestos Inspector: Thomas Ferro
	Date of Report: 05/13/2026	Number of Samples Collected: 29
	Laboratory: AmeriSci Labs	No. of Samples Analyzed: PLM - 29 / TEM - 14

Asbestos Bulk Sample Report Form

Sample Number	HA*	Floor	Bulk Sample Description / Details	Material Type	Asbestos Type	PLM Result % Asbestos	TEM Result % Asbestos
2026.210.001 - 13A	04	Cab	Carpet Mastic from Elevator Cab	Miscellaneous	ND	ND	ND
2026.210.001 - 13B	05	Cab	Carpet Mastic from Elevator Cab	Miscellaneous	ND	ND	ND

HA - Homogenous Area **ND** - No Asbestos Detected **NA** - Not Analyzed by Methodology **NA/PS** - Not Analyzed, Positive Stop
TSI - Thermal System Insulation **Misc** - Miscellaneous Material **Trace / < 1%** - Non-asbestos by definition

APPENDIX B

Laboratory Analytical Results

**AmeriSci New York**

117 EAST 30TH ST.
NEW YORK, NY 10016
TEL: (212) 679-8600 • FAX: (212) 679-3114

PLM Bulk Asbestos Report

Delta Engineers
Attn: Stephen Prislupsky
860 Hooper Road

Endwell, NY 13760

Date Received 5/8/2026 **AmeriSci Job #** 226051652
Date Examined 05/09/26 **P.O. #**
ELAP # 11480 **Page** 1 **of** 5
RE: 2026.210.001; Peterson Guadagnolo Engineers PC; Myron Talor
Jane Foster Addition Elevator Modernization Project Asbestos Survey

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos	Notes
2026.210.001-01A 01 Location: Bsmt - Top Coat Plaster, Wall, Room L0068 Analyst Description: White, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%	226051652-01	No	NAD (by NYS ELAP 198.1) by Khaalid W. Perine on 05/09/26	
2026.210.001-01B 01 Location: Bsmt - Top Coat Plaster, Wall, Room L0068 Analyst Description: White, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%	226051652-02	No	NAD (by NYS ELAP 198.1) by Khaalid W. Perine on 05/09/26	
2026.210.001-01C 01 Location: Bsmt - Top Coat Plaster, Wall, Room L0068 Analyst Description: White, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%	226051652-03	No	NAD (by NYS ELAP 198.1) by Khaalid W. Perine on 05/09/26	
2026.210.001-02A 02 Location: Bsmt - Base Coat Plaster, Wall, Room L0068 Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%	226051652-04	No	NAD (by NYS ELAP 198.1) by Khaalid W. Perine on 05/09/26	
2026.210.001-02B 02 Location: Bsmt - Base Coat Plaster, Wall, Room L0068 Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%	226051652-05	No	NAD (by NYS ELAP 198.1) by Khaalid W. Perine on 05/09/26	
2026.210.001-02C 02 Location: Bsmt - Base Coat Plaster, Wall, Room L0068 Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%	226051652-06	No	NAD (by NYS ELAP 198.1) by Khaalid W. Perine on 05/09/26	

See Reporting notes on last page

Client Name: Delta Engineers

PLM Bulk Asbestos Report

2026.210.001; Peterson Guadagnolo Engineers PC; Myron Talor
Jane Foster Addition Elevator Modernization Project Asbestos Survey

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos	Notes
2026.210.001-03A 03 Location: 1st Fl. - Single Coat Plaster, Wall, 10045 @ Call Buttons Analyst Description: White, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%	226051652-07	No	NAD (by NYS ELAP 198.1) by Khaalid W. Perine on 05/09/26	
2026.210.001-03B 03 Location: 2nd Fl. - Single Coat Plaster, Wall, 20045 @ Call Buttons Analyst Description: White, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%	226051652-08	No	NAD (by NYS ELAP 198.1) by Khaalid W. Perine on 05/09/26	
2026.210.001-03C 03 Location: 3rd Fl. - Single Coat Plaster, Wall, 30045 @ Call Buttons Analyst Description: White, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%	226051652-09	No	NAD (by NYS ELAP 198.1) by Khaalid W. Perine on 05/09/26	
2026.210.001-04A 04 Location: Bsmt - Sheetrock, Ceiling, Room L0066 Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose Trace, Fibrous glass 10%, Non-fibrous 90%	226051652-10	No	NAD (by NYS ELAP 198.1) by Khaalid W. Perine on 05/09/26	
2026.210.001-04B 04 Location: Bsmt - Sheetrock, Wall, Room L0068 Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose Trace, Fibrous glass 10%, Non-fibrous 90%	226051652-11	No	NAD (by NYS ELAP 198.1) by Khaalid W. Perine on 05/09/26	
2026.210.001-05A 05 Location: Bsmt - Joint Compound, Ceiling, Room L0066 Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%	226051652-12	No	NAD (by NYS ELAP 198.1) by Khaalid W. Perine on 05/09/26	
2026.210.001-05B 05 Location: Bsmt - Joint Compound, Wall, Room L0068 Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%	226051652-13	No	NAD (by NYS ELAP 198.1) by Khaalid W. Perine on 05/09/26	

Client Name: Delta Engineers

PLM Bulk Asbestos Report

2026.210.001; Peterson Guadagnolo Engineers PC; Myron Talor
Jane Foster Addition Elevator Modernization Project Asbestos Survey

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos	Notes
2026.210.001-06A 06 Location: Bsmt - Grey 12"x12" Floor Tile, Room L0068 Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 44%	226051652-14	No	Inconclusive - NAD (NOB by NYS ELAP 198.6) by Khaalid W. Perine on 05/09/26	1
2026.210.001-06B 06 Location: Bsmt - Grey 12"x12" Floor Tile, Room L0068 Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 45%	226051652-15	No	Inconclusive - NAD (NOB by NYS ELAP 198.6) by Khaalid W. Perine on 05/09/26	1
2026.210.001-07A 07 Location: Bsmt - Mastic From HA 06A Analyst Description: Yellow, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 33%	226051652-16	No	Inconclusive - NAD (NOB by NYS ELAP 198.6) by Khaalid W. Perine on 05/09/26	1
2026.210.001-07B 07 Location: Bsmt - Mastic From HA 06B Analyst Description: Yellow, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 36%	226051652-17	No	Inconclusive - NAD (NOB by NYS ELAP 198.6) by Khaalid W. Perine on 05/09/26	1
2026.210.001-08A 08 Location: Bsmt - Mastic From 6" Black Cove Base, Room L0068 Analyst Description: Cream, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 25%	226051652-18	No	Inconclusive - NAD (NOB by NYS ELAP 198.6) by Khaalid W. Perine on 05/09/26	1
2026.210.001-08B 08 Location: Bsmt - Mastic From 6" Black Cove Base, Room L0068 Analyst Description: Cream, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 20%	226051652-19	No	Inconclusive - NAD (NOB by NYS ELAP 198.6) by Khaalid W. Perine on 05/09/26	1
2026.210.001-09A 09 Location: Bsmt - 2'x2' Holed Ceiling Tile, Room L0068 Analyst Description: White/Beige, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 68%	226051652-20	No	Inconclusive - NAD (NOB by NYS ELAP 198.6) by Khaalid W. Perine on 05/09/26	1

Client Name: Delta Engineers

PLM Bulk Asbestos Report

2026.210.001; Peterson Guadagnolo Engineers PC; Myron Talor
Jane Foster Addition Elevator Modernization Project Asbestos Survey

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos	Notes
2026.210.001-09B 09 Location: Bsmt - 2'x2' Holed Ceiling Tile, Room L0068 Analyst Description: White/Beige, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 80%	226051652-21	No	Inconclusive - NAD (NOB by NYS ELAP 198.6) by Khaalid W. Perine on 05/09/26	1
2026.210.001-10A 10 Location: Bsmt - Tar Coating, Wall, Room 10066 Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 1.7%	226051652-22	No	Inconclusive - NAD (NOB by NYS ELAP 198.6) by Khaalid W. Perine on 05/09/26	1
2026.210.001-10B 10 Location: Bsmt - Tar Coating, Wall, Room 10066 Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 0.9%	226051652-23	No	Inconclusive - NAD (NOB by NYS ELAP 198.6) by Khaalid W. Perine on 05/09/26	1
2026.210.001-11A 11 Location: Bsmt - Grey Epoxy, Floor, Room 10066 Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 18%	226051652-24	No	Inconclusive - NAD (NOB by NYS ELAP 198.6) by Khaalid W. Perine on 05/09/26	1
2026.210.001-11B 11 Location: Bsmt - Grey Epoxy, Floor, Room 10066 Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 10%	226051652-25	No	Inconclusive - NAD (NOB by NYS ELAP 198.6) by Khaalid W. Perine on 05/09/26	1
2026.210.001-12A 12 Location: Grd. - Grout / Mudset From 1'x2' Stone Wall Tiles @ G0045 Call Buttons Analyst Description: White, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%	226051652-26	No	NAD (by NYS ELAP 198.1) by Khaalid W. Perine on 05/09/26	
2026.210.001-12B 12 Location: Grd. - Grout / Mudset From 1'x2' Stone Wall Tiles @ G0045 Call Buttons Analyst Description: White, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%	226051652-27	No	NAD (by NYS ELAP 198.1) by Khaalid W. Perine on 05/09/26	

Client Name: Delta Engineers

PLM Bulk Asbestos Report

2026.210.001; Peterson Guadagnolo Engineers PC; Myron Talor
Jane Foster Addition Elevator Modernization Project Asbestos Survey

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos	Notes
2026.210.001-13A 13 Location: Cab - Carpet Mastic From Elevator Cab Analyst Description: Yellow, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 39%	226051652-28	No	Inconclusive - NAD (NOB by NYS ELAP 198.6) by Khaalid W. Perine on 05/09/26	1
2026.210.001-13B 13 Location: Cab - Carpet Mastic From Elevator Cab Analyst Description: Yellow, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 37%	226051652-29	No	Inconclusive - NAD (NOB by NYS ELAP 198.6) by Khaalid W. Perine on 05/09/26	1

Reporting Notes:

(1) NAD results by NYS 198.6 are inconclusive and are not considered non-ACM

Analyzed by: Khaalid W. Perine
Date: 5/9/2026

Reviewed by: Karol H. Lu



*NAD/NSD =no asbestos detected; NA =not analyzed; NAP/PS=not analyzed/positive stop, (SOF-V) = Sprayed On Fireproofing containing Vermiculite; (SM-V) = Surfacing Material containing Vermiculite; PLM Bulk Asbestos Analysis using Nikon , Model Labophot Pol, Microscope, Serial #: 952062, by Appd E to Subpt E, 40 CFR 763 quantified by either CVES or 400 pt ct as noted for each analysis (NVLAP 200546-0), ELAP PLM Method 198.1 for NY friable samples, which includes the identification and quantitation of vermiculite, or ELAP 198.6 for NOB samples, or EPA 400 pt ct by EPA 600-M4-82-020 (NY ELAP Lab 11480); Note:PLM is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. NAD or Trace results by PLM are inconclusive, TEM is currently the only method that can be used to determine if this material can be considered or treated as non asbestos-containing in NY State (also see EPA Advisory for floor tile, FR 59,146,38970,8/1/94) National Institute of Standards and Technology Accreditation requirements mandate that this report must not be reproduced except in full without the approval of the lab.This PLM report relates ONLY to the items tested. RI Cert AAL-094, CT Cert PH-0186, Mass Cert AA000054, NJ Lab ID #NY031.

____END OF REPORT____

Table I
Summary of Bulk Asbestos Analysis Results by NYS ELAP 198.4

2026.210.001; Peterson Guadagnolo Engineers PC; Myron Talar Jane Foster Addition Elevator Modernization Project Asbestos Survey

AmeriSci Sample #	Client Sample#	HG Area	NOB Sample Weight (gram)	NOB Heat Sensitive Organic %	NOB Acid Soluble Inorganic %	NOB Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
01	2026.210.001-01A	01	----	----	----	----	NAD	NA
Location: Bsmt - Top Coat Plaster, Wall, Room L0068								
02	2026.210.001-01B	01	----	----	----	----	NAD	NA
Location: Bsmt - Top Coat Plaster, Wall, Room L0068								
03	2026.210.001-01C	01	----	----	----	----	NAD	NA
Location: Bsmt - Top Coat Plaster, Wall, Room L0068								
04	2026.210.001-02A	02	----	----	----	----	NAD	NA
Location: Bsmt - Base Coat Plaster, Wall, Room L0068								
05	2026.210.001-02B	02	----	----	----	----	NAD	NA
Location: Bsmt - Base Coat Plaster, Wall, Room L0068								
06	2026.210.001-02C	02	----	----	----	----	NAD	NA
Location: Bsmt - Base Coat Plaster, Wall, Room L0068								
07	2026.210.001-03A	03	----	----	----	----	NAD	NA
Location: 1st Fl. - Single Coat Plaster, Wall, 10045 @ Call Buttons								
08	2026.210.001-03B	03	----	----	----	----	NAD	NA
Location: 2nd Fl. - Single Coat Plaster, Wall, 20045 @ Call Buttons								
09	2026.210.001-03C	03	----	----	----	----	NAD	NA
Location: 3rd Fl. - Single Coat Plaster, Wall, 30045 @ Call Buttons								
10	2026.210.001-04A	04	----	----	----	----	NAD	NA
Location: Bsmt - Sheetrock, Ceiling, Room L0066								
11	2026.210.001-04B	04	----	----	----	----	NAD	NA
Location: Bsmt - Sheetrock, Wall, Room L0068								
12	2026.210.001-05A	05	----	----	----	----	NAD	NA
Location: Bsmt - Joint Compound, Ceiling, Room L0066								
13	2026.210.001-05B	05	----	----	----	----	NAD	NA
Location: Bsmt - Joint Compound, Wall, Room L0068								
14	2026.210.001-06A	06	0.351	16.7	39.8	43.5	NAD	NAD
Location: Bsmt - Grey 12"x12" Floor Tile, Room L0068								
15	2026.210.001-06B	06	0.362	16.8	38.0	45.3	NAD	NAD
Location: Bsmt - Grey 12"x12" Floor Tile, Room L0068								
16	2026.210.001-07A	07	0.193	52.0	15.5	32.5	NAD	NAD
Location: Bsmt - Mastic From HA 06A								

Table I
Summary of Bulk Asbestos Analysis Results by NYS ELAP 198.4

2026.210.001; Peterson Guadagnolo Engineers PC; Myron Talar Jane Foster Addition Elevator Modernization Project Asbestos Survey

AmeriSci Sample #	Client Sample#	HG Area	NOB Sample Weight (gram)	NOB Heat Sensitive Organic %	NOB Acid Soluble Inorganic %	NOB Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
17	2026.210.001-07B	07	0.182	50.5	13.9	35.6	NAD	NAD
Location: Bsmt - Mastic From HA 06B								
18	2026.210.001-08A	08	0.391	67.1	7.7	25.2	NAD	NAD
Location: Bsmt - Mastic From 6" Black Cove Base, Room L0068								
19	2026.210.001-08B	08	0.186	67.0	13.5	19.5	NAD	NAD
Location: Bsmt - Mastic From 6" Black Cove Base, Room L0068								
20	2026.210.001-09A	09	0.143	14.6	17.7	67.6	NAD	NAD
Location: Bsmt - 2'x2' Holed Ceiling Tile, Room L0068								
21	2026.210.001-09B	09	0.185	15.1	5.2	79.7	NAD	NAD
Location: Bsmt - 2'x2' Holed Ceiling Tile, Room L0068								
22	2026.210.001-10A	10	0.081	92.6	5.7	1.7	NAD	NAD
Location: Bsmt - Tar Coating, Wall, Room 10066								
23	2026.210.001-10B	10	0.171	89.8	9.3	0.9	NAD	NAD
Location: Bsmt - Tar Coating, Wall, Room 10066								
24	2026.210.001-11A	11	0.053	76.4	5.5	18.1	NAD	NAD
Location: Bsmt - Grey Epoxy, Floor, Room 10066								
25	2026.210.001-11B	11	0.085	70.2	19.4	10.4	NAD	NAD
Location: Bsmt - Grey Epoxy, Floor, Room 10066								
26	2026.210.001-12A	12	----	----	----	----	NAD	NA
Location: Grd. - Grout / Mudset From 1'x2' Stone Wall Tiles @ G0045 Call Buttons								
27	2026.210.001-12B	12	----	----	----	----	NAD	NA
Location: Grd. - Grout / Mudset From 1'x2' Stone Wall Tiles @ G0045 Call Buttons								
28	2026.210.001-13A	13	0.324	54.7	6.4	39.0	NAD	NAD
Location: Cab - Carpet Mastic From Elevator Cab								
29	2026.210.001-13B	13	0.307	55.8	7.3	36.9	NAD	NAD
Location: Cab - Carpet Mastic From Elevator Cab								

Table I
Summary of Bulk Asbestos Analysis Results by NYS ELAP 198.4
2026.210.001; Peterson Guadagnolo Engineers PC; Myron Talor Jane Foster Addition Elevator Modernization Project Asbestos Survey

AmeriSci Sample #	Client Sample#	HG Area	NOB Sample Weight (gram)	NOB Heat Sensitive Organic %	NOB Acid Soluble Inorganic %	NOB Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM

Analyzed by: Karol H. Lu
Date: 5/12/2026



Reviewed by: Karol H. Lu



**Quantitative Analysis (Semi/Full): Bulk Asbestos Analysis - PLM by Appd E to Subpt E, 40 CFR 763 or NYSDOH ELAP 198.1 for New York friable samples or NYSDOH ELAP 198.6 for New York NOB samples; TEM (Semi/Full) by EPA 600/R-93/116 (or NYSDOH ELAP 198.4; for New York samples). Analysis using Hitachi, Model H7000-Noran 7 System, Microscope, Serial #: 747-05-06. NAD = no asbestos detected during a quantitative analysis; NA = not analyzed; Trace = < 1%; (SOF-V) = Sprayed On Fireproofing containing Vermiculite; (SM-V) = Surfacing Material containing Vermiculite; Quantitation for beginning weights of <0.1 grams should be considered as qualitative only; Qualitative Analysis: Asbestos analysis results of "Present" or "NVA = No Visible Asbestos" represents results for Qualitative PLM or TEM Analysis only (no accreditation coverage available from any regulatory agency for qualitative analyses): NVLAP (PLM) 200546-0, NYSDOH ELAP Lab 11480, NJ Lab ID #NY031.

Warning Note: PLM limitation, only TEM will resolve fibers <0.25 micrometers in diameter. TEM bulk analysis is representative of the fine grained matrix material and may not be representative of non-uniformly dispersed debris for which PLM evaluation is recommended (i.e. soils and other heterogenous materials).

Bulk Sample Data Sheet/COC

Client: Peterson Guadagnolo Engineers PC	Delta Project No.: 2026.210.001	Date: 5/7/2026
Project: Myron Talar Jane Foster Addition Elevator Modernization Project Asbestos Survey	Client Project No.:	Turnaround Time: 48 Hours
Collected By: Thomas Ferro		

Sample Number	Material Type	Material Condition	Floor	Description / Sample Location
2026.210.001 - 01A	Surfacing	Intact	Bsmt	Top Coat Plaster, Wall, Room L0068
2026.210.001 - 01B	Surfacing	Intact	Bsmt	Top Coat Plaster, Wall, Room L0068
2026.210.001 - 01C	Surfacing	Intact	Bsmt	Top Coat Plaster, Wall, Room L0068
2026.210.001 - 02A	Surfacing	Intact	Bsmt	Base Coat Plaster, Wall, Room L0068
2026.210.001 - 02B	Surfacing	Intact	Bsmt	Base Coat Plaster, Wall, Room L0068
2026.210.001 - 02C	Surfacing	Intact	Bsmt	Base Coat Plaster, Wall, Room L0068
2026.210.001 - 03A	Surfacing	Intact	1	Single Coat Plaster, Wall, 10045 @ Call Buttons
2026.210.001 - 03B	Surfacing	Intact	2	Single Coat Plaster, Wall, 20045 @ Call Buttons

Instructions: Analyze all non-NOB samples by NYS ELAP 198.1 PLM methodology. Analyze all NOB samples initially by NYS ELAP 198.6 PLM methodology. If all samples from a given sample set are reported as non-asbestos by 198.6, analyze by NYS ELAP 198.4 TEM methodology. Stop analysis after 1st positive for a given sample set.

Email Results to wjohnson@delta-eas.com, sprislupsky@delta-eas.com, rcherevko@delta-eas.com

Notes:

Submitted By:

Thomas Ferro

Thomas Ferro

Date: 5/7/2026

Received By:

Justin Herfich

Justin Herfich

Date: 5/8/26 10:45

Bulk Sample Data Sheet/COC

Client: Peterson Guadagnolo Engineers PC	Delta Project No.: 2026.210.001	Date: 5/7/2026
Project: Myron Talor Jane Foster Addition Elevator Modernization Project Asbestos Survey	Client Project No.:	Turnaround Time: 48 Hours
Collected By: Thomas Ferro		

Sample Number	Material Type	Material Condition	Floor	Description / Sample Location
2026.210.001 - 03C	Surfacing	Intact	3	Single Coat Plaster, Wall, 30045 @ Call Buttons
2026.210.001 - 04A	Miscellaneous	Intact	Bsmt	Sheetrock, Ceiling, Room L0066
2026.210.001 - 04B	Miscellaneous	Intact	Bsmt	Sheetrock, Wall, Room L0068
2026.210.001 - 05A	Miscellaneous	Intact	Bsmt	Joint Compound, Ceiling, Room L0066
2026.210.001 - 05B	Miscellaneous	Intact	Bsmt	Joint Compound, Wall, Room L0068
2026.210.001 - 06A	Miscellaneous	Intact	Bsmt	Grey 12" x 12" Floor Tile, Room L0068
2026.210.001 - 06B	Miscellaneous	Intact	Bsmt	Grey 12" x 12" Floor Tile, Room L0068
2026.210.001 - 07A	Miscellaneous	Intact	Bsmt	Mastic from HA 06A
2026.210.001 - 07B	Miscellaneous	Intact	Bsmt	Mastic from HA 06B
2026.210.001 - 08A	Miscellaneous	Intact	Bsmt	Mastic from 6" Black Cove Base, Room L0068
2026.210.001 - 08B	Miscellaneous	Intact	Bsmt	Mastic from 6" Black Cove Base, Room L0068
2026.210.001 - 09A	Miscellaneous	Intact	Bsmt	2' x 2' Holed Ceiling Tile, Room L0068
2026.210.001 - 09B	Miscellaneous	Intact	Bsmt	2' x 2' Holed Ceiling Tile, Room L0068
2026.210.001 - 10A	Miscellaneous	Intact	Bsmt	Tar Coating, Wall, Room 10066
2026.210.001 - 10B	Miscellaneous	Intact	Bsmt	Tar Coating, Wall, Room 10066
2026.210.001 - 11A	Miscellaneous	Intact	Bsmt	Grey Epoxy, Floor, Room 10066

Bulk Sample Data Sheet/COC

Client: Peterson Guadagnolo Engineers PC	Delta Project No.: 2026.210.001	Date: 5/7/2026
Project: Myron Talor Jane Foster Addition Elevator Modernization Project Asbestos Survey	Client Project No.:	Turnaround Time: 48 Hours
	Collected By: Thomas Ferro	

Sample Number	Material Type	Material Condition	Floor	Description / Sample Location
2026.210.001 - 11B	Miscellaneous	Intact	Bsmt	Grey Epoxy, Floor, Room 10066
2026.210.001 - 12A	Miscellaneous	Intact	Grd.	Grout / Mud Set from 1' x 2' Stone Wall Tiles @ G0045 Call Buttons
2026.210.001 - 12B	Miscellaneous	Intact	Grd.	Grout / Mud Set from 1' x 2' Stone Wall Tiles @ G0045 Call Buttons
2026.210.001 - 13A	Miscellaneous	Intact	Cab	Carpet Mastic from Elevator Cab
2026.210.001 - 13B	Miscellaneous	Intact	Cab	Carpet Mastic from Elevator Cab

APPENDIX C

Delta Engineers, Architects, & Land Surveyors Company and Personnel Certifications

WE ARE YOUR DOL



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



THOMAS P FERRO

CLASS(EXPIRES)

C ATEC (12/26) D INSP (12/26)

H PM (12/26)

CERT# 26-61USN-SHAB
DMV# 404844888

MUST BE CARRIED ON ASBESTOS PROJECTS



APPENDIX D

Laboratory Certifications

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER



Expires 12:01 AM April 01, 2027
Issued April 01, 2026

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. KAROL H. LU
AMERICA SCIENCE TEAM NEW YORK, INC
117 EAST 30TH ST
NEW YORK, NY 10016

NY Lab Id No: 11480

is hereby APPROVED as an Environmental Laboratory for the category
ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved subcategories and/or analytes are listed below:

Miscellaneous

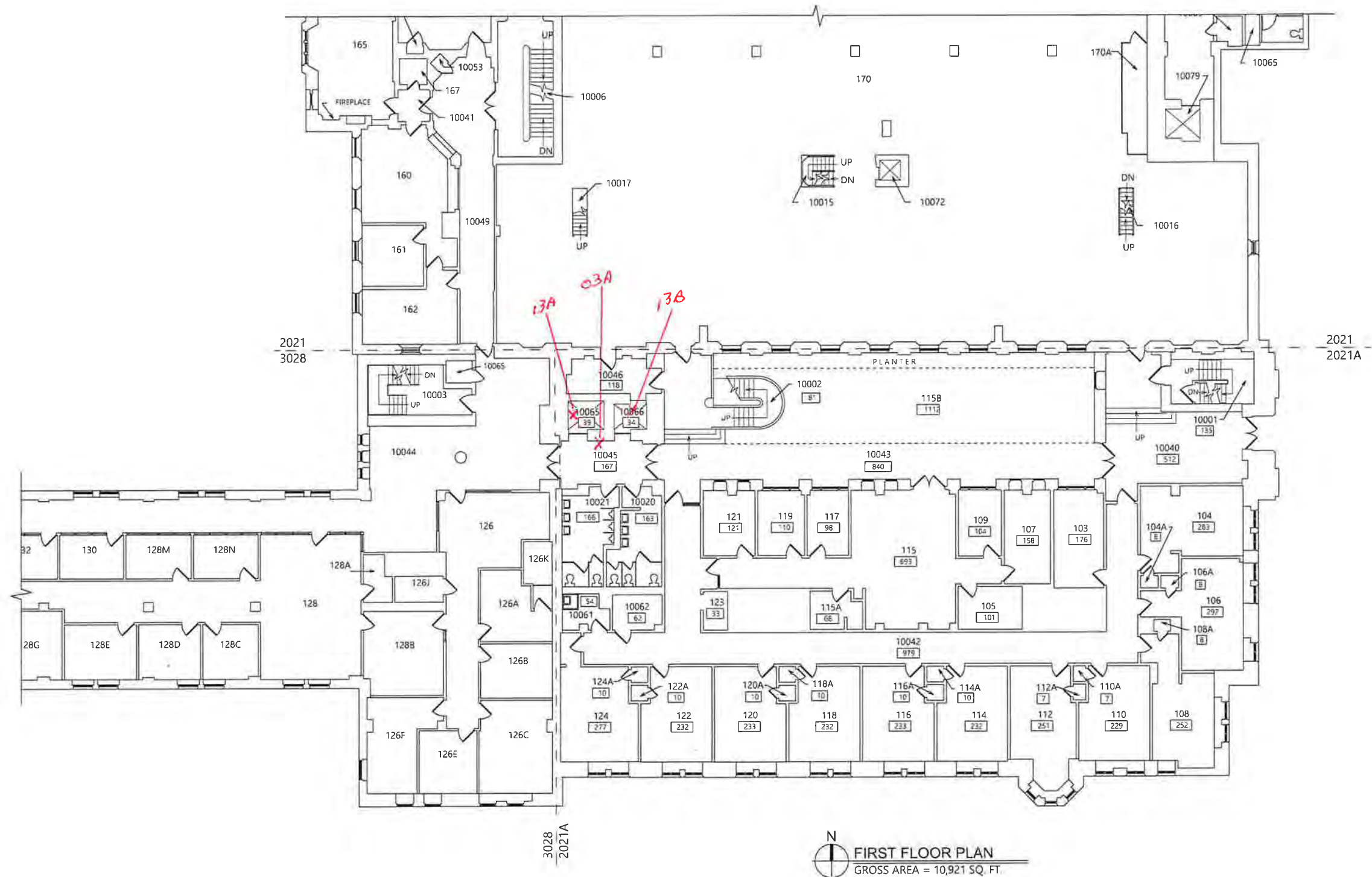
Asbestos in Friable Material	Item 198.1 of Manual
	EPA 600/M4/82/020
Asbestos in Non-Friable Material-PLM	Item 198.6 of Manual (NOB by PLM)
Asbestos in Non-Friable Material-TEM	Item 198.4 of Manual

Serial No.: 72134

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at <https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/>, by phone (518) 485-5570 or by email to elap@health.ny.gov.

APPENDIX E

Bulk Sample Location Drawings



Cornell University

FACILITIES INVENTORY

HJMPHREYS SERVICE BUILDING
638 DRYDEN ROAD
ITHACA NEW YORK 14853-3701

DRAWING DISCLAIMER

THESE DRAWINGS AND THEIR ASSOCIATED ELECTRONIC FILES HAVE BEEN PRODUCED FOR THE PURPOSE OF SPACE INVENTORY CAMPUS BUILDINGS. FEATURES SHOWN ARE INCIDENTAL TO THEIR PURPOSE AND DEPICT CONDITIONS AT THE TIME THE DRAWINGS WERE PRODUCED. THESE DRAWINGS SHOULD NOT BE RELIED UPON FOR ANY OTHER PURPOSE.

REVISIONS
6/10 EQ 9/16 SV 6/17 SV

GRAPHIC SCALE:



DRAWN BY:

BSG

CHECKED BY:

EQ

DRAWING NO.

3 OF 6

DATE:

10-1-00

PLAN LEVEL:

1

TOTAL BLDG GROSS SQ. FT.

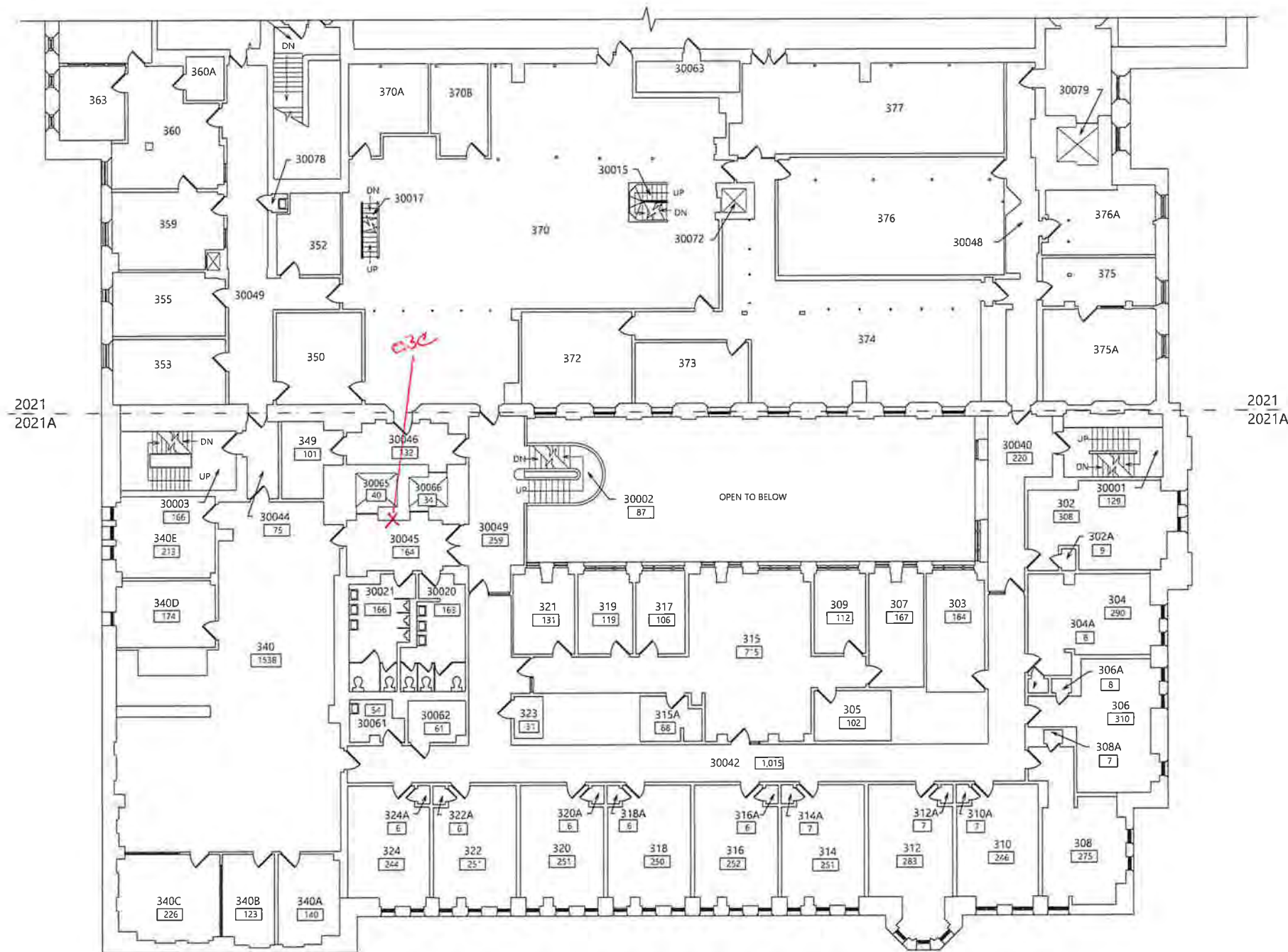
SEE SHEET 1

BLDG NAME:

MYRON TAYLOR JANE FOSTER ADDITION

BLDG NO.:

2021A



N
THIRD FLOOR PLAN
GROSS AREA = 12,727 SQ. FT.



Cornell University

FACILITIES INVENTORY

HUMPHREYS SERVICE BUILDING
638 DRYDEN ROAD
ITHACA, NEW YORK 14853-3701

DRAWING DISCLAIMER

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REVISIONS
IGI 1/01 3/02 EQ 8/03 EQ 6/10 EQ 11/12 TM

GRAPHIC SCALE:
0 5 10 20

DRAWN BY:
BSG

CHECKED BY:
EQ

DRAWING NO:
5 OF 6

DATE:
10-1-00

PLAN LEVEL:
3

TOTAL BLDG GROSS SQ FT
SEE SHEET 1

BLDG NAME:

MYRON TAYLOR JANE FOSTER ADDITION

BLDG NO:

2021A

APPENDIX F

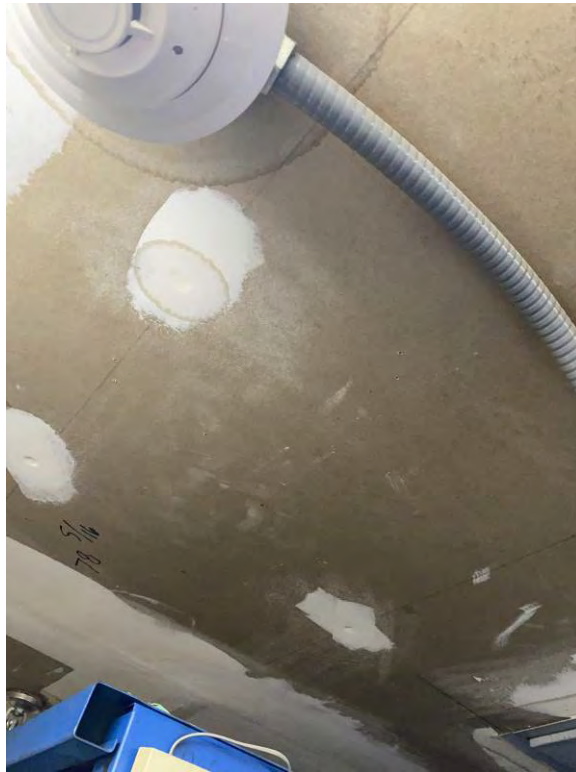
Photo Log



HA's 01 & 02 - Top Coat and Base Coat Wall Plasters, Both No Asbestos Detected



HA 03 - Single Coat Wall Plaster, No Asbestos Detected



HA's 04 & 05 - Ceiling System Sheetrock & Joint Compound, Both No Asbestos Detected



HA 06 - Gray 12" x 12" Floor Tile, No Asbestos Detected



HA 07 - Mastic from Gray 12" x 12" Floor Tile, No Asbestos Detected



HA 08 - Mastic from non-suspect 6" Vinyl Cove Base, No Asbestos Detected



HA 09 - 2' x 2' Hole-Pattern Ceiling Tile, No Asbestos Detected



HA 10 - Tar Coating on Concrete Walls, No Asbestos Detected



HA 11 - Gray Epoxy Flooring, No Asbestos Detected



HA 12 - Grout / Mudset from 1' x 2' Stone Wall Tile, No Asbestos Detected



HA 13 - Elevator Cab Carpet Mastic, No Asbestos Detected

PCB in Oil Sampling Report

Performed for the
Myron Taylor Jane Foster (2021A)
Elevator Modernization 2026
Cornell University Ithaca, New York Campus



Prepared for:
Mr. Chad Loomis, PE - Principal
Peterson Guadagnolo Consulting Engineers PC
476 East Brighton Avenue
Syracuse, NY 13210-4144

Prepared by:

ENGINEERS, ARCHITECTS, & SURVEYORS
860 Hooper Road
Endwell, NY 13760
Tel: 607-231-6600 Fax: 607-231-6640
www.delta-eas.com
Delta Project No. 2026.210.001
PGPC Project No. 950001

Field work performed by: Stephen Prislupsky, May 7th, 2026

Report prepared by: Stephen Prislupsky

Report reviewed by: William Johnson



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EXECUTIVE SUMMARY:

DELTA ENGINEERS, ARCHITECTS, LAND SURVEYORS, & LANDSCAPE ARCHITECTS, DPC

(Delta) was contacted by Peterson Guadagnolo Consulting Engineers PC to perform sampling of the Oil associated with the Myron Taylor Jane Foster Hydraulic Elevators for the presence of PCB's. The sampling was performed in support of the upcoming Myron Taylor Jane Foster Elevator Modernization 2026 Project. One sample of oil was collected from each of the two holding tanks and were submitted to ALS York Analytical Laboratories, Inc. for analysis. The Oil sampled, and the associated results, are as follows:

<u>Sample No.</u>	<u>Description</u>	<u>Result</u>
2026.210.001-P1	Jane Foster Elevator #1 (ID# 100480) Holding Tank Oil	None Detected
2026.210.001-P2	Jane Foster Elevator #2 (ID# 100481) Holding Tank Oil	None Detected

ALS York Analytical Laboratories, Inc. analyzed the samples utilizing the Method SW846-3550B/8082A and reported all samples as being "Not Detected", or non-PCB product. Industry standard, as well as EPA regulations, consider solid materials with concentrations under 50 ppm or 50 mg/kg to be a Non-PCB Product. It should be noted that EPA protocol includes the **total** or cumulative PCB content for each sample (i.e. the total PCB count for all tested matrices) should be used in determining the regulated level (i.e. "PCB Free", "non-PCB", "PCB-contaminated" or "PCB"). Results and particulars from ALS York Analytical Laboratories, Inc. are included in Appendix A.



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APPENDIX A

ALS York Analytical Laboratories, Inc. Technical Report



Technical Report

prepared for:

Delta Engineers
860 Hooper Road
Endwell NY, 13760
Attention: Stephen Prislupsky

Report Date: 05/12/2026

Client Project ID: Cornell Jane Foster Elevator Modernization 2026 / 2026.210.001

Project (SDG) No.: 26E0427



Delta Engineers
860 Hooper Road
Endwell NY, 13760
Attention: Stephen Prislupsky

Purpose and Results

This report contains the analytical data for the sample(s) identified on the attached chain-of-custody received in our laboratory on May 08, 2026 and listed below. The project was identified as your project: **Cornell Jane Foster Elevator Modernization 2026 / 2026.210.001**.

The analyses were conducted utilizing appropriate EPA, Standard Methods, and ASTM methods as detailed in the data summary tables.

All samples were received in proper condition meeting the customary acceptance requirements for environmental samples except those indicated under the Sample and Analysis Qualifiers section of this report.

All analyses met the method and laboratory standard operating procedure requirements except as indicated by any data flags, the meaning of which are explained in the Sample and Data Qualifiers Relating to This Work Order section of this report and case narrative if applicable.

The results of the analyses, which are all reported on dry weight basis (soils) unless otherwise noted, are detailed in the following pages.

Please contact Client Services at 203.325.1371 with any questions regarding this report.

Sample ID	Client Sample ID	Matrix	Date Collected	Date Received
26E0427-01	2026.210.001-P1 (Jane Foster Elevator #1 ID# 100480)	Oil	05/07/2026	05/08/2026
26E0427-02	2026.210.001-P2 (Jane Foster Elevator #2 ID# 100481)	Oil	05/07/2026	05/08/2026

General Notes for Project (SDG) No.: 26E0427

1. The RLs and MDLs (Reporting Limit and Method Detection Limit respectively) reported are adjusted for any dilution necessary due to the levels of target and/or non-target analytes and matrix interference. The RL(REPORTING LIMIT) is based upon the lowest standard utilized for the calibration where applicable.
2. Samples are retained for a period of thirty days after submittal of report, unless other arrangements are made.
3. ALS' liability for the above data is limited to the dollar value paid to ALS for the referenced project.
4. This report shall not be reproduced without the written approval of ALS, Inc.
5. All analyses conducted met method or Laboratory SOP requirements. See the Sample and Data Qualifiers Section for further information.
6. It is noted that no analyses reported herein were subcontracted to another laboratory, unless noted in the report.
7. This report reflects results that relate only to the samples submitted on the attached chain-of-custody form(s) received by ALS.
8. Analyses conducted at ALS, Inc. Stratford, CT are indicated by NYDOH-NY10854, NJDEP-CT005, PADEP-68-04440, CTDPH-PH0840; those conducted at ALS, Inc., Richmond Hill, NY are indicated by NYDOH-NY12058, NJDEP-NY037, CTDPH-PH0837, NHDES-NH2097, MDDEP-375, PADEP-68-06231.

Approved By:



Cassie Mosher
Laboratory Manager - Stratford

Date: 05/12/2026



Positive Hits Included in This Report
Excludes Subcontracted Analysis

No positive hits found



Client: Delta Engineers **Sample ID:** 26E0427-01
Client Project: Cornell Jane Foster Elevator Modernization 2026 / 2026.210.001 **Date Received:** 05/08/2026
Client Sample ID: 2026.210.001-P1 (Jane Foster Elevator #1 ID# 100480) **Collection Date/Time:** 5/7/26 10:10

Lab ID: 26E0427-01				Laboratory: ALS Environmental - Stratford							
Analysis: Polychlorinated Biphenyls by GC/ECD				Matrix: Oil							
Prep Method: Sample Prepared by Method: Oil Preparation for GC				Sample Notes:							
Parameter	Result	Lab Qualifier	CLP Flag	MDL	RL	Dilution	Units	Reference Method	Extracted	Analized Date	By
Aroclor 1016	ND		U	1.00	1.00	1	mg/kg	EPA 8082A	5/11/26 11:40	5/12/26 09:53	NF
Aroclor 1221	ND		U	1.00	1.00	1	mg/kg	EPA 8082A	5/11/26 11:40	5/12/26 09:53	NF
Aroclor 1232	ND		U	1.00	1.00	1	mg/kg	EPA 8082A	5/11/26 11:40	5/12/26 09:53	NF
Aroclor 1242	ND		U	1.00	1.00	1	mg/kg	EPA 8082A	5/11/26 11:40	5/12/26 09:53	NF
Aroclor 1248	ND		U	1.00	1.00	1	mg/kg	EPA 8082A	5/11/26 11:40	5/12/26 09:53	NF
Aroclor 1254	ND		U	1.00	1.00	1	mg/kg	EPA 8082A	5/11/26 11:40	5/12/26 09:53	NF
Aroclor 1260	ND		U	1.00	1.00	1	mg/kg	EPA 8082A	5/11/26 11:40	5/12/26 09:53	NF
Aroclor 1262	ND		U	1.00	1.00	1	mg/kg	EPA 8082A	5/11/26 11:40	5/12/26 09:53	NF
Aroclor 1268	ND		U	1.00	1.00	1	mg/kg	EPA 8082A	5/11/26 11:40	5/12/26 09:53	NF
* Total PCBs	ND		U	1.00	1.00	1	mg/kg	EPA 8082A	5/11/26 11:40	5/12/26 09:53	NF
Surrogate Recoveries			Result	Flag	Acceptance Range			Reference Method		Analized	
Surrogate: Tetrachloro-m-xylene			116 %		30-120			EPA 8082A		5/12/26 09:53	
Surrogate: Decachlorobiphenyl			78.5 %		30-120			EPA 8082A		5/12/26 09:53	

Client: Delta Engineers **Sample ID:** 26E0427-02
Client Project: Cornell Jane Foster Elevator Modernization 2026 / 2026.210.001 **Date Received:** 05/08/2026
Client Sample ID: 2026.210.001-P2 (Jane Foster Elevator #2 ID# 100481) **Collection Date/Time:** 5/7/26 10:13

Lab ID: 26E0427-02				Laboratory: ALS Environmental - Stratford							
Analysis: Polychlorinated Biphenyls by GC/ECD				Matrix: Oil							
Prep Method: Sample Prepared by Method: Oil Preparation for GC				Sample Notes:							
Parameter	Result	Lab Qualifier	CLP Flag	MDL	RL	Dilution	Units	Reference Method	Extracted	Analized Date	By
Aroclor 1016	ND		U	0.925	0.925	1	mg/kg	EPA 8082A	5/11/26 11:40	5/11/26 17:27	NF
Aroclor 1221	ND		U	0.925	0.925	1	mg/kg	EPA 8082A	5/11/26 11:40	5/11/26 17:27	NF
Aroclor 1232	ND		U	0.925	0.925	1	mg/kg	EPA 8082A	5/11/26 11:40	5/11/26 17:27	NF
Aroclor 1242	ND		U	0.925	0.925	1	mg/kg	EPA 8082A	5/11/26 11:40	5/11/26 17:27	NF
Aroclor 1248	ND		U	0.925	0.925	1	mg/kg	EPA 8082A	5/11/26 11:40	5/11/26 17:27	NF
Aroclor 1254	ND		U	0.925	0.925	1	mg/kg	EPA 8082A	5/11/26 11:40	5/11/26 17:27	NF
Aroclor 1260	ND		U	0.925	0.925	1	mg/kg	EPA 8082A	5/11/26 11:40	5/11/26 17:27	NF
Aroclor 1262	ND		U	0.925	0.925	1	mg/kg	EPA 8082A	5/11/26 11:40	5/11/26 17:27	NF
Aroclor 1268	ND		U	0.925	0.925	1	mg/kg	EPA 8082A	5/11/26 11:40	5/11/26 17:27	NF
* Total PCBs	ND		U	0.925	0.925	1	mg/kg	EPA 8082A	5/11/26 11:40	5/11/26 17:27	NF
Surrogate Recoveries			Result	Flag	Acceptance Range		Reference Method		Analized		
Surrogate: Tetrachloro-m-xylene			78.0 %		30-120		EPA 8082A		5/11/26 17:27		
Surrogate: Decachlorobiphenyl			55.0 %		30-120		EPA 8082A		5/11/26 17:27		





Certified Analyses included in this Report

Analyte	CAS #	Certifications
<i>EPA 8082A in Oil</i>		
Aroclor 1016	12674-11-2	CTDPH-PH-0840,NYSDOH-NY10854,PADEP-68-04440
Aroclor 1221	11104-28-2	CTDPH-PH-0840,NYSDOH-NY10854,PADEP-68-04440
Aroclor 1232	11141-16-5	CTDPH-PH-0840,NYSDOH-NY10854,PADEP-68-04440
Aroclor 1242	53469-21-9	CTDPH-PH-0840,NYSDOH-NY10854,PADEP-68-04440
Aroclor 1248	12672-29-6	CTDPH-PH-0840,NYSDOH-NY10854,PADEP-68-04440
Aroclor 1254	11097-69-1	CTDPH-PH-0840,NYSDOH-NY10854,PADEP-68-04440
Aroclor 1260	11096-82-5	CTDPH-PH-0840,NYSDOH-NY10854,PADEP-68-04440
Aroclor 1262	37324-23-5	NYSDOH-NY10854,PADEP-68-04440
Aroclor 1268	11100-14-4	CTDPH-PH-0840,NYSDOH-NY10854,PADEP-68-04440



List of Certifications

Code	Description	Number	Expires
CTDPH-PH-0840	CTDPH - Stratford	PH-0840	06/30/2027
NJDEP-CT005	NJDEP Certification - Stratford	CT005	06/30/2026
NYSDOH-NY10854	NYSDOH NELAC/ELAP Program - Stratford	NY ELAP-10854	04/01/2027
PADEP-68-04440	PADEP Registration - Stratford	68-04440	09/30/2026



Sample and Data Qualifiers Relating to This Work Order

Λ	Analyte is not certified but the state of sample origination offer certification for the Analyte
E	The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate.
S-08	The recovery of this surrogate was outside of QC limits.
S-GC	Two surrogates are used for this analysis. One surrogate recovered within control limits therefore the analysis is acceptable.
Temp_S3	Sample was received from mail carrier outside of proper temperature range. No ice was present upon delivery.

CLP Flags

B	Blank Contamination. The analyte was also detected in the method blank.
D	Diluted sample result. The sample was diluted before analysis.
E	Exceeds Calibration range. Result is above the instruments' linear calibration range.
H	Holding time exceeded. The sample was analyzed after the recommended/required holding time.
J	Estimated Value. Result is above the Method Detection Limit (MDL) but below the Reporting Limit (RL).
N	Tentatively Identified Compound (TIC). The compound is presumptively identified but not confirmed with a standard.
P	Poor Precision / duplicate variance. Indicates poor agreement between duplicates (e.g. matrix spike duplicates or lab duplicates).
U	Not Detected. Analyte not detected above laboratory's established reporting limit.

Definitions and Other Explanations

*	Analyte is not certified or the state of the samples origination does not offer certification for the Analyte.
ND	NOT DETECTED - the analyte is not detected at the Reported to level (LOQ/RL or LOD/MDL)
RL	REPORTING LIMIT - the minimum reportable value based upon the lowest point in the analyte calibration curve.
LOQ	LIMIT OF QUANTITATION - the minimum concentration of a target analyte that can be reported within a specified degree of confidence. This is the lowest point in an analyte calibration curve that has been subjected to all steps of the processing/analysis and verified to meet defined criteria. This is based upon NELAC 2009 Standards and applies to all analyses.
LOD	LIMIT OF DETECTION - a verified estimate of the minimum concentration of a substance in a given matrix that an analytical process can reliably detect. This is based upon NELAC 2009 Standards and applies to all analyses conducted under the auspices of EPA SW-846.
MDL	METHOD DETECTION LIMIT - a statistically derived estimate of the minimum amount of a substance an analytical system can reliably detect with a 99% confidence that the concentration of the substance is greater than zero. This is based upon 40 CFR Part 136 Appendix B and applies only to EPA 600 and 200 series methods.
Reported to	This indicates that the data for a particular analysis is reported to either the LOD/MDL, or the LOQ/RL. In cases where the "Reported to" is located above the LOD/MDL, any value between this and the LOQ represents an estimated value which is "J" flagged accordingly. This applies to volatile and semi-volatile target compounds only.
NR	Not reported
RPD	Relative Percent Difference
Wet	The data has been reported on an as-received (wet weight) basis
Low Bias	Low Bias flag indicates that the recovery of the flagged analyte is below the laboratory or regulatory lower control limit. The data user should take note that this analyte may be biased low but should evaluate multiple lines of evidence including the LCS and site-specific MS/MSD data to draw bias conclusions. In cases where no site-specific MS/MSD was requested, only the LCS data can be used to evaluate such bias.
High Bias	High Bias flag indicates that the recovery of the flagged analyte is above the laboratory or regulatory upper control limit. The data user should take note that this analyte may be biased high but should evaluate multiple lines of evidence including the LCS and site-specific MS/MSD data to draw bias conclusions. In cases where no site-specific MS/MSD was requested, only the LCS data can be used to evaluate such bias.



Non-Dir. Non-dir. flag (Non-Directional Bias) indicates that the Relative Percent Difference (RPD) (a measure of precision) among the MS and MSD data is outside the laboratory or regulatory control limit. This alerts the data user where the MS and MSD are from site-specific samples that the RPD is high due to either non-homogeneous distribution of target analyte between the MS/MSD or indicates poor reproducibility for other reasons.

If EPA SW-846 method 8270 is included herein it is noted that the target compound N-nitrosodiphenylamine (NDPA) decomposes in the gas chromatographic inlet and cannot be separated from diphenylamine (DPA). These results could actually represent 100% DPA, 100% NDPA or some combination of the two. For this reason, ALS reports the combined result for n-nitrosodiphenylamine and diphenylamine for either of these compounds as a combined concentration as Diphenylamine.

If Total PCBs are detected and the target aroclors reported are "Not detected", the Total PCB value is reported due to the presence of either or both Aroclors 1262 and 1268 which are non-target aroclors for some regulatory lists.

2-chloroethylvinyl ether readily breaks down under acidic conditions. Samples that are acid preserved, including standards will exhibit breakdown. The data user should take note.

Certification for pH is no longer offered by NYDOH ELAP.

Semi-Volatile and Volatile analyses are reported down to the LOD/MDL, with values between the LOD/MDL and the LOQ being "J" flagged as estimated results.

For analyses by EPA SW-846-8270D, the Limit of Quantitation (LOQ) reported for benzidine is based upon the lowest standard used for calibration and is not a verified LOQ due to this compound's propensity for oxidative losses during extraction/concentration procedures and non-reproducible chromatographic performance.



Field Chain-of-Custody Record

ALS' Standard Terms & Conditions are listed on the back side of this document. This legal document serves as your written authorization for ALS to proceed with the analyses requested below. Your signature binds you to ALS' Standard Terms & Conditions.

120 Research Drive Stratford, CT 06615 132-02 89th Ave Queens, NY 11418 55 Church Hill Rd. #2 Newtown, CT 06470 2161 Whitesville Rd Toms River, NJ 08755 clientservices@yorklab.com 800-306-YORK 800-306-9675

Page 1 of 1

Report To: Company: Delta Engineers Address: 860 Hooper Road Endwell, NY 13760 Phone: 607-231-6600 Contact: Stephen Prislupsky E-mail: sprislupsky@delta-eas.com		Invoice To: Company: Delta Payables Address: 860 Hooper Road Endwell, NY 13760 Phone: 607-231-6600 Contact: Stephen Prislupsky E-mail: payables@delta-eas.com		YOUR Project Name / Number Cornell Jane Foster Elevator Modernization 2026 / 2026.210.001 PO Number		Samples Collected From NY X CT PA NJ Analyses Requested		Turn-Around Time RUSH - Next Day X RUSH - Two Day RUSH - Three Day RUSH - Four Day RUSH - Five Day Standard (6-9 Day) PFAS Standard 7-10 Day			
Sample Identification 2026.210.001-P1 (Jane Foster Elevator #1 ID# 100480) 2026.210.001-P2 (Jane Foster Elevator #2 ID# 100481)		Matrix Codes S - soil/solid/sludge GW - groundwater DW - drinking water SW - surface water WW - wastewater O - Oil Other		Preservative (please list number of containers) Unpreserved HCl (hydrochloric acid) MeOH (methanol) HNO ₃ (nitric acid) H ₂ SO ₄ (sulfuric acid) NaOH (sodium hydroxide) Na ₂ S ₂ O ₃ (sodium thio) Trizma Ammonium Acetate Other		PCB in Oil EPA SW-846-8082A		G/C		Report Type (circle) QA Report Summary (Results Only) NY ASP B Package NJ Reduced NJ DKQP NJ Full CT RCP	
										EDD Type (circle) EQUIS (standard) NYSDEC EQUIS NJDEP SRP Haz Site Standard Excel CMDP	
Comments: Please email results to sprislupsky@delta-eas.com and wjohnson@delta-eas.com		Lab Sample Receiving Checklist (to be completed by the receiving laboratory only) Circle Y / N Custody Seals: Y / N Containers Intact: Y / N COC Labels Agree: Y / N Preservation Confirmed: Y / N COC Complete: Y / N COC Received: Y / N Appropriate Sample Volumes: Y / N Appropriate Sample Containers: Y / N Cooler Temperature Confirmed: Y / N Samples Submitted within Holding Times: Y / N Corrective Action Form Required: Y / N		Regulatory Comparative Compared to the following Regulation(s): (please fill in)		Field Filtered		Lab Filtered			
1. Samples Relinquished by / Company Date/Time: 05/07/26 1240		2. Samples Relinquished by / Company Date/Time:		3. Samples Relinquished by / Company Date/Time:		4. Samples Relinquished by / Company Date/Time:		5. Samples Relinquished by / Company Date/Time:			
6. Samples Relinquished by / Company Date/Time:		7. Samples Relinquished by / Company Date/Time:		8. Samples Relinquished by / Company Date/Time:		9. Samples Relinquished by / Company Date/Time:		10. Samples Relinquished by / Company Date/Time:			



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APPENDIX B

ALS York Analytical Laboratories, Inc. Certification

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER



Expires 12:01 AM April 01, 2027
Issued April 01, 2026
Revised April 13, 2026

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. SCOTT HALL
ALS ENVIRONMENTAL - STRATFORD
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

*is hereby APPROVED as an Environmental Laboratory in conformance with the
National Environmental Laboratory Accreditation Conference Standards (2016) for the category
ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:*

Phthalate Esters

Di-n-butyl phthalate	EPA 8270E
Di-n-octyl phthalate	EPA 625.1
	EPA 8270E

Polychlorinated Biphenyls

Aroclor 1016 (PCB-1016)	EPA 8082A
	EPA 608.3
Aroclor 1221 (PCB-1221)	EPA 8082A
	EPA 608.3
Aroclor 1232 (PCB-1232)	EPA 8082A
	EPA 608.3
Aroclor 1242 (PCB-1242)	EPA 8082A
	EPA 608.3
Aroclor 1248 (PCB-1248)	EPA 8082A
	EPA 608.3
Aroclor 1254 (PCB-1254)	EPA 8082A
	EPA 608.3
Aroclor 1260 (PCB-1260)	EPA 8082A
	EPA 608.3
Aroclor 1262 (PCB-1262)	EPA 8082A
Aroclor 1268 (PCB-1268)	EPA 8082A

Polynuclear Aromatics

Acenaphthene	EPA 625.1
	EPA 8270E
Acenaphthylene	EPA 625.1
	EPA 8270E
Anthracene	EPA 625.1

Serial No.: 72618

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at <https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/>, by phone (518) 485-5570 or by email to elap@health.ny.gov.



May 20, 2026

Ms. Tami Norman, Project Manager
Cornell University
Engineering & Project Management
102 Humphreys Service Building
Ithaca, New York 14850

Re: Cornell University Myron Taylor Jane Foster Elevator Modernization 2026 Project
Delta Project No.: 2036.210.001

Dear Ms. Norman:

The following is associated with the Cornell University Myron Taylor Jane Foster Elevator Modernization 2026 Project. Based on the results for suspect materials sampled as a part of Delta's Pre-Renovation Asbestos Survey for the Project, *No Asbestos Containing Materials with the potential to be impacted as a part of the Cornell University Myron Taylor Jane Foster Elevator Modernization 2026 Project were identified.*

In regard to the existing Hydraulic Elevator System, results for the associated Oil sampled for PCB Content were reported as "Not Detected" for PCB's.

Please reference Delta's Pre-Renovation Asbestos Survey Report and PCB Oil Sampling Report prepared for the project for additional Survey / Sampling details and information. 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

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. Analytical laboratory sample results and material Certifications for all imported soil and granular materials (“borrow”).
 - 2. Contractor's Waste Material Disposal Plan.
 - 3. Weight tickets from the Borrow Material Supplier.
 - 4. Proposed methods for dewatering and construction water management.
 - 5. Analytical laboratory sample results for all waste materials.
 - 6. Copies of manifests for all waste materials disposed of off-site.

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 CLEARING, SITE PREPARATION AND SITE USE

- A. In accordance with Section 01 14 00, only that portion of the working area that is absolutely necessary and essential for the Work shall be cleared for construction. All clearing should be approved and performed to provide minimum practical exposure of soils.
- B. The Contractor shall make every effort to avoid the destruction of plants, trees, shrubs and lawns outside the area of construction so as not to unduly disturb the ecological or environmental quality of the area.
- C. Topsoil excavated as part of the Project, which can be reused as part of the Project, shall be stockpiled for future use and temporarily stabilized to prevent erosion.

1.6 SPOIL AND BORROW

- A. Spoil
 - 1. Dispose of excavated material which, in the opinion of the Owner's Representative, is unfit to be used as backfill or embankment or which is in excess of the amount required under the Contract.
 - 2. All spoil areas shall be graded and seeded to match the surrounding area.
 - 3. Spoil areas shall be covered and protected from erosion into adjacent storm sewers, drainage ways, land areas, or water bodies.
- B. Borrow Material
 - 1. Borrow material shall be provided from a clean source. Submittals of proposed borrow material shall be reviewed by the Owner prior to delivery on-site. Submittals shall include the quantity of materials, source location and certification by the material supplier that it is free of chemicals or other foreign matter.

1.7 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

1.8 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.

1.9 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.

1.10 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.

1.11 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.

1.12 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 Available from Defense Standardization Program www.dps.dla.mil Available from General Services Administration www.gsa.gov Available from National Institute of Building Sciences www.nibs.org	(215) 697-6257 (202) 619-8925 (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.turfgrassod.org	(847) 649-5555
TRI	Tile Roofing Institute www.tilerroofing.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 45 29 TESTING LABORATORY SERVICES

1.0 GENERAL

1.1 DESCRIPTION

- A. The Owner will employ and pay for the services of an Independent Testing Laboratory to perform specified services.
 - 1. Contractor shall cooperate with the laboratory to facilitate the execution of its required services.
 - 2. Employment of the laboratory shall in no way relieve Contractor's obligations to perform the Work of the Contract.
- B. Testing Laboratory services are specified in connection with work including but not limited to the following:
 - 1. New York State Building Code, Chapter 17, Special Inspections

1.2 QUALIFICATIONS OF LABORATORY

- A. Meet "Recommended Requirements for Independent Laboratory Qualification", latest edition, published by American Council of Independent Laboratories.
- B. Meet basic requirements of ASTM E329-05b, "Standard Specification for Agencies Engaged in Construction Inspection and/or Testing".
- C. Authorized to operate in the State of New York.
- D. Testing and inspections shall be performed under the direction of Licensed Professional Engineer registered in the State of New York who shall be responsible for administering all testing and inspections and shall certify any local agency requirements.
- E. Submit copy of report of inspection of facilities made by Materials Reference Laboratory of National Bureau of Standards during the most recent tour of inspection, with memorandum of remedies of any deficiencies reported by the inspection.
- F. Testing Equipment:
 - 1. Calibrated at maximum 12 month intervals by devices of accuracy traceable to either:
 - a. National Bureau of Standards
 - b. Accepted values of natural physical constants.
 - 2. Submit copy of certificate of calibration made by accredited calibration agency.

1.3 LABORATORY DUTIES

- A. Cooperate with Owner, Architect and Contractor; provide qualified personnel promptly on notice.
- B. Perform specified inspections, sampling and testing of materials and methods of construction.
 - 1. Comply with specified standards, ASTM, other recognized authorities, and as specified.
 - 2. Ascertain compliance of materials with requirements of Contract Documents.
- C. Promptly notify Owner, Architect and Contractor of observed irregularities or deficiencies of work or products.
- D. Should Laboratory tests of material performed at specified intervals of time indicate that strengths do not meet Specification requirements, the Inspection Agency and Geotechnical Engineer shall IMMEDIATELY notify the Owner, Contractor, and Architect. The Architect shall determine whether remedial action is necessary.
- E. Promptly submit written report of each test and inspection; one copy each to Architect, Owner, Contractor, and one copy to Record Documents File. Each report shall include:
 - 1. Date issued.
 - 2. Project title and number.
 - 3. Testing laboratory name, address and telephone number.
 - 4. Name and signature of laboratory inspector.
 - 5. Date and time of sampling or inspection.
 - 6. Record of temperature and weather conditions.
 - 7. Date of test.
 - 8. Identification of product and specification section.
 - 9. Location of sample or test in the Project.
 - 10. Type of inspection or test.
 - 11. Observations on compliance with Contract Documents.
- F. Prepare a summary report for each category of inspection certifying that the work has been inspected and meets the Contract Documents. Specifically list all discrepancies found which have not yet been repaired or resolved.
- G. Perform additional tests as required by Architect or the Owner.

1.4 LIMITATIONS OF AUTHORITY OF TESTING LABORATORY

- A. Laboratory is not authorized to:
 - 1. Release, revoke, alter or enlarge on requirements of Contract Documents.
 - 2. Approve or accept any portion of the Work.
 - 3. Perform any duties of the Contractor.

1.5 CONTRACTOR'S RESPONSIBILITIES

- A. Cooperate with laboratory personnel. Provide access to Work, and Manufacturer's operations.
- B. Secure and deliver to the laboratory adequate quantities of representative samples of materials proposed to be used and for which testing is specified.
- C. Provide to the laboratory the approved design mixes proposed to be used for concrete, and other material mixes which require control by the testing laboratory.
- D. Furnish copies of Products test reports as required.
- E. Furnish incidental labor and facilities:
 - 1. To provide access to work to be tested.
 - 2. To obtain and handle samples at the Project site or at the source of the product to be tested.
 - 3. To facilitate inspections and tests.
 - 4. For Laboratory's exclusive use for storage and curing of test samples.
- F. Notify laboratory a minimum of 24 hours in advance of operations to allow for laboratory assignment of personnel and scheduling of tests.
 - 1. When tests or inspections cannot be performed after such notice, reimburse laboratory for personnel and travel expenses incurred due to Contractor's responsibility.
- G. Make arrangements with laboratory and pay for additional samples and tests required for Contractor's convenience.
- H. Employ and pay for the services of a separate, equally qualified independent testing laboratory to perform additional inspections, sampling and testing required when initial tests indicate work does not comply with Contract Documents.

2.0 PRODUCTS – NOT USED

3.0 EXECUTION – NOT USED

*****END OF SECTION 01 45 29*****

SECTION 01 45 33 CODE REQUIRED SPECIAL INSPECTIONS AND PROCEDURES

1.0 GENERAL

1.1 REQUIREMENTS

- A. Special Inspections and Structural Testing shall be in accordance with Chapter 17 of the *Building Code of New York State* (BCNYS).
- B. Hold a Special Inspections preconstruction meeting at least seven (7) days prior to the initial planned date for start of construction.
 - 1. Discussion shall include the following:
 - a. Review of specifications and Schedule of Special Inspections for work requiring Special Inspections.
 - b. Responsibilities of Contractor, Owner, Testing Agency, Special Inspector, and Registered Design Professional.
 - c. Notification and reporting procedures.
 - 2. Attendees shall include the Contractor, Owner's representative, Testing Agency, Special Inspector, and Registered Design Professionals for Structural Engineering and for Architecture.

1.2 DEFINITIONS

- A. Registered Design Professional: The licensed Professional Engineer or Registered Architect whose seal appears on the Construction Drawings.
- B. Code Enforcement Official: The Officer or other designated authority charged with administration and enforcement of the BCNYS.
- C. Testing/Inspecting Agency: An agent retained by the Special Inspector or by the Owner and coordinated by the Special Inspector, to perform some of the inspection services on behalf of the Special Inspector. (An example of an Inspecting Agent is a Geotechnical Engineer.)
- D. Statement of Special Inspections: A document prepared by the Registered Design Professional and filed with and approved by the Code Enforcement Official that includes the Schedule of Special Inspections listing the materials and work requiring Special Inspections. This document includes the inspections and verifications required for the project and the individuals, agencies, and/or firms who will be retained to perform these services.
- E. Continuous Special Inspection: The full-time observation of work by the Special Inspector or Testing Agency while the work is being performed.

- F. Periodic Special Inspections: The part-time or intermittent observation of work by the Special Inspector or Testing Agency for work that has been or is being performed and at the completion of the Work.

1.3 QUALIFICATIONS

- A. The Special Inspector and Testing/Inspecting Agency shall be accepted by the Owner.
- B. Special Inspections shall be performed by agents who have relevant experience for each category of inspections indicated on the drawings.
- C. Minimum qualifications of inspection agents are indicated on the drawings.

1.4 SUBMITTALS

- A. The Special Inspector and Testing/Inspecting Agency shall submit to the Registered Design Professional and Code Enforcement Official for review, a copy of their qualifications including the names and qualifications of each of the individual inspectors and technicians who will be performing inspections or tests.
- B. The Special Inspector and Testing/Inspecting Agency shall disclose any past or present business relationship or potential conflict of interest with the Contractor or any of the Subcontractors whose work will be inspected or tested.

1.5 PAYMENT

- A. The Owner will engage and pay for the services of the Special Inspector and Testing/Inspecting Agency.
- B. If any materials requiring Special Inspections are fabricated in a plant not located within 200 miles of the project site, the Contractor shall be responsible for the travel expenses of the Special Inspector or Testing/Inspecting Agency.
- C. The Contractor shall be responsible for the cost of any retesting or re-inspection of work failing to comply with the requirements of the Contract Documents.

1.6 OWNER RESPONSIBILITIES

- A. The Owner will provide the Special Inspector with a complete set of Contract Documents sealed by the Registered Design Professional and approved by the Code Enforcement Official.

1.7 CONTRACTOR RESPONSIBILITIES

- A. The Contractor shall cooperate with the Special Inspector and his agents so that Special Inspections and testing may be performed without hindrance.

- B. As indicated in the Schedule of Special Inspections, the Contractor shall notify the Special Inspector and/or Testing/Inspecting Agency at least 48 hours in advance of a required inspection or test.
- C. The Contractor shall provide incidental labor and facilities to provide access to the Work to be inspected or tested, to obtain and handle samples at the site or at source of products to be tested, to facilitate tests and inspections, and for storage and curing of test samples.
- D. If Special Inspections or testing require the use of the Contractor's scaffolding to access work areas, the Contractor shall provide a competent person to perform the daily evaluation of the scaffolding to verify that it is safe to use. The Contractor shall notify the Special Inspector and Testing Agent of this review before each use. The Contractor is responsible for the safe assembly and stability of the scaffolding.
- E. The Contractor shall keep the latest set of Construction Drawings, field sketches, accepted shop drawings, and specifications at the project site for field use by the Inspectors and Testing Technicians.
- F. The Contractor shall perform remedial work (if required) and sign non-conformance reports stating that remedial work has been completed. The Contractor shall submit signed reports to the Special Inspector as Work proceeds.
- G. The Special Inspection program shall in no way relieve the Contractor of his obligation to perform work in accordance with the requirements of the Contract Documents or from implementing an effective Quality Control program.
- H. The Contractor shall be solely responsible for construction site safety.

1.8 LIMITS ON AUTHORITY

- A. The Special Inspector or Testing/Inspecting Agency shall not release, revoke, alter, or enlarge on the requirements of the Contract Documents.
- B. The Special Inspector or Testing/Inspecting Agency shall not have control over the Contractor's means and methods of construction.
- C. The Special Inspector or Testing/Inspecting Agency shall not be responsible for construction site safety.
- D. The Special Inspector or Testing/Inspecting Agency shall not have the authority to stop the Work.

2.0 INSPECTIONS AND TESTING

- A. The Contractor shall follow the Special Inspection requirements developed by the Registered Design Professional of Record.

3.0 DOCUMENTATION**3.1 RECORDS AND REPORTS**

- A. Detailed reports shall be prepared of each test or inspection. The reports shall include the following general information:
1. Project name and number.
 2. Date of test or inspection.
 3. Name of Testing Agency or Inspecting Agency.
 4. Name of technician or inspector.
 5. Weather conditions.
 6. Locations and elevations of specific areas tested or inspected referenced to gridlines.
 7. Description of test or inspection.
 8. Reference to applicable ASTM standard.
 9. Summary of observations, results, and recommendations.
 10. Description of any areas or materials requiring retesting or re-inspection.

3.2 COMMUNICATION

- A. The Testing/Inspecting Agency shall immediately notify the Owner, Contractor, Special Inspector, and Registered Design Professional by telephone or email of any test results failing to comply with the requirements of the Contract Documents.
- B. The Special Inspector shall immediately notify the Contractor of any work found to be in nonconformance with the Contract Documents during inspections. If the nonconforming work is not corrected while the Special Inspector is on-site, the Special Inspector shall notify the Owner and Registered Design Professional within 24 hours (one business day) and issue a nonconformance report. The Special Inspector may use the Special Inspection Non-Conformance Report form at the end of this section or other similar form.
- C. If the nonconforming work is not corrected at the time of substantial completion of the structure or other appropriate time, the Special Inspector shall notify the Owner.

3.3 DISTRIBUTION OF REPORTS

- A. The Testing/Inspecting Agency shall submit reports to the Owner, Special Inspector and the Registered Design Professional within seven (7) days of the inspection or test. Reports may be submitted in the ePM system.

- B. The Special Inspector shall submit reports to the Owner and Registered Design Professional within seven (7) days of the inspections. Reports may be submitted in the ePM system
- C. If requested by the Code Enforcement Official, the Special Inspector shall submit interim reports which include all inspections and tests performed since the beginning of construction or since the previous interim report. Interim reports shall be addressed to the Code Enforcement Official with copies sent to the Registered Design Professionals (Structural Engineer and Architect) and Contractor. Interim reports shall be signed by the agent performing inspections.

3.4 FINAL REPORT OF SPECIAL INSPECTIONS

- A. At the completion of Work, each Testing/Inspecting Agency shall electronically submit an Agent's Final Report of Special Inspections to the Special Inspector stating that work was completed in substantial conformance with the Contract Documents and that appropriate inspections and tests were performed. The Testing/Inspecting Agency may use the Agent's Final Report of Special Inspections form provided at the end of this section or other similar form.
- B. At the completion of Work, the Special Inspector shall compile all inspection and test reports generated by each Agent into a Final Report of Special Inspections. The Final Report of Special Inspections shall state that required inspections have been performed and shall itemize any nonconforming work not corrected or resolved.
- C. The Special Inspector may use the Final Report of Special Inspections form provided at the end of this section or other similar form based on CASE Form 102-2001.
- D. The Special Inspector shall submit The Final Report of Special Inspections to the Owner, Registered Design Professional and Code Enforcement Official prior to issuance of a Certificate of Use and Occupancy.

SPECIAL INSPECTION NON-CONFORMANCE REPORT NO.

DATE: _____

TO:

CC: Contractor:

FROM: _____, Special Inspector

PROJECT:

PART I: REFERENCE SPECIAL INSPECTION REPORT NO.

(Attach copy of report)

DESCRIPTION OF NON-CONFORMANCE:

RDP RESPONSE: (PROVIDE ATTACHMENTS IF NECESSARY)

.....
RDP SIGNATURE _____ DATE _____

IS RE-INSPECTION BY SPECIAL INSPECTOR REQUIRED ☐ YES ☐ NO

PART II: CONTRACTOR VERIFICATION (To be completed by either the *[General Contractor or Construction Manager]* or Subcontractor and returned to the Special Inspector and the RDP.)

I verify that as of the date listed, the non-conforming item noted above has been corrected as required.

Date Completed _____ By _____
(Contractor's Site Representative)

**MYRON TAYLOR
JANE FOSTER ELEVATOR
MODERNIZATION 2026**

**CODE-REQUIRED
SPECIAL INSPECTIONS
AND PROCEDURES**

**01 45 33-6
MAY 15, 2026**

AGENT'S FINAL REPORT OF SPECIAL INSPECTIONS

Project Name: _____ Special Inspector: _____

Location: _____ Agent: _____

Special Inspector's Project: _____

Agent's Project: _____

To the best of my information, knowledge, and belief, the Special Inspections or testing required for this project and designated for this Agent in the Statement of Special Inspections (which includes the Schedule of Special Inspections) submitted for permit have been performed and discovered discrepancies have been reported and resolved other than the following:

Comments:

[Attach continuation sheets if required to complete description of uncorrected discrepancies.]

Respectfully submitted,
Agent of the Special Inspector

(Type or print name)

Signature Date

Address

City, State, Zip

Design Professional Seal
or Certification

**FINAL REPORT OF SPECIAL INSPECTIONS
AND STRUCTURAL OBSERVATIONS**

Project Name: _____ Registered Design Professionals
Location: _____ Architecture: *Name*
Address
Owner: CORNELL UNIVERSITY
Owner's Address: Structural Engineering: *Name*
Address
Special Inspector: *Name*
Address

To the best of my information, knowledge, and belief, the Special Inspections required for this project and itemized in the Statement of Special Inspections (which includes the Schedule of Special Inspections) submitted for permit have been performed and discovered discrepancies have been reported and resolved other than the following:

Comments:

[Attach continuation sheets if required to complete description of uncorrected discrepancies.]

Interim reports submitted prior to this final report form a basis for and are to be considered an integral part of this final report. Agent's Final Reports of Special Inspections are attached and are also a part of this Final Report.

Respectfully submitted,

Special Inspector

(Type or print name)

Signature

Date

Professional Seal

*****END OF SECTION 01 45 33*****

**MYRON TAYLOR
JANE FOSTER ELEVATOR
MODERNIZATION 2026**

**CODE-REQUIRED
SPECIAL INSPECTIONS
AND PROCEDURES**

**01 45 33-8
MAY 15, 2026**

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.

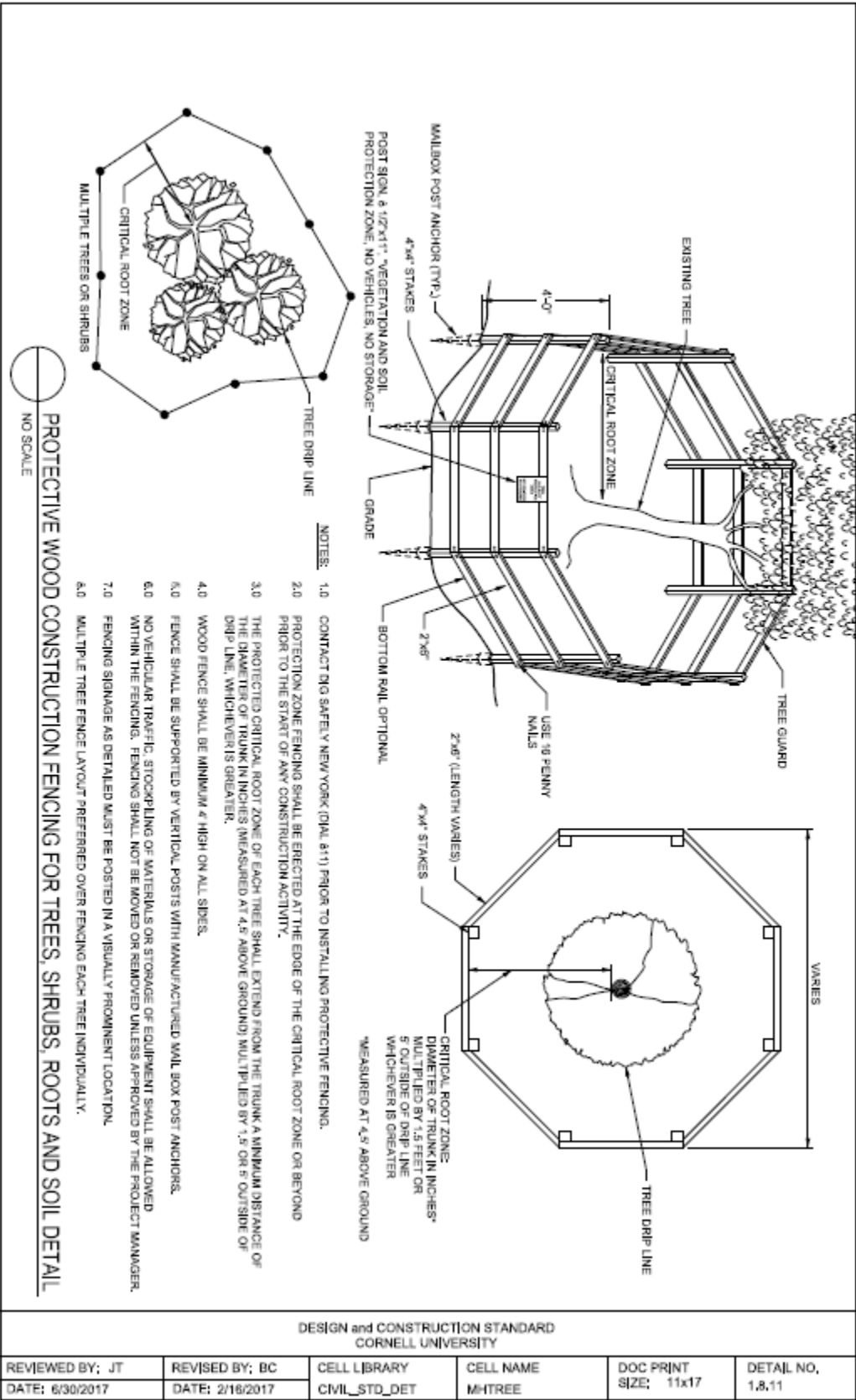
2.7 TEMPORARY WATER CONTROL

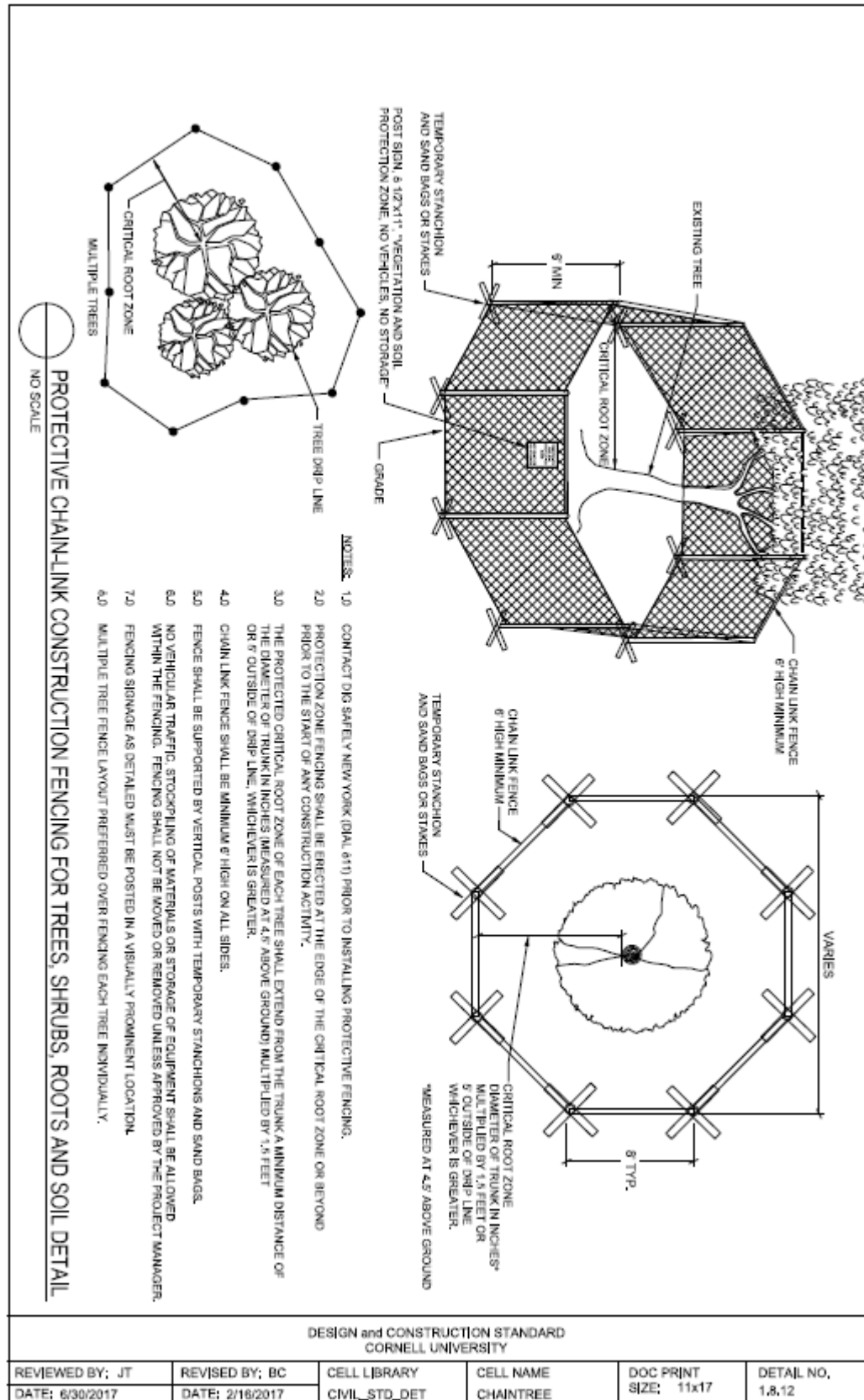
- A. The Contractor shall provide, maintain and operate pumps required to keep the Work free of water at all times.
- B. Dispose of all water with due care and shall not infringe on the rights of others on the Site, of adjacent property owners and of the public. All cost in connection with the removal of such water shall be paid by the Contractor.

2.8 TREE, PLANT AND LAWN PROTECTION

- A. Preserve and protect existing trees, plants and lawns at the site which are designated to remain, and those adjacent to the site.
- B. Consult with Owner, and remove agreed-on roots and branches which interfere with construction.
 - 1. Employ certified arborist to remove, and to treat cuts.
- C. Provide temporary fences to a height of six feet, around each, or around each group of trees and plants. Provide temporary lawn protection to prevent soil compaction. Reference Cornell University Design Standards and Details for wood and chain fencing below.

- D. Protect root zones of trees, plants and lawn areas:
 - 1. Do not allow vehicular traffic or parking.
 - 2. Do not store materials or products.
 - 3. Prevent dumping of refuse or chemically injurious materials or liquids.
 - 4. Prevent puddling or continuous running water.
- E. Carefully supervise excavating, grading and filling, and subsequent construction operations to prevent damage.
- F. Replace, or suitably repair, trees, plants and lawn areas designated to remain which are damaged or destroyed due to construction operations.
- G. Roots 2 inches or larger that are damaged or cut during construction are to be sawed off close to the tree side of the excavation by certified arborist.
- H. During the leafing-out period in the spring, extra care should be exercised to reduce root damage such as keeping exposed roots wet, saturating soil when backfilling around roots, and backfilling as soon as possible.
- I. Consult Cornell University Grounds Department for mitigation of root or tree damage.





2.9 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.

2.10 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.

2.11 PROJECT IDENTIFICATION AND SIGNS

- A. No Contractor signs to be displayed at the project site, unless authorized by the Owner in writing.

2.12 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.

2.13 FIELD OFFICES

- A. The Owner shall designate a space within the facility to serve as a field office for the use of the Contractor and Owner.

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 USE OF ELEVATOR

- A. Use of Existing Elevator
 - 1. If the Contractor elects to use the existing elevator equipment, the Contractor shall:
 - a. Provide adequate protection for such equipment and shall operate such equipment within a capacity not to exceed that allowed by law, rule or regulation.

- b. Provide for the maintenance and cleaning of the elevator equipment as approved by the Owner's Representative.
- c. Prior to start of construction, accurately record the condition of the existing elevator. Promptly repair or replace items that are damaged as a result of Contractor's use. Service calls that arise as a result of Contractor misuse will be charged to the Contractor. At Substantial Completion, restore elevators to condition existing before initial use.
- d. Use only elevators designated by Owner's Representative at dates and times designated by Owner's Representative. Dates and times available for Contractor's use shall be scheduled with, and at the convenience of, the Owner, and may vary during the course of the Project.
- e. Owner will not provide elevator operators or other monitoring of elevator use.
- f. Do not load elevators beyond their rated weight capacity.
- g. Provide code compliant protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator maintenance contractor to restore damaged work so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.
- h. Procure and coordinate the elevator maintenance contractor to gain access to the elevator shaft as required to complete the Work

2.4 TEMPORARY HEAT AND VENTILATION

- A. The Contractor shall furnish temporary heat as may be necessary for constructing the Work.
- B. The Contractor will be permitted to use the building's permanent heating system for temporary heat. Permission to use the building's permanent heating system shall in no way constitute the Owner's acceptance of that portion of the Work.
- C. When using the permanent building systems for space conditioning, provide a written maintenance plan for acceptance by the Owner's Representative, prior to utilizing the equipment. Plan to address temporary filtering of air and water, sealing of open ducts, lubrication, operation outside of normal ranges, and controls/safeties. Return all equipment to its newly installed condition prior to acceptance testing.
 - 1. If the Contractor elects to use the building's permanent heating system for temporary heat, the Contractor shall provide filters with a minimum MERV of 8 at each return-air grille in system, maintain to keep them free of dust and debris, replace if necessary and remove at end of construction and clean HVAC system as required in Section 01 77 00 – Project Closeout.
- D. Any temporary system shall be removed when no longer required.

- E. During heating cycles the enclosures separating the interior building areas from outside shall be maintained closed to conserve heat energy.
- F. The Contractor shall provide for ventilation of all structures until physical completion of the Work and shall control such ventilation to avoid excessive moisture levels and rates of drying of construction materials, including but not limited to concrete and to plaster, and to prevent condensation on sensitive surfaces. The Contractor shall be responsible for any moisture intrusion that is detrimental to the Project.

2.5 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.

2.6 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 51 23 HEAT DURING CONSTRUCTION

1.0 GENERAL

1.1 DESCRIPTION

- A. The Contractor shall maintain existing or temporary building heating systems to accomplish the following:
 - 1. Protect the existing facility and facility plumbing systems against damage due to cold temperatures.
 - 2. Provide sufficient heat so that the Work can be accomplished in accordance with the Contract Documents.
 - 3. Maintain construction schedules as required by the Contract.
- B. Include in the bid price an amount necessary to provide Construction Heat as required.
- C. Existing central steam systems may be used to the extent that they do not interfere with the safe and effective completion of Work. However, any modifications to existing systems shall be corrected prior to the conclusion of Work.
- D. No natural gas is available to the facility for temporary heat.
- E. At the conclusion of the project the facility heating systems shall be returned to functional order as necessary to protect the building and facility plumbing systems.

1.2 RESPONSIBILITY

- A. The Contractor shall include in the bid the cost of the temporary heat.
- B. The Contractor shall be responsible for repairs to the facility necessitated by the failure to provide heat during any portion of the Work.

2.0 PRODUCTS – NOT USED

3.0 EXECUTION – NOT USED

*****END OF SECTION 01 51 23*****

SECTION 01 57 13 SOIL EROSION AND SEDIMENT CONTROL

1.0 GENERAL

1.1 DESCRIPTION

- A. The Contractor shall be responsible for preparing and implementing an Erosion and Sediment Control Plan.
- B. This Section describes minimum standards for the prevention and control of erosion during the construction process and may not be sufficient for all sites. The Contractor shall remain responsible for the means and methods of preventing erosion and may be required to employ additional means and methods as required to prevent violations of local, state, or federal standards.
- C. Contractor shall be responsible for regulatory fines and/or delays resulting from Contractor's failure to adhere to the plan or correct deficiencies identified during inspections.

1.2 SUBMITTALS

- A. Submit an Erosion and Sediment Control Plan, as specified herein.
- B. Refer to Section 01 33 00 – Submittal Procedures.

1.3 PLAN AND IMPLEMENTATION GENERAL REQUIREMENTS

- A. Plan shall comply with design specifications in the New York Guidelines for Urban Erosion and Sediment Control, NYS Stormwater Management Design Manual, NYSDEC Technical and Operational Guidance Series, local storm water codes, good engineering practices, and this Section.
- B. Erosion and Sediment Control Plan shall be reviewed and approved by the Environment, Health and Safety Office, and implemented prior to any site work. Contact information for EHS can be found at: <https://ehs.cornell.edu/about-us/contact-us>
- C. Maintain Erosion and Sediment Control measures throughout the course of site construction activities until vegetative growth is established to the Owner's satisfaction.
- D. At conclusion of the Project, remove all remaining temporary erosion control structures and properly dispose of accumulated sediment on-site in areas approved by the Owner.

1.4 PERFORMANCE STANDARDS

- A. At no time shall construction operations or any related disturbance of the site result in the impairment of local waterways. "Impairment" is defined by regulations as including, but not limited to, the following:
 - 1. The release of water into receiving waters that causes a substantial visible contrast to natural conditions; or
 - 2. The deposition of significant sediment into such waters.
- B. Such deficiencies shall be corrected immediately by the Contractor to prevent further impairment.
- C. In addition, and without notice to the Contractor, the Owner shall also have the right, based on the Owner's independent assessment, to stop work or engage other contractor(s) to construct or correct such work as may be necessary to prevent the impairment of waterways, and to charge all costs related to such corrective or additional actions against the Contract.
- D. Acceptance of an Erosion and Sediment Control plan shall not in any way imply that the plan will be adequate in preventing impairment of waters, or that maintenance and modification will not be necessary. Rather, acceptance of the plan authorizes the Contractor to begin installation of the control measures under the assumption the appropriate maintenance and modification will be required throughout the life of the project to meet the project requirements.
- E. The Contractor's responsibilities under this Section shall end upon final completion and payment of the Work of the entire Contract.

1.5 EROSION AND SEDIMENT CONTROL PLAN COMPONENTS

- A. The Erosion and Sediment Control Plan submitted shall specifically address project measures, features, and areas critical to proper site erosion and sediment control. The Plan shall specifically include, but are not limited to, the following:
 - 1. Site Map, to scale;
 - 2. Measures to prevent stormwater from running onto the disturbed areas of the site;
 - 3. Inlet protection for storm sewers and catch basins;
 - 4. Measures to be used for dewatering; and
 - 5. Measures to be used for soil stabilization, runoff control, and sediment control, including specific measures for the following:
 - a. Site entrance stabilization
 - b. Staging areas
 - c. Material and soil stock piles

- d. Concrete curing operations
- e. Disturbed areas of the site

In addition to the requirements included in these specifications, specific erosion control measures shown on the Contract Drawings, if any, shall also be required.

- B. All features shall be designed and installed in accordance with the references included in Paragraph 1.3 – Plan and Implementation General Requirements of this Section.
- C. Keep access roads and public roads clear of mud and construction debris at all times. Maintain dust control measures throughout construction.

1.6 INSPECTIONS

- A. At the sole discretion of the Owner, inspections may be performed by a third party or on-staff representative of the Owner.
 - 1. The Owner may inspect the site at any time, without prior notification, for compliance with the Erosion and Sediment Control Plan and applicable local, state and federal regulations. Any instances of non-compliances or failure to meet the performance standards found must be resolved within 24 hours, with more immediate responses as required to mitigate active erosion during storm events or similar instances.
 - 2. Modify the Erosion and Sediment Control Plan as necessary, to provide full compliance with the performance standards.

2.0 PRODUCTS – NOT USED

3.0 EXECUTION – NOT USED

*****END OF SECTION 01 57 13*****

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:
 - a. Foundation construction

- b. Bearing and retaining walls
 - c. Structural concrete
 - d. Structural steel and lintels
 - e. Structural decking
 - f. Miscellaneous structural metals
 - g. Exterior wall back-up supports and anchoring systems
 - h. Piping, ductwork, vessels, and equipment supports
 - i. Equipment supports
- 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.
- 1. Obtain written approval of the cutting and patching proposal before cutting and patching the following operating elements or safety related systems:
 - a. Primary operational systems and equipment
 - b. Air or smoke barriers
 - c. Water, moisture, or vapor barriers
 - d. Membranes and flashings
 - e. Fire protection systems
 - f. Control systems
 - g. Communication systems
 - h. Electrical wiring systems
 - i. Operating systems of special construction for MEP work
- 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 for 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 22 FIXED EQUIPMENT INVENTORY

1.0 GENERAL

1.1 FIXED EQUIPMENT INVENTORY

- A. The Owner shall provide the Contractor with a list of Equipment Types to be inventoried and an Excel template.
- B. The Contractor shall populate the template (see Example Equipment List to be inventoried in Section 1.2). Once populated, the Contractor shall electronically return the list to the Owner's Representative. The initial data to be captured on each piece of equipment shall include:
 - 1. Name of Product
 - 2. Equipment Classification
 - 3. Manufacturer
 - 4. Model Number
 - 5. Serial Number
 - 6. Cost
 - 7. Location (including Building and Room Number)
 - 8. Acquisition Date (Date of Installation)
- C. The Owner shall from the Contractor provided data, create a follow-up equipment Excel template that contains the MAXIMO ID for the equipment with all the name plate and specification fields for each type of equipment. This template shall then be returned to the Contractor.
- D. The Contractor shall be responsible for the initial labeling of the equipment and its' disconnects with the MAXIMO ID using an electronic label maker. ID labels shall be in close proximity to Equipment Identification information, visually locatable from the access point to the equipment and on the face of disconnects.
- E. The Contractor shall then populate the MAXIMO Equipment Specification Template with the equipment nameplate, specification information, and warranty information. The Contractor shall electronically submit the equipment data and any related documentation (i.e. - O&M manuals) to the Owner's Representative.

F. EXAMPLE EQUIPMENT LIST

- Building Equipment
- AC Drive/VSD
- Air Dryer
- Backflow Preventor
- Air Compressor
 - Building
 - Sprinkler
 - Control
 - Vacuum
- Pump
 - Condensate
 - Glycol
 - CWC
 - HWC
 - Potable
 - Sanitary Sewer
 - Storm Sewer
 - Sump
 - Quality Water
 - Fuel
- Fan
 - Exhaust
 - Supply
 - Return
- Fume Hood
- Furnace
- Generator
- Hot Water Heater
- Heat Exchangers
- Boiler
- Tank
- Unit Heater
- Fan Coil
- VAV Box
- Transfer Switch
- Motor
 - Pump
 - Fan
- Lift/Levelers
- Water Softener
- Reverse Osmosis

2.0 PRODUCTS – NOT USED

3.0 EXECUTION – NOT USED

*****END OF SECTION 01 78 22*****

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 or 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. Survey Mapping

1. Provide an accurate topographic, planimetric, utility map of as-built conditions, and mapped locations and elevations of constructed facilities / elements including as-built and exposed underground utilities. Survey work in progress as required to accurately locate constructed facilities / elements. Survey final condition of project extents at final acceptance.
 - a. Site related elements including:
 - Sidewalks, ramps, curbs, and gutters - indicate type and surface material.
 - Streets, driveways, parking areas, labeled with material.
 - Fences, walls, steps, handrails, signs, site furniture and light fixtures labeled with material.
 - Live trees which have a trunk diameter of three inches (3") or greater and all isolated or specimen trees. Measure tree trunk 3' above grade. Indicate approximate trunk diameter, "drip line" and common name of tree.
 - Shrubs, show outlines of shrub masses.
 - Streams and bodies of water.
 - b. Utility related elements and supporting infrastructure including:
 - The Contractor shall provide GPS points on all utility infrastructure: water, steam, chilled water, storm, sewer, electric, telecommunications, etc. Data is to be sent to the Owner on a quarterly basis throughout the project.
 - Manholes, catch basins, drain inlets, cleanouts, vent stacks, tanks, underdrains, foundation drains, monitoring wells, detention/retention/filtration facilities. Label type (sanitary or storm), dimensions and material of structure and cover/grate; pipe connections; sizes, materials, direction of flow and invert elevations. Locate and identify size, material, and invert elevations for culverts.
 - Water, gas, central steam, chilled water or other pressure lines, valve boxes, meter boxes, hydrants, tanks, fittings, etc. Label type, size, material, elevations at building walls and all intersections, connections and vertical angle changes.
 - Utility poles, above and below ground lines including but not limited to power, street lighting, traffic control communication and sensors, telephone, television, communication, fire and police call boxes, public communication or display facilities. Label utility as direct buried, in conduit, or concrete encased duct. Identify elevations at building walls and all intersections, connections and vertical angle changes. Label all utilities and associated duct banks or conduits with sizes and materials.

- Existing and abandoned utilities exposed during construction. Show ends of abandoned utilities left in place and assumed continued direction of utilities. Label with information as listed above.
- 2. Survey mapping shall be done under the personal supervision of a Surveyor, registered in and licensed by the State of New York, who shall certify under his/her seal the accuracy of the survey.
- 3. Field Survey Accuracy:
 - Horizontal and Vertical mapping shall be ACSM Second Order Class II, 1 in 20,000.
- 4. Coordinate base:
 - NAD83-86 geodetic system with grid values in the New York Central State Plane coordinate system in feet with elevations in NAVD '88 in feet.
- 5. Each different feature shall be drafted on a separate named CAD level/layer in Revit or AutoCAD format using industry standard symbology of color, line style, line weight, and cells.
- 6. Provide an ASCII file list of coordinates for all survey points including control, feature, and topographic in the following comma delimited format: Point number, Northing coordinate, Easting coordinate, Elevation coordinate, Point description.
- 7. Topography and spot elevations:
 - a. Topographic contours shall be accurately plotted at one foot (1') contour intervals.
 - b. Record spot grade elevations as follows:
 - i. Within natural ground and lawn and planted areas, spot elevations shall be shown to one-tenth of a foot (0.1'). Within all areas of built-up improvements such as pavements, curbs, steps, walls, utility and drainage systems or other site improvements, spot elevations shall be shown to one-hundredth of a foot (0.01').
 - ii. Existing grade at building corners; and thresholds and finished floor at all entrance, exit, or access points.
 - iii. Develop road cross sections at 50-foot intervals maximum, record spot elevations for all drive centerlines and all beginning radius of street intersections. For each cross section obtain elevations for front and back of existing sidewalk, top and bottom of curb, and centerline of the street. Obtain elevations for centerline intersection of all roads.
 - iv. For trees of three inches to eighteen inches (3" - 18") in diameter, record elevation at high and low side at base of trunk. For specimen trees of eighteen inches (18") or greater diameter, indicate four (4) spot elevations on the north, south, east, and west at base of each trunk to one-hundredth (.01) foot elevation.

- v. Base, top, corners, and at cheek walls for all steps. Indicate elevations at top and bottom of walls and curbs.
- vi. Rim elevations of all catch basins, drain inlets, manholes, valve boxes, slabs on grade. Inverts at all sewer pipes and culverts. Bottom of structure floor and sump.

D. 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. Civil and Structural

- a. Dimensions for load carrying elements, both horizontal and vertical
- b. Materials and products where submittals are requested
- c. Load carrying elements and foundation systems
- d. Site related elements including:
 - Building outlines, entranceways, areaways, roof overhangs, downspouts, significant architectural projections and other pertinent data.
- e. All significant changes in foundations, columns, beams, openings, concrete reinforcing, lintels, concealed anchorages and "knock-out" panels made during construction.
- f. Building envelope systems including roofing systems and building shell systems

- g. Geotechnical subsurface information
 - h. Items that will require future maintenance
 - i. Life safety critical items
- 3. 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.
- 4. 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.
- 5. Environmental
 - a. Utility related elements and supporting infrastructure
 - b. Storm water maintenance/testing access points
 - c. Location of unusual excavation findings / contaminated soil (i.e. mercury uncovered during excavation, also on-site spills during construction), including quantity excavated/disposed.

E. 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

**MYRON TAYLOR JANE FOSTER
ELEVATOR MODERNIZATION 2026**

**CORNELL UNIVERSITY
ITHACA, NEW YORK**

DIVISION 8 OPENINGS

SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Standard hollow metal doors and frames.
2. Tempered glass in doors.

B. Related Sections:

1. Division 8 Section “Door Hardware” for door hardware for hollow metal doors.
2. Division 9 Sections “Interior Painting” for field painting hollow metal doors and frames.

1.03 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings.

- B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, fire-resistance rating, and finishes.

- B. Shop Drawings: Include the following:

1. Elevations of each door design.
2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening conditions.
6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.
8. Details of molding, removable stops, and glazing.
9. Details of conduit and preparations for power, signal, and control systems.

- C. Samples for Initial Selection:

1. Glass for doors or interior windows.

- D. Other Action Submittals:

1. Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.
- E. Oversize Construction Certification: For assemblies required to be fire rated and exceeding limitations of labeled assemblies.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of hollow metal door and frame assembly.

1.05 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.
- B. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9. Label each individual glazed lite.
- C. Smoke-Control Door Assemblies: Comply with NFPA 105 or UL 1784.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use non-vented plastic.
 1. Provide additional protection to prevent damage to finish of factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4" high wood blocking. Do not store in a manner that traps excess humidity.
 1. Provide minimum 1/4" space between each stacked door to permit air circulation.

1.07 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.08 COORDINATION

- A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Republic Doors and Frames.
 - 2. Ceco Door Products.
 - 3. Steelcraft.

2.02 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z (12G) coating designation; mill phosphatized.
 - 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot dip galvanized according to ASTM A 153/A 153M, Class B.
- D. Inserts, Bolts, and Fasteners: Hot dip galvanized according to ASTM A 153/A 153M.
- E. Grout: ASTM C 476, except with a maximum slump of 4", as measured according to ASTM C 143/C 143M.
- F. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6-to 12-lb/cu. ft. (96-to 192-kg/cu. m) density; with maximum flame-spread and smoke-development indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
- G. Glazing: Comply with requirements in Division 8 Section "Glazing".
- H. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.03 STANDARD HOLLOW METAL DOORS

- A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.
 - 1. Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush).
- B. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

- C. Fabricate concealed stiffeners and hardware reinforcement from either cold-or hot-rolled steel sheet.

2.04 STANDARD HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Interior Frames: Fabricated from cold-rolled steel sheet.
 - 1. Fabricate frames with mitered or coped corners.
 - 2. Fabricate frames as face welded unless otherwise indicated.
 - 3. Frames for Level 2 Steel Doors: 0.053" thick steel sheet.
 - 4. Frames for Borrowed Lights: Same as adjacent door frame.
- C. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.

2.05 FRAME ANCHORS

- A. Jamb Anchors:
 - 1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042" thick.
- B. Floor Anchors: Formed from same material as frames, not less than 0.042" thick, and as follows:
 - 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.06 HOLLOW METAL PANELS

- A. Provide hollow metal panels of same materials, construction, and finish as specified for adjoining hollow metal work.

2.07 GLASS AND GLAZING

- A. Door Glass:
 - 1. Basis of Design Product: Provide Firelite or approved equal.
 - a. 45 min. ceramic glass.

2.08 STOPS AND MOLDINGS

- A. Moldings for Glazed Lites in Doors: Minimum 0.032" thick, fabricated from same material as door face sheet in which they are installed.
- B. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of $\frac{5}{8}$ " high unless otherwise indicated.
- C. Loose Stops for Glazed Lites in Frames: Minimum 0.032" thick, fabricated from same material as frames in which they are installed.

2.09 ACCESSORIES

- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

2.10 FABRICATION

- A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/NAAMM-HMMA 861.
- C. Hollow Metal Doors:
1. Glazed Lites: Factory cut openings in doors.
 2. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum $\frac{3}{4}$ " beyond edge of door on which astragal is mounted.
- D. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
 2. Sidelight Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
 3. Provide countersunk, flat-or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 4. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
 5. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Stud-Wall Type: Locate anchors not more than 18" from top and bottom of frame. Space anchors not more than 32" o.c. and as follows:
 - i. Three anchors per jamb up to 60" high.
 - ii. Four anchors per jamb from 60" to 90" high.
 - iii. Two anchors per head for frames above 42" wide and mounted in metal-stud partitions.
 - b. Compression Type: Not less than two anchors in each jamb.
 6. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

- E. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold-or hot-rolled steel sheet.
- F. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 8 Section “Door Hardware”.
 - 1. Locate hardware as indicated, or if not indicated, according to ANSI/NAAMM-HMMA 861.
 - 2. Reinforce doors and frames to receive non-templated, mortised and surface-mounted door hardware.
 - 3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
- G. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
 - 1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
 - 2. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
 - 3. Provide loose stops and moldings on inside of hollow metal work.
 - 4. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.11 STEEL FINISHES

- A. Prime Finish: Apply manufacturer’s standard primer immediately after cleaning and pretreating.
 - 1. Shop Primer: Manufacturer’s standard, fast-curing, lead-and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

- B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:
 - 1. Squareness: Plus, or minus 1/16", measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - 2. Alignment: Plus, or minus 1/16", measured at jambs on a horizontal line parallel to plane of wall.
 - 3. Twist: Plus, or minus 1/16", measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - 4. Plumbness: Plus, or minus 1/16", measured at jambs on a perpendicular line from head to floor.
- C. Drill and tap doors and frames to receive non-templated, mortised, and surface-mounted door hardware.

3.03 INSTALLATION

- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with HMMA 840.
 - 1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. At fire-protection-rated openings, install frames according to NFPA 80.
 - b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - c. Install frames with removable glazing stops located on secure side of opening.
 - d. Install door silencers in frames before grouting.
 - e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - g. Field-apply bituminous coating to backs of frames that are filled with grout containing anti-freezing agents.
 - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post installed expansion anchors.
 - a. Floor anchors may be set with powder-actuated fasteners instead of post installed expansion anchors if so indicated and approved on Shop Drawings.
 - 3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
 - 4. In-Place Gypsum Board Partitions: Secure frames in place with post installed expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 - 5. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

- a. Squareness: Plus, or minus 1/16", measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus, or minus 1/16", measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus, or minus 1/16", measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus, or minus 1/16", measured at jambs at floor.
- C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
 1. Non-Fire-Rated Standard Steel Doors:
 - a. Jambs and Head: 1/8" plus or minus 1/16".
 - b. Between Edges of Pairs of Doors: 1/8" plus or minus 1/16".
 - c. Between Bottom of Door and Top of Threshold: Maximum 3/8".
 - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4".
 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
 3. Smoke-Control Doors: Install doors according to [NFPA 105].
- D. Glazing: Comply with installation requirements in Division 8 Section "Glazing" and with hollow metal manufacturer's written instructions.
 1. Secure stops with countersunk flat-or oval-head machine screws spaced uniformly not more than 9" o.c. and not more than 2" o.c. from each corner.

3.04 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow metal work immediately after installation.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

END OF SECTION 08 11 13

DIVISION 8 OPENINGS

SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section includes:

- 1. Mechanical door hardware for the following:

- a. Swinging doors.

- B. Related Sections:

- 1. Division 8 Section “Hollow Metal Doors and Frames” for astragals provided as part of labeled fire-rated assemblies and for door silencers provided as part of hollow-metal frames.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.

- B. Other Action Submittals:

- 1. Door Hardware Schedule: Prepared by or under the supervision of Installer, detailing fabrication, and assembly of door hardware, as well as installation procedures and diagrams. Coordinate final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

- a. Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
 - b. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
 - c. Content: Include the following information:
 - i. Identification number, location, hand, fire rating, size, and material of each door and frame.
 - ii. Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
 - iii. Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product. Fastenings and other pertinent information.

- iv. Explanation of abbreviations, symbols, and codes contained in schedule.
 - v. Mounting locations for door hardware.
 - vi. List of related door devices specified in other Sections for each door and frame.
 - 2. Keying Schedule: Vendor to provide two key blanks for each cylinder. Contractor to turn cylinders and keys over to Cornell Project Manager who will deliver to Cornell lock shop who will perform final keying.
 - C. Qualification Data: For Installer.
 - D. Product Certificates: For electrified door hardware, from the manufacturer.
 - 1. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
 - E. Product Test Reports: For compliance with accessibility requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.
 - F. Maintenance Data: For each type of door hardware, include in maintenance manuals. Include final hardware and keying schedule.
 - G. Warranty: Special warranty specified in this Section.
- 1.04 QUALITY ASSURANCE
- A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and an Architectural Hardware Consultant who is available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
 - 1. Warehousing Facilities: In Project's vicinity.
 - 2. Scheduling Responsibility: Preparation of door hardware and key blank schedule.
 - B. Source Limitations: Obtain each type of door hardware from a single manufacturer to match Cornell Standards.
 - C. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated, provide door hardware rated for use in assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C, unless otherwise indicated.
 - D. Smoke-and Draft-Control Door Assemblies: Where smoke-and draft-control door assemblies are required, provide door hardware that meets the requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
 - 1. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at the tested pressure differential of 0.3" wg (75 Pa) of water.

- E. Means of Egress Doors: Latches do not require more than 15 lbf (67 N) to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
- F. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines] [ICC/ANSI A117.1].
 - 1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf (22.2 N).
 - 2. Comply with the following maximum opening-force requirements:
 - a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
 - 3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than ½" (13 mm) high.
 - 4. Adjust door closer sweep periods so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3" (75 mm) from the latch, measured to the leading edge of the door.
- G. Keying Conference: Not required. Final keying by Cornell.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
- B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
- C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.
- D. Deliver keys and permanent cores to Owner by registered mail or overnight package service.

1.06 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete. Concrete, reinforcement, and formwork requirements are specified in Division 3.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- D. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.

1.07 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including excessive deflection, cracking, or breakage.
 - b. Faulty operation of doors and door hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
 - 2. Warranty Period: Three years from date of Substantial Completion, unless otherwise indicated.

PART 2 - PRODUCTS

2.01 SCHEDULED DOOR HARDWARE

- A. Provide door hardware for each door as scheduled in Part 3 "Door Hardware Schedule" and shown on the Contract Drawings. Each article to comply with requirements in this Section.
 - 1. Door Hardware Sets: Provide quantity, item, size, finish, or color indicated, and products equivalent in function and comparable in quality to named products.
- B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Schedule" Article. Products are identified by using door hardware designations, as follows:
 - 1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. The conformance to specific building and Cornell standard takes precedence. Manufacturers' names are abbreviated in Part 3 "Door Hardware Schedule" Article.
 - 2. References to BHMA Designations: Provide products complying with these designations and requirements for description, quality, and function.

2.02 HINGES

- A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
 - a. Stanley Commercial Hardware; Div. of The Stanley Works.

2.03 MECHANICAL LOCKS AND LATCHES

- A. Lock Functions: As indicated in door hardware schedule.
- B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:

1. Bored Locks: Minimum $\frac{1}{2}$ " (13-mm) latchbolt throw.
 2. Mortise Locks: Minimum $\frac{3}{4}$ " (19-mm) latchbolt throw.
 3. Deadbolts: Minimum [1.25" (32-mm)] bolt throw.
- C. Lock Backset: $2\frac{3}{4}$ " (70 mm), unless otherwise indicated.
- D. Lock Trim:
1. Description: Match existing trim (Satin Brass finish).
- E. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.
1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
 2. Rabbet Front and Strike: Provide on locksets for rabbeted meeting stiles.
- F. Bored Locks: BHMA A156.2; Grade [1] [2]; Series 4000.
1. Manufacturers: Subject to compliance with requirements, provide products by the following (No Substitution):
 - a. Schlage Commercial Lock Division.
- G. Mortise Locks: BHMA A156.13; stamped steel case with steel or brass parts; Series 1000.
1. Manufacturers: Subject to compliance with requirements, provide products by the following (No Substitution):
 - a. Schlage Commercial Lock Division.
- 2.04 SURFACE BOLTS
- A. Surface Bolts: BHMA A156.16.
1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
 - a. IVES Hardware.
- 2.05 MANUAL FLUSH BOLTS
- A. Manual Flush Bolts: BHMA A156.16; minimum $\frac{3}{4}$ " (19-mm) throw; designed for mortising into door edge.
1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
 - a. IVES Hardware.

2.06 LOCK CYLINDERS

- A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.
 - 1. Manufacturer: Same manufacturer as for locking devices.
- B. Standard Lock Cylinders: BHMA A156.5; permanent cores that are removable; face finished to match lockset.
- C. Construction Master Keys: Provide cylinders with features that permit voiding of construction keys without cylinder removal. Provide ten (10) construction master keys.
- D. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide ten (10) construction master keys.

2.07 KEYING

- A. Keying System: By Cornell. Provide blank keys.

2.08 ACCESSORIES FOR PAIRS OF DOORS

- A. Coordinators: BHMA A156.3; consisting of active-leaf, hold-open lever, and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release; and with internal override.
- B. Astragals: BHMA A156.22.

2.09 SURFACE CLOSERS

- A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
 - a. Corbin Russwin Architectural Hardware.
 - b. LCN Closers.
 - c. Norton Door Controls.
 - d. Rixson Specialty Door Controls.
 - e. SARGENT Manufacturing Company.

2.10 MECHANICAL STOPS AND HOLDERS

- A. Wall-and Floor-Mounted Stops: BHMA A156.16; polished cast brass base metal.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
 - a. IVES Hardware.

2.11 FABRICATION

- A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by Architect.
 - 1. Manufacturer's identification is permitted on rim of lock cylinders only.
- B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.
- C. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.
 - 1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
 - 2. Fire-Rated Applications:
 - a. Wood or Machine Screws for the following:
 - i. Hinges mortised to doors or frames.
 - ii. Strike plates to frames.
 - iii. Closers to doors and frames.
 - b. Steel Through Bolts for the following unless door blocking is provided:
 - i. Surface hinges to doors.
 - ii. Closers to doors and frames.
 - 3. Spacers or Sex Bolts for through bolting of hollow-metal doors.

2.12 FINISHES

- A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.

3.03 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
- B. Install each door hardware item to comply with manufacturer's 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.
 - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
 - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- C. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30" (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- D. Lock Cylinders: Install construction cores to secure building and areas during construction period.
 - 1. Replace construction cores with permanent cores as directed by Owner.
- E. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.
- F. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- G. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

3.04 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.
 - 1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

3.05 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.06 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes.

3.07 HARDWARE SCHEDULE

A. Set No.	Hardware
1	3/4 Hour Fire Rated door in 1 Hour fire resistive wall assembly. Storeroom function. 1 ½ Pair Butts-McKinney TA2314 4½" x 4½" 606. 1 Lockset-Sargent 8204 LNL 606. 1 Sargent SFIC Cylinder 606. 1 Door Closer-Sargent 351 606. 1 Kickplate.

END OF SECTION 08 71 00

DIVISION 9 FINISHES

SECTION 09 20 00 - METAL FRAMING & DRYWALL

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Section includes:

1. Metal wall/ceiling support systems.
2. Gypsum wallboard.
3. Water-resistant gypsum backing board.
4. Drywall finishing.

B. Provide metal support systems, gypsum wallboard and dry wall finishing as shown. The items covered include but are not limited to the following:

1. GWB ceiling in Elevator Machine Room.
2. Temporary work for dust control.
3. Repair of drywall and plaster surfaces affected by the work of this contract.

1.02 SUBMITTALS

A. Submit product data for all materials to be used in conjunction with this project.

1.03 QUALITY ASSURANCE

A. Standards of work. Provide work in accordance with:

1. GA-214-90 Recommended Specification: Level of Gypsum Board Finish; Gypsum Association; 1990.
2. GA-219-89 Recommendations for installation of Steel Fire Door Frames in Steel Stud-Gypsum Board Fire-Rated Partitions; Gypsum Association; 1989.

B. Installer Qualifications: Provide installation by a company specializing in work similar to that required on this project and with not less than 5 years of documented experience.

C. Regulatory Requirements: At locations indicated on drawings, provide fire-rated assemblies tested in accordance with ASTM E 119 and acceptable to authorities for ratings required. Provide assemblies as listed in the following:

1. Underwriters Laboratories Inc.'s (UL) "Fire Resistance Directory".

PART 2 - PRODUCTS

2.01 FRAMING MATERIALS

A. General: Select size and gage of framing members and establish spacing to comply with requirements of ASTM C 754 unless otherwise specifically indicated.

1. Maximum deflection: L/240 at 5 lbf per square foot.

- B. Studs and Tracks: ASTM C 645, minimum 25 gauge steel with protective coating except 20 gauge for use with "Cement Backer Boards" (Durock or equal). Provide nominal sized units as indicated on drawings.
- C. Hanger Wire: ASTM A 641, soft, Class I galvanized.
 - 1. Ceiling hangers: Minimum 0.162 inch diameter (8 gauge) wire.
 - 2. Furring channel ties: Minimum 0.048 inch diameter (18 gauge) wire.
- D. Furring Channel Ties: Minimum 0.048 inch diameter (18 gauge) wire.
 - 1. Hat-shaped except as otherwise indicated.
- E. Furring Fasteners/Connectors: Manufacturer's recommended system for specific application indicated, complying with ASTM C 754.
- F. Manufacturers: Provide products complying with requirements of the contract documents and made by one of the following:
 - 1. Dale/Incor.
 - 2. Dietrich Industries, Inc.
 - 3. Gold Bond Building Products, a National Gypsum Division.
 - 4. USG Corporation.

2.02 GYPSUM BOARD

- A. General: Maximum length available to minimize end to end butt joints in area receiving finished gypsum board.
 - 1. Edges: Tapered.
 - 2. Rating: All assemblies shall use fire-rated (Type-X) drywall.
 - 3. Thickness: As shown on Partition Type drawings or 5/8" if no thickness shown.
- B. Gypsum Wallboard: ASTM C36:
 - 1. Top and Base drywall layers for all interior non-wet wall/ceiling area applications.
- C. Moisture-Resistant Gypsum Backing Board: ASTM C 630:
 - 1. Top and Base wall layers for all interior wet area wall/ceiling area applications except for ceramic tile installations.
 - 2. Base layer for cement board top layer in all ceramic tile wall locations as detailed.
- D. Cement Backer Board: USG "Durock" or equal.
 - 1. Top layer for all wet interior ceramic wall tile and Shower/Drying type ceiling areas.
- E. Gypsum Lath Board: USG "Imperial GYPSUM Base" or equal.
 - 1. Top layer for skim coat plaster wall and ceiling finishes.
 - 2. High activity use and damage areas.

- F. Manufacturers: Provide products complying with requirements of the Contract Documents and made by one of the following:

1. Domtar Gypsum.
2. Georgia-Pacific Corporation.
3. Gold Bond Building Products, a National Gypsum Division.
4. USG Corporation.

2.03 TRIM AND ACCESSORIES

- A. General: Except as otherwise specifically indicated, provide trim and accessories by manufacturer of gypsum board materials, made of galvanized steel or zinc alloy and configured for concealment in joint compound.

1. Include corner beads, edge trim, and other trim units necessary for project conditions. Provide accessories as required in order to achieve details indicated, whether or not specific accessories are shown on the drawings.
2. All trim shall be concealed in joint compound.

2.04 JOINT TREATMENT

- A. General: Provide products by manufacturer of gypsum boards. Comply with ASTM C 475 and with manufacturer's recommendations for specific project conditions.

1. Joint Tape: Manufacturer's standard paper reinforcing tape recommended for use with finish scheduled.
2. Provide open mesh glass fiber tapes suitable for use with any or all drywall boards if so recommended or defined as a better system by the manufacturer.

- B. Setting Type Joint Compound: Chemical hardening type, for the following applications:

1. Interior Use: (USG "Durabond" or equal.)
 - a. Laminating drywall to face of existing masonry or plaster wall systems.
 - b. Taping and prefilling.
 - c. Filling, smoothing or otherwise preparing existing interior concrete, masonry, or other solid surfaces for laminated application of gypsum board in accordance with manufacturer's recommendations.

- C. Finish Setting Type Joint Compound: Chemically hardening type for finish coat use as follows:

1. Interior Use: (USG "Sheetrock Lightweight Setting Type-Easy Sand" or equal.)

2.05 VENEER FINISH PLASTER

- A. U.S. Gypsum Company (USG) "Imperial Finish Plaster" or approved equal.
- B. Comply with ASTM C587.
- C. One or Two Coat System.
- D. Total applied thickness: 3/32' to 1/8".

2.06 MISCELLANEOUS MATERIALS

- A. General: Provide miscellaneous materials as produced or recommended by manufacturer of gypsum products.
- B. Screws: ASTM C 1002; self-drilling type; lengths as recommended by gypsum board manufacturer for project conditions.

PART 3 - EXECUTION

3.01 PROJECT CONDITIONS

- A. Environmental Conditions: Establish and maintain environmental conditions for applying and finishing gypsum board to comply with ASTM C 840 requirements or gypsum board manufacturer's recommendations, whichever are more stringent. For nonadhesive attachment of gypsum board to framing, maintain not less than 40°F (4°C). For adhesive attachment and finishing of gypsum board, maintain not less than 50°F (10°C) for 48 hours before application and continuously after until dry. Do not exceed 95°F (35°C) when using temporary heat sources. Ventilate building spaces as required to dry joint treatment materials. Avoid drafts during hot, dry weather to prevent finishing materials from drying too rapidly.
- B. Ventilation: Provide controlled ventilation during joint finishing operations, to eliminate excessive moisture. Avoid drafts during hot, dry weather to prevent finishing materials from drying too quickly.

3.02 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original and unopened packages, containers, or bundles, with brand names and manufacturer's labels intact and legible.
- B. Store materials in dry location, fully protected from weather and direct exposure to sunlight.
- C. Stack gypsum board products flat and level, properly supported to prevent sagging or damage to ends and edges.
- D. Store corner bead and other metal accessories to prevent bending, sagging, distortion, or other mechanical damage.

3.03 INSTALLATION OF METAL FRAMING

- A. Coordinate installation of anchorage devices for suspended ceilings/soffits, verifying that spacing and rated strength are correct for anticipated load conditions.
- B. Comply with provisions of ASTM C 754 and ASTM C 840 requirements that apply to framing installation except where exceeded by other requirements.
- C. Headers and Soffits:
 - 1. Secure hangers to structure or to anchorage devices so that full strength of hanger can be achieved.
 - a. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system.

- b. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
- 2. Secure metal framing members by means of screws, clips, or wire ties, as appropriate to substrate. Space framing members at not more than 16" on center.

D. Steel Studs:

- 1. General: Install tracks and studs in accordance with manufacturer's recommendations and as follows:
 - a. Stud spacing: 16" on center, except as otherwise shown.
- 2. Door openings: Comply with GA-214; reinforce openings as required for size and weight of doors, using a minimum of two side-by-side studs and each side of opening.
 - a. At openings in fire-rated partitions, comply with requirements of governing authorities for framing.
- 3. Partition heights: Extend studs to full height, to underside of floor or roof construction above.
- 4. Blocking and bracing: Install blocking and bracing as recommended by manufacturers for adequate support of wall-mounted items installed as work of other sections.

E. Wall Furring:

- 1. General: Install wall furring members in accordance with manufacturers' recommendations.
 - a. Spacing: 16" on center, except as otherwise shown.
- 2. On solid walls, install furring members vertically.

3.04 INSTALLATION OF GYPSUM BOARD

A. General: Comply with ASTM C 840 and CA-216 except where exceeded by other requirements.

- 1. Install all drywall up to underside of existing deck unless detailed otherwise.
- 2. Wherever possible, install gypsum board to minimize butt and joints.
- 3. Apply ceiling boards prior to installation of wallboards. Arrange to minimize butt end joints near center of ceiling area.
- 4. Install wallboards in a manner which will minimize butt end joints in center of wall area. Stagger vertical joints on opposite sides of walls.
- 5. Butt all joints loosely, with maximum of 1/16" between boards.
- 6. Place wrapped edges adjacent to one another; do not place cut edges or butt ends adjacent to wrapped edges.
- 7. Support all edges and ends of each board on framing or by solid substrate, except that long edges at right angles to framing members in non-fire-rated construction may be left unsupported.

B. Installation on Metal Framing and Furring:

- 1. Single-layer application: Install gypsum board by means of screw attachment.

- a. On walls and partitions, plan installation so that leading edge or end of gypsum board is attached to open end of stud flange first.
 2. Double-layer application:
 - a. Install base layer by means of 1" screws, spaced at 24" on center.
 - b. Install face layer by means of screws at least $\frac{3}{8}$ " longer than total thickness of gypsum board layers, spaced at 12" on center.
 3. For fire-rated construction, install gypsum board by means of screws as specified for the tested assembly.
- C. Installation on Interior Masonry, Concrete Walls, or Other Solid Substrates: Grind off protruding areas to produce a plumb and true wall surface. Fill pockets or holes greater than 4" in diameter with chemically hardening joint compound and allow to dry. Skim coat glazed block surfaces with similar joint compound noted above. Apply adhesive recommended by manufacturer to back of gypsum boards and install boards vertically, pressing into place. Provide additional support and bracing with mechanical fasteners at maximum 24' o.c. while adhesive is hardening.
- D. Installation of Cement Board, Gypsum Lath Board and Water-Resistant Backing Boards:
1. Install at all wet locations as detailed on Drawings.
 2. Install specialty gypsum boards in accordance with manufacturer's recommendations for installation, including minimum clearances and sealing of penetrations and edges.
- 3.05 INSTALLATION OF TRIM AND ACCESSORIES
- A. General: Comply with manufacturers' recommendations for installation of trim items. Except for items intended by manufacturer to be left exposed or semi-exposed, install trim units for concealment in joint finishing compound. Wherever possible, fasten metal trim items to substrate with same fasteners used to install gypsum board products.
- B. Corner Bead: Install metal corner bead at all external corners unless details clearly indicate its omission at specific locations.
- C. Edge Trim: Install edge trim at locations indicated and wherever edge of gypsum board otherwise would be exposed.
- 3.06 FINISHING
- A. General: Comply with ASTM C 840 and GA-216 except where exceeded by other requirements.
1. Do not mix joint compounds except as specifically recommended by manufacturer.
- B. Finish gypsum board in each area to the level of finish per GA-214 indicated below:
- C. All finishing compounds shall be chemically hardening type.
- D. All Exposed Wall/Ceiling Drywall Surfaces:

1. Level 4: Embed tape in joint compound at all joints and interior angles. Provide three separate coats of compound at all joints, angles, fastener heads, and accessories. Provide smooth surfaces free of tool marks and ridges.
 - E. All Concealed Drywall Behind Ceramic Tile Surfaces:
 1. Level 2: Embed tape in joint compound at all joints and interior angles. Provide one separate coat of compound at all joints, angles, fastener heads, and accessories. Provide surfaces free of excess joint compound; tool marks and ridges are acceptable.
 - F. All Wall/Ceiling Drywall Surfaces Scheduled for Plaster Veneer Finish:
 1. Level 5: Embed tape in joint compound at all joints and interior angles. Provide three separate coats of compound at all joints, angles, fastener heads, and accessories. Apply a thin skim coat of joint compound or a special-purpose coating to the entire gypsum board surface. Provide smooth surfaces free of tool marks, ridges and visual defects; ready for decoration. Touch up and sand if necessary to produce satisfactory surface.
 - G. Joint Treatment: Tape and finish joints in accordance with manufacturer's instructions for compounds used, using proper hand tools designed for the purpose.
 1. Avoid raising nap of face paper when sanding; carefully sponge down any areas roughened by sanding process.
 - H. Penetrations: Fill cutouts and openings around fixtures and penetrations with joint compound.
 - I. Finish water-resistant gypsum backing board forming base for ceramic tiles to comply with ASTM C 840 and gypsum board manufacturer's directions for treatment of joints behind tile.
- 3.07 CLEANING
- A. Promptly remove any residual gypsum drywall materials from adjacent or adjoining surfaces, leaving spaces ready for subsequent finishing operations and decoration.

END OF SECTION 09 20 00

DIVISION 9 FINISHES

SECTION 09 65 13 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Resilient base.
2. Resilient molding accessories.

1.02 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each type of product indicated, in manufacturer's standard-size samples but not less than 12" long, of each resilient product color, texture, and pattern required.

1.03 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.04 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturers in spaces to receive resilient products.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer.
- C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.01 RESILIENT BASE

A. Resilient Base:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Armstrong World Industries, Inc.
 - b. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
 - c. Flexco, Inc.
 - d. Johnsonite.
 - e. Mondo Rubber International, Inc.
 - f. Musson, R. C. Rubber Co.

- g. Nora Rubber Flooring; Freudenberg Building Systems, Inc.
- h. Roppe Corporation, USA.

B. Resilient Base Standard: ASTM F 1861.

- 1. Style: Cove (base with toe).

C. Minimum Thickness: [0.125"] [0.080"].

D. Height: 4".

E. Lengths: Cut lengths 48" long or coils in manufacturer's standard length.

F. Outside Corners: Preformed.

G. Inside Corners: Job formed or preformed.

H. Colors and Patterns: As selected by Architect from full range of industry colors.

2.02 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, Portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturers to suit resilient products and substrate conditions indicated.

- 1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

- a. Cove Base Adhesives: Not more than 50 g/L.

C. Floor Polish: Provide protective liquid floor polish products as recommended by resilient stair tread manufacturer.

PART 3 - EXECUTION

3.01 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

C. Do not install resilient products until they are same temperature as the space where they are to be installed.

- 1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

D. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.02 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.

3.03 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
- B. Floor Polish: Remove soil, visible adhesive, and surface blemishes from resilient stair treads before applying liquid floor polish.
 - 1. Apply two coat(s).
- C. Cover resilient products until Substantial Completion.

END OF SECTION 09 65 13

DIVISION 9 FINISHES

SECTION 09 91 00 - PAINTING

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Section Includes:

1. Preparation of surfaces.
2. Painting of machine room wall, ceiling, and floor.
3. Painting of storage room walls and floors.
4. Painting of hoistway entrance doors and frames.

1.02 RELATED WORK NOT INCLUDED

- A. Do not paint pre-finished items, concealed surfaces, finished metal surfaces, operating parts, and labels. Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

1.03 DEFINITIONS

- A. "Paint" includes coating systems materials, primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate, or finish coats.
- B. DFM (Dry Film Mils): thickness, measured in mils, of a coat of paint in the cured state.
- C. General: Standard coating terms defined in ASTM D 16 apply to this Section:
 1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
 2. Eggshell refers to low-sheen finish with a gloss range between 5 and 20 when measured at a 60-degree meter.
 3. Satin refers to low-sheen finish with a gloss range between 15 and 35 when measured at a 60-degree meter.
 4. Semigloss refers to medium-sheen finish with a gloss range between 30 and 65 when measured at a 60-degree meter.
 5. Full gloss refers to high-sheen finish with a gloss range more than 65 when measured at a 60-degree meter.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's technical information, label analysis, and application instructions for materials proposed for use.
 1. List materials and cross-reference the specific coating and finish system and application. Identify materials by the manufacturer's catalog number and general classification.
- B. Samples: Submit initial color selection in the form of manufacturer's color charts.

- C. Provide a list of materials and applications for each sample. Label each sample as to location and application.

1.05 QUALITY ASSURANCE

A. Materials:

- 1. All coating materials required by this section shall be provided by a single manufacturer, unless otherwise required or approved. For a given application (i.e. interior walls in student rooms) a single brand, color and mix shall be used.
- B. Applicator: Firm with not less than ten (10) years of successful experience in painting work similar in scope to work of this project.
- C. Crew: Maintain throughout duration of the work a crew of painters who are fully qualified to satisfy requirements of the specifications.
- D. VOCs: Certify that all products supplied comply with Federal State and Local regulations controlling the use of Volatile Organic Compounds (VOCs).

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturer: Provide products of the following:

- 1. Benjamin Moore Paint Company.
- 2. Strathmore Paint Company.
- 3. Sherwin-Williams Company.

2.02 LEAD CONTENT

- A. Not more than 0.06 % lead by weight (calculated as lead metal) in the total nonvolatile content of the paint or the equivalent measure of lead in the dried film.
- B. Not more than permitted by applicable regulations where they are more stringent than above.

2.03 MATERIAL SCHEDULE

A. Provide paint materials as follows:

- 1. Ceilings and Walls:
 - a. Primer: Sherwin-Williams PrepRite 200 Latex Primer; one (1) coat.
 - b. Paint: Sherwin-Williams Promar 200 Int. Latex Eggshell; two (2) coats.
- 2. Elevator Machine Room and Storage Room Floor:
 - a. Primer: Sherwin-Williams Armor Seal Tread-Plex Primer; one (1) coat.
 - b. Paint: Sherwin-Williams Armor Seal Tread-Plex Finish; two (2) coats. Provide “shark grip” slip resistance additive.

3. Exposed Piping, Conduit, Hangers, etc. in Finished Spaces:
 - a. Primer: Sherwin-Williams All-Surface Enamel Latex Primer or equal in Benjamin Moore Super Spec, one (1) coat.
 - b. Paint: Sherwin-Williams Promar 200 Int. Latex Eggshell or equal in Benjamin Moore Super Spec, two (2) coats.
4. Hoistway Doors and Frames:
 - a. Primer: Sherwin-Williams PrepRite 200 Latex Primer; one (1) coat.
 - b. Paint: Sherwin-Williams Promar 200 Int. Latex Eggshell; two (2) coats.

PART 3 - EXECUTION

3.01 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the job site in the manufacturer's original, unopened packages and containers bearing manufacturer's name and label with the following information:
 1. Product name or title of material.
 2. Product description.
 3. Federal Specification number, if applicable.
 4. Manufacturer's stock number and date of manufacture.
 5. Contents by volume, for pigment and vehicle constituents.
 6. Thinning instructions.
 7. Application instructions.
 8. Color name and number.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45F (7C). Maintain containers used in storage in a clean conditions, free of foreign materials and residue.
- C. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

3.02 PREPARATION

- A. Clean all surfaces of moisture, rust, plaster, dirt and foreign matter before painting. Schedule painting so that dust and other contaminants do not fall on wet painted surfaces.
- B. Remove dirt, dust, grease, oils, and foreign matter. Prepare surface for proper texture necessary to achieve optimum coating adhesion and intended finished appearance. Plan cleaning, preparation and coating operations to avoid contamination of freshly coated surfaces.
- C. Remove hardware, cover plates, and similar items before applying coatings. After application of coatings, install removed items. Use only skilled workers for removal and replacement of such items.
- D. Provide protection for non-removable items not scheduled for coating.
- E. Protect surfaces not scheduled for coating. Clean, repair, or replace to the satisfaction of the Engineer any surfaces inadvertently spattered or coated.

- F. Before hand or power tool cleaning, remove visible oil, grease, soluble welding residue, and salts by solvent cleaning. After hand or power tool cleaning, re-clean surfaces if necessary.
- G. Before touching up coatings damaged by handling or welding, re-prepare damaged surfaces.
- H. For piping equipped with lubricated groove lock type fittings, such as Victaulic, clean all lubricant from fitting and pipe prior to priming. Take all necessary steps to eliminate bleed through of lubricants.

3.03 MIXING AND THINNING

- A. Remove and discard any skin formed on surface of coatings in containers. Discard any containers where skin comprises 2% or more of the remaining materials. Do not add thinner except as specifically recommended (not merely permitted) by the coating manufacturer for proper coating application under the circumstances prevailing at the project site when application equipment recommended by the coating manufacturer is employed. Use only the quantities and the types of thinner recommended.

3.04 APPLICATION

- A. Apply coatings in accordance with manufacturer's instructions and use applicators and techniques best suited for substrate and type of material being applied.
- B. Apply additional coats when undercoats show through the final coat of paint until paint is of uniform color and finish and is approved by the Engineer.
- C. Apply coats of paint as scheduled.
- D. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pre-treated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
 - 1. The number of coats and the film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
 - 2. Omit primer on metal surfaces that have been shop primed and touch-up primed.
 - 3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
 - 4. Allow sufficient time between successive coats to permit proper drying. Do not re-coat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.
- E. Techniques: Use applicators and techniques best suited for substrate and type of material being applied.
 - 1. Paint colors, surface treatments, and finishes as indicated in the schedules.
 - 2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
 - 3. Provide finish coats that are compatible with primers used.
- F. Application Procedure: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

1. Brushes: use brushes best suited for the type of material applied. Use brush of appropriate size for the surface or item being painted.
 2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the materials and texture required.
 3. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.
- G. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.
- H. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Re-coat primed and sealed surfaces where evidence appears of suction spots or unsealed areas in first coat, to endure a finish coat with no burn through or other defects due to insufficient sealing.
- I. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
- J. Completed work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.05 FIELD QUALITY CONTROL

- A. The Owner reserves the right to invoke the following test procedure at any time and as often as the Owner deems necessary during the period when paint is being applied.
1. The Owner may engage the services of an independent testing agency to sample the paint material being used. Samples of material delivered to the Project may be taken, identified, sealed, and certified in the presence of the Contractor.
 2. The testing agency will perform appropriate tests for the following characteristics as required by the Owner:
 - a. Quantitative material analysis.
 - b. Abrasion resistance.
 - c. Apparent reflectivity.
 - d. Flexibility.
 - e. Washability.
 - f. Absorption.
 - g. Accelerated weathering.
 - h. Dry opacity.
 - i. Accelerated yellowness.
 - j. Recoating.
 - k. Skinning.
 - l. Color retention.
 - m. Alkali and mildew resistance.

3. The Owner may direct the Contractor to discontinue painting if test results show material being used does not comply with specified requirements. The Contractor shall remove noncomplying paint from the site, pay for testing, and repaint surfaces previously coated with the rejected paint. If necessary, the Contractor may be required to remove rejected paint from previously painted surfaces if, on repainting with specified paint, the two coatings are incompatible.

3.06 CLEAN UP

- A. Clean paint spattered surfaces by washing or scraping and use care not to damage adjacent finished surfaces.
- B. Provide "Wet Paint" signs to newly painted surfaces.
- C. Remove protection from surfaces, equipment, and operating parts. Remove tape and adhesive residue.
- D. Protect sprinkler heads - they ARE NOT to be painted.

END OF SECTION 09 91 00

DIVISION 14 CONVEYING EQUIPMENT

SECTION 14 21 50 - GC/TRADE SUPPORT FOR ELEVATOR INSTALLATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SCOPE

- A. Provide where shown, all materials, labor, services, permits and related work, to provide elevator hoistways, GC support, electrical, mechanical, fire protection and fire alarm support to enable completion of a complete, operating, tested, functioning, documented elevator system including all work shown, specified, or required.
- B. GC shall provide an on-site storage area for elevator equipment. The area shall be dry and enclosed within the building. Space will provide rollable access to the elevator hoistway at ground level, adjacent to the hoistway.
- C. If required by the GC, provide scaffolding from the base to the top of the hoistway to be used by the GC for the construction of the hoistway, roof and closure walls. GC shall remove scaffolding prior to the date of turnover to Elevator Contractor. (Elevator Contractor shall not require scaffolding.)
- D. GC shall provide on-site refuse containers for disposal of elevator packing material and Elevator Contractor refuse.
- E. GC shall provide cut-outs to accommodate elevator equipment and patching/painting of walls, floors, or partitions in the hoistway and control room.
- F. GC shall provide guarding and protection of the public and workers from the project site and hoistway during construction. Elevator Contractor shall provide additional barricades for the protection of workers when Elevator Contractor is on site.
- G. GC shall provide a permanent light fixture in each elevator pit together with GFCI outlet and outlet for appropriate switches.
- H. GC shall provide enclosed Machine Room maintained at a temperature between 55°F and 95°F.
- I. GC shall provide a fire extinguisher in Machine Room.
- J. GC shall provide illumination of the Machine Room and Elevator Hoistways.
- K. GC shall provide a self-closing and self-locking door for the Machine Room.
- L. GC shall provide fire alarm system interface with suitable relays for Phase 1 and Phase 2 recall and contact for fireman's hat.

- M. GC shall provide shunt trip main circuit breakers at locations designated by Elevator Contractor, with associated wiring.
- N. GC shall provide 480Y/277V, 3-phase circuits for machines and separate 120V, 1-phase circuits for car lights/fans. All circuits shall have full-sized ground conductor.
- O. GC shall provide finished flooring material in elevator cars.

PART 2 - PRODUCTS

2.01 ELEVATOR CAR FLOORS

- A. Provide flooring in elevator cars, 1/8" rubber with epoxy mastic, Nora norament grano with two-part polyurethane mastic, color as selected by Owner.

PART 3 - EXECUTION

3.01 DELIVERY OF TOOLS, MATERIALS AND EQUIPMENT

- A. The Contractor shall assume responsibility and all costs associated with the delivery and removal of all materials and equipment. The Contractor shall furnish all trucking, rigging, and transportation for all items required to complete the project. In addition, the Contractor shall accept responsibility to protect the grounds, building, and building contents during associated deliveries and removals.

3.02 BARRICADES

- A. Solid barricades shall completely enclose entrances to the shaft from the public and shall have a keyed locked entrance on each floor. Each barricade shall completely contain all portions of the project for each individual landing to a height of not less than 8'-0" or to the ceiling. At no time shall the barricades be removed prior to the installation of fully functional safety interlocks, and installation of walls. At no time shall any entrance be left open to any elevator shaft. The contractor shall comply with any and all Occupational Safety and Health Standards for general industry (26 CFR 1911) and for the Construction Industry (29 CFR 1926). Special attention shall be addressed to sections 1926.502 Personal Fall Arrest Systems and especially 1926.502(d)(ii) regarding work in Elevator Shafts by all persons working inside the guarded areas. The Contractor shall be required to show documentation that each person who has access to the elevator entrances has been trained in the proper use of personal fall protection. The Owner reserves the right to require additional safety precautions at any time. A copy of the "Elevator Industry Field Employee's Safety Handbook" shall be always required on the site and an additional copy shall be provided to the Owner along with a job specific safety program prior to the beginning of any work. Always perform work in accordance with the minimum requirements of the "Elevator Industry Field Employee's Safety Handbook," published by Elevator World.

3.03 PROTECTION

- A. Temporary Use: Do not use elevator for construction purposes unless cars are provided with temporary enclosures, either within finished cars or in place of finished cars, to protect finishes from damage.

END OF SECTION 14 21 50

DIVISION 14 CONVEYING EQUIPMENT

SECTION 14 25 00 - HYDRAULIC ELEVATORS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This section includes the following:

1. Provide, install, startup, test, maintain until final acceptance and maintain for 1 year following final acceptance, complete, operating, documented hydraulic elevator installation as specified herein and shown on the Contract Drawings.
 - a. Provide modernization of two (2) existing hydraulic elevators including elevator controllers, cylinders, tank/pump units, car interiors, fixtures door operators, door locks, and associated door equipment.
2. Allowance for remediation and drilling.
 - a. The Contractor shall provide an allowance in their bid of \$50,000 for the work of remediation of cylinder well hole and for re-drilling of cylinder well hole, if necessary. The Contractor shall submit itemized billing with backup for all activities that will be charged against the allowance.
 - b. Any unused allowance will be returned to the Owner in the form of a deduct change order at the completion of the project. In the event the allowance amount is exhausted, the contractor shall provide a change request to the Owner detailing the additional work required and obtain Owner's approval prior to completion of the work.

1.03 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product data for each elevator includes capacities, sizes, performances, operations, safety features, controls, finishes, and similar information.
- C. Shop drawings for each elevator showing plans, elevations, sections, and large-scale details indicating service at each landing, coordination with building structure, and relationships with other construction. Indicate variations from specified requirements, maximum dynamic and static loads imposed on building structure at points of support, and location of signals. Include maximum and average power demands.
- D. Maintenance manuals for each different hydraulic elevator, including operation and maintenance instruction, parts listing with sources indicated, recommended parts inventory listing, emergency instruction, and similar information. Include all diagnostic and repair information available to manufacturers and installer's maintenance personnel. Submit for Owner's information at project closeout as specified in Division 1.

- E. Inspection and acceptance certificates and operating permits as required by governing authorities for normal, unrestricted elevator use.
- F. Color and material selection chart for all Architect selected furnishes.
- G. Submit welding certificates for all personnel performing field welding.
- H. Submit warranty certificate from manufacturer and guarantee from Contractor.

1.04 SPECIFICATION INTENT

- A. It is the intent of the Specification to provide hydraulic elevators which conform to Cornell University Standards in terms of keying, car accessories and maintainable parts.
- B. Provide and install fully non-proprietary elevator system complying in all respects with these specifications. Contractor shall utilize only freely available supplies and components from approved third party suppliers.

1.05 APPLICABLE CODES

- A. Facilities to comply with all current applicable building codes. These codes include but are not limited to:
 - 1. Americans with Disabilities Act (ADA).
 - 2. Building Code of New York State 2025 Edition
 - 3. NFPA 72 National Fire Alarm Code, 2022 Edition.
 - 4. ASME A17.1 Safety Code for Elevators and Escalators, 2022 Edition.
 - 5. NFPA 70 National Electric Code, 2023 Edition.

1.06 DEFINITIONS

- A. Hydraulic Elevators: Elevators in which cars are hoisted either directly or indirectly by action of one or more hydraulic plungers and cylinders (jacks); with other components of the Work, including fluid storage tank, pump, piping, valves, car enclosures, hoistway entrances, operation systems, signal equipment, guide rails, electrical wiring, buffers, and devices for operations, safety, security, required performance at rated speed and capacity, and for complete elevator installation.
- B. Defective Elevator Work: Operation or control system failures; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; the need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
- C. Authority Having Jurisdiction (AHJ): For this project, the AHJ is The City of Ithaca.

1.07 QUALITY ASSURANCE

- A. Installer Qualifications: Engage the elevator manufacturer or an experienced Installer approved by the elevator manufacturer who has completed elevator installations similar in material, design, and extent to that indicated for this Project and who has a documented record of successful in-service performance.
- B. Regulatory Requirements: In addition to local governing regulations, comply with the applicable provisions of the codes and standards listed in Part 1.05.

- C. Accessibility Requirements: In addition to local governing regulations, comply with Section 4.10 in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)."

1.08 ENVIRONMENTAL HEALTH PROVISIONS FOR HYDRAULIC ELEVATOR CONTRACTS

- A. At the commencement of the Contract, and continuously thereafter, the Contractor shall provide the Owner with a Safety Data Sheet (SDS) for each product to be used in conjunction with the elevators. The Contractor shall indicate which products are most likely to be used on site and describe how and where the products will be stored.
- B. Throughout the Contract, all materials stored on site by the Elevator Contractor must be stored in compliance with all Federal, State, and local laws, regulations, and codes as well as Owner policies and requirements.
- C. Throughout the Contract, the Contractor shall utilize non-RCRA (Federal Resource Conservation and Recovery Act) materials where possible.
- D. At the commencement of the Contract and continuously thereafter, the Contractor shall post an Emergency Procedure in each elevator machine room, with instructions to Contractor employees on the process for monitoring and reporting oil release. The Contractor shall submit the language of this procedure to the Owner for approval. As a minimum, the procedure shall require the Contractor to immediately report any release of oil from hydraulic cylinders, tanks, to ground, to water or to drain or any unexplained release to Owner.
- E. Throughout the Contract, the Contractor shall make monthly checks of oil levels in elevator machine reservoirs and record the results of those checks in a permanent on site logbook.
- F. Throughout the Contract, the Contractor shall maintain clear legible logs in all of the elevator mechanical rooms indicating any oil replacement for each system. The log shall note the date, the quantity of oil added to the system, and the reason for such replacement, and the legible printed name of the person making the log entry. Any unexplained loss, or any suspected loss of oil shall be reported to the Owner immediately.
- G. Throughout the Contract, no more than one gallon of oil shall be kept in an elevator mechanical room at any time. It shall be stored in compliance with applicable regulations and codes, in appropriate secondary containment. If larger quantities of waste or new oil are required in a particular room for a specific maintenance operation, the Contractor shall provide appropriate (110%) secondary containment and shall notify the Owner one week in advance of the proposed operation. The notification shall include the quantity of oil, proposed protection methods and proposed start date and duration of the operation.
- H. Throughout the construction portion of the Contract and prior to final acceptance of the elevator system by the Owner, all waste oil, oily rags, and oily waste generated under performance of this Contract shall be considered as property of the Contractor and shall be appropriately stored for disposal by the Contractor. Upon final acceptance of the elevator system by the Owner and during any maintenance period that is part of the construction contract, all non-hazardous waste oils, oily rags requiring disposal, and oil contaminated absorbent material generated in performance of this contract shall be immediately removed from site and disposed of appropriately.
- I. Throughout the maintenance period, the Contractor shall notify the Owner of any waste material generated under the contract that has the potential to contain an "RCRA hazardous" component. Federal and/or State laws may prevent the Contractor from transporting hazardous waste on public rights of way.

1.09 WARRANTY

- A. General Warranty: The elevator warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrently with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Standard Elevator Warranty: Submit a written warranty signed by manufacturer agreeing to repair, restore, or replace defective elevator work within the specified warranty period.

- 1. Warranty Period: 12 months from date of completion.

1.10 RELATED WORK TO BE PROVIDED BY OTHER SUBCONTRACTORS AS DESIGNATED BY THE GENERAL CONTRACTOR: (DO NOT INCLUDE IN ELEVATOR BID)

- A. Other Subcontractor will provide on-site storage area for elevator equipment. The area shall be dry and enclosed within the building. Space will provide rollable access to the elevator hoistway at ground level, adjacent to the hoistway.
- B. Other Subcontractor shall provide on-site refuse containers for disposal of elevator packing material.
- C. Other Subcontractor shall provide cut-outs to accommodate elevator equipment and patching/painting of walls, floors, or partitions in the hoistway and machine room.
- D. Other Subcontractor shall provide painting of hoistway entrance, frames and areas surrounding frames, where required.
- E. Other Subcontractor shall provide guarding and protection of the public from the hoistway during construction. Elevator Contractor shall provide barricades for the protection of workers as specified in this Section.
- F. Other Subcontractor shall provide a permanent light fixture in each elevator pit together with GFCI outlet and light switch.
- G. Other Subcontractor shall provide the enclosed Machine Room maintained at a temperature between 32°F and 95°F.
- H. Other Subcontractor shall provide a fire extinguisher in the Machine Room.
- I. Other Subcontractor shall provide illumination of the Machine Room providing 19 footcandles minimum at the floor level.
- J. Other Subcontractor shall provide a self-closing and self-locking door for the Machine Room.
- K. Other Subcontractor shall provide fire alarm system interface with suitable relays for Phase 1 Recall and contact for firefighter's hat activation. (Connection to Elevator Controller by Elevator Contractor).
- L. Other Subcontractor shall provide 480Y/277V, 3-phase circuits for machine power and a separate 120V, 1-phase circuit for car lights.
- M. Other Subcontractor shall provide illumination in each elevator shaft.

- N. Other Subcontractor shall provide flooring in elevator cars.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering hydraulic elevator components that may be incorporated in the Work include, but are not limited to, the following:
1. GAL.
 2. Janus.
 3. MCE.
 4. Imperial.
 5. PLT Equipment.
 6. MEI.
 7. Custom Elevator.

2.02 GENERAL MATERIALS AND COMPONENTS

- A. Provide Cornell University standard equipment. Where components are not otherwise indicated, provide only non-proprietary, ASME A17.1 and ADA compliant components as required for a complete system.

2.03 ELEVATOR CAR

- A. Existing platform to remain. Provide new car shell and finishes including wall panels, ceiling, flooring, etc.
1. Upper wall panels shall be horizontally applied with plastic laminate finish. Lower wall panels shall be horizontally applied with 5-WL stainless steel finish.
 2. The ceiling shall be suspended island type with plastic laminate finish. Lighting shall be perimeter cove-type LED.
 3. The flooring shall be 1/8" thick rubber sheet goods.
 4. All finish material colors shall be as selected by Owner.
- B. Provide and install new vandal resistant, applied-style Car Operating Panel (C.O.P.) with:
1. #4 Stainless Steel finish.
 2. Hands free emergency telephone installed in the C.O.P.
 3. Emergency light.
 4. Keyed off/on switches for inspection, phase two fire service, run/stop, light, fan, hoistway access, and independent service. Provide five (5) copies of each key to Owner.
 - a. Fire Service: # FEO-K1.
 - b. Independent, Lights and Fan: Vendor standard keying.
 - c. Inspection, Hoistway Access, and Run: Vendor standard keying.
 5. Red illuminated Fire emblem, and hands free phone call received.
 6. Local Alarm button, call cancel, alarm, door open, and door close.
 7. Provide illuminated buttons with Braille tags and audible signal registered display for each floor.
 8. C.O.P. shall be provided with permanently engraved fire service instructions.
 9. C.O.P. shall contain a digital position indicator with voice annunciation and passing chime.

10. The elevator number shall be permanently engraved within the C.O.P.
11. COP shall be manufactured by PTL Equipment.

- C. Provide emergency two-way visual communication system in each elevator and integrate with existing Campus installation, Rath Smartview 2.
- D. Provide pad studs and pads. The pads shall be heavy-duty brown canvas type as manufactured by Palmer Pads.

2.04 TOP-OF-CAR EQUIPMENT

- A. Ventilation Fan: Single Speed, 350 CFM. Nylube Model X12F5.\
- B. Inspection Station: Integrated unit with mushroom head run/stop switch, direction controls, inspection switch, GFCI outlet, and guarded top-of-car light. Draka Model TOCI-L.
 1. Provide medium base A19 Type LED lamp.
- C. Provide complete top of car handrail system.

2.05 DOOR EQUIPMENT

- A. Door Operator: Provide closed loop VVVF door operator for use with side slide doors. Operator shall have hand-held programmer for adjustment of door operation parameters. GAL Model MOVFR2.
- B. Door Clutch: Provide new door clutches, GAL Model LZW-2, with integrated door restrictor.
- C. Door Locks: Provide new door locks, GAL Model MOH.
- D. Car Gate Switch: Provide new car gate switch, GAL Model G.
- E. Provide all new door rollers and gibs on all hoistway and car doors.
- F. Provide non-contract, infrared door edge detector, Janus Model PanaChrome 3D.

2.06 ENTRANCE FIXTURES

- A. Provide and install ASME A17.1, AHJ approved, ADA compliant, vandal resistant hall call fixtures at 42" center line above the finished floor. Primary recall landing shall have permanently engraved fire service instructions within the call station fixture.
- B. All fixtures shall be surface-mount, ADA extender type, satin brass finish. Fixtures shall be manufactured by PTL Equipment.
- C. Fire Service key switch on Primary recall landing only. Verify primary and secondary recall locations with the AHJ. Fixtures shall have illuminated buttons, Braille tags.
- D. Provide fire pictographs on each landing, engraved on hall call fixtures.
- E. Metal plate floor tags with Braille and raised lettering permanently attached to both sides of the doorframe jambs. Tags shall be riveted to the doorframe at 60" above the finished floor. Tags shall be brass with black lettering.

- F. Provide hoistway access key switches at front terminal landings only.
- G. Each entrance shall have a vandal resistant digital position indicator/directional lantern fixture located in the elevator lobby on every floor; fixture shall be located adjacent the entrance. Fixture shall have one (1) stroke up and two (2) strokes down gong. Fixtures shall have stain brass finish, bi-color arrows, and red digits. CE Electronic Model GTCH/GTCV.
- H. Provide emergency phone line monitoring buzzer, light, and alarm silence key switch at primary recall landing only. These functions may be integrated into the hall station or provided as a separate fixture. Set monitoring test call to be no more than once per 24-hour period.
- I. Provide five (5) copies of each key to Owner.

2.07 ENTRANCES

- A. Existing hoistway doors and entrance frames shall remain.

2.08 MECHANICAL

- A. Provide and install elevator equipment in Machine Room as shown on Contract Documents.
- B. Hydraulic Machines and Elevator Equipment:
 - 1. Provide new submersible tank/pump unit for each elevator. Unit shall have IMO pump and Imperial Electric Motor. Motor shall be horsepower and voltage scheduled to meet the loading and speed requirements without use of service factors or other overload factors, and to match the building voltage available.
 - 2. Provide hydraulic control valve. Valve shall provide smooth acceleration, deceleration, and leveling in both the up and down directions. Valve will allow for accurate and acceptable landing levels to be attained. Size as directed by manufacturers. Maxton Model UC4.
 - 3. Provide blowout proof muffler in pipeline between control valve and cylinder head.
 - 4. Provide tank-mounted hydraulic oil cooler.
 - 5. Tank/pump unit and oil cooler shall be manufactured by MEI.
- C. Power Supply:
 - 1. Locally available voltages are as scheduled on the Drawings.
 - 2. Confirm available motor circuit ampacity as shown on the Electrical Plans and schedules.
- D. Car Frame and Platform: Existing to remain.
- E. Provide microprocessor-based controller for Duplex operation:
 - 1. Features:
 - a. Capacity shall be as specified in ASME A17.1.
 - b. Provide door nudging and pre-opening.
 - c. Terminate all required fire alarm connections as directed to provide Phase 1 Recall and Phase 2 Emergency Operation.
 - d. Provide manufacturer's standard factory installed remote monitoring communication interface for future Owner-supplied ethernet connection.
 - e. Provide hydraulic controller enclosure, tank-mounted.

- f. Provide connection for phone lines (provided by others) for emergency phone. Verify type of ring-down service.
 - g. Make provisions to connect light/fan circuits to separate power disconnect left in the vicinity of the controller by a separate subcontractor.
 - h. Provide viscosity control programming.
 - i. Provide low oil sensor.
 - j. Provide high oil temperature cutout, 70°C setting.
 - k. Provide factory installed support for Owner-provided card reader security.
 - l. Provide Siemens electronic soft starter with LCD screen for programming and display.
- F. Provide approved capacity plates.
- G. Provide interlocks and terminal landing devices. Pin all switches to rails where rail connections are made.
- H. Provide fascias, dust covers, and toe guards.
- I. Provide standard traveling cable, number and type of conductors to match elevator controller requirements. Provide additional communications-only traveling cable, with dedicated CAT5e twisted shielded pairs for owner-provided security camera, as well as standard twisted shielded pairs for emergency phone, in-car swipe card reader, and emergency visual communication system. Draka Model 18-020-99 with RJ-45 terminal blocks.
- J. Provide pit stop switches. The stop switch shall be pushed to stop, pull to run, mushroom head style. A toggle switch is not acceptable.
- K. All hoistway wiring shall be wholly enclosed in cableways.

2.09 MICROPROCESSOR LOGIC CONTROLLER

- A. Function:
 - 1. The controller shall start and stop the car smoothly and shall cause the cab to make accurate landings under all load conditions.
 - 2. Components and operating devices shall govern starting, stopping, direction of travel, acceleration, retardation, and speed.
- B. Type: Microprocessor based self-diagnostic programmable controller with an Erasable Programmable Read Only Memory with provisions for enabling random access memory for such items as timer adjustments and motion control tuning.
 - 1. The printed circuit boards (modules) shall be of the type that plug into prewired wiring harnesses via terminal blocks. No field wiring or alteration shall be necessary in order to replace defective modules.
 - 2. Any field wiring changes required during construction shall be required to be made only to the terminal block connection points and not to the individual module circuitry or components. If it becomes necessary to alter individual modules, they shall be returned to the factory where such design changes may be made so that correct replacements units are available.
 - 3. Wiring connections for operating circuits and for external control circuits shall be brought to terminal blocks mounted in an accessible location within the controller cabinet. Terminal blocks using pierce-through serrated washers shall not be accepted.
 - 4. Safety and Motion Circuits: Electro-Mechanical pilot type relays. Safety circuits shall be monitored by the microprocessor for redundant protection. All outputs shall be individually fused.

5. Identify each device and fuse (ampere rating) on panels by name, letter, or standard symbol, in an approved indelible and legible manner. Coordinate identification markings with wiring diagrams. All logic symbols and circuitry designations shall be in accordance with ANSI Standards.
- C. Hand-Held Diagnostic Tester: Shall plug into the control processing unit or shall be capable of being cable connected. Tester shall enable operator to monitor logic, timer, and counter values for more productive operation. Tester shall be furnished to Owner at completion of the Project. Integral (LED) diagnostic devices shall be acceptable in lieu of hand-held tester.
- D. Fault Protection System:
 1. Protect against the following:
 - a. Complete power circuit protects from failure under short circuit.
 - b. Surge protection.
 - c. Overload.
 - d. Low voltage, phase loss, unbalanced voltage.
- E. Components and Operating Devices:
 1. Reverse phase relay.
 2. Additional components and devices as required to suit the type of operation specified.
- F. Operation:
 1. Provide selective-collective automatic operation as defined in ASME A17.1. Provide optional home landing to floor selected by Owner.

2.10 HYDRAULIC JACK-CYLINDER ASSEMBLY

- A. Type: Direct lift, single cylinder, single acting plunger; assembly designed to withstand a test pressure of twice the calculated working pressure. Working pressure shall not exceed 450 psi.
- B. Cylinder: Steel tubing with double bottom buckhead and double packing. If built up construction, connect units with external connections.
- C. Cylinder Head and Flange: Drip rings, double packing rings, lantern ring, oil wiper ring, bronze, or phenolic guide bearings. Bleeder valve located below cylinder flange to release air or other gases from the system. The cylinder head and flange constructed of carbon steel construction designed to provide an impact seat for the plunger stop ring.
- D. Cylinder Head Supports: Structural steel beams or channels running the full width of the hoistway installed on the pit floor.
- E. Spring Buffers: Heavy coil springs, complying with ASME A17.1, mounted on pit channels.
- F. Plunger: Selected steel tubing of proper diameter turned true and smooth with fine polished finish. If built up construction, join units with internal connections or couplings.
- G. Oil Line Outlet: 2½".
- H. Stops: Stop ring, welded at bottom of plunger to prevent plunger from leaving cylinder.

- I. Completely infill around cylinder with concrete to prevent liquids in the pit from entering the casing hole.
- J. Provide rigid PVC lining with pressurized monitoring for system integrity. PVC shall connect to jack assembly via a threaded, grooved, or other mechanical connection.
- K. Provide two (2) sets of packing glands. One set shall be used during construction, and the second set shall be installed after the final Elevator inspection.

2.11 HYDRAULIC OIL

- A. Type and grade as recommended by equipment manufacturers. The viscosity of the hydraulic fluid shall be thermostatically controlled to maintain the fluid temperature in the reservoir, pump, and valves at a consistent operating viscosity. Tank shall be labeled with oil type, manufacturer, and quantity.

2.12 PIPE AND PIPE FITTINGS

- A. Pipe with grooved couplings and fittings: Schedule 40 black steel, ASTM A-53 with Victaulic Style 77 couplings, Nitrile gaskets, and standard Victaulic Ductile Iron fittings.
- B. Pipe with threaded fittings: Schedule 40 black steel, ASTM A-53, with Ward Class 300 Malleable Iron fittings.
- C. Size of pipe and fittings installed between cylinder and pumping unit shall be such that fluid pressure loss is limited to 10 pounds, but not less than 2½" inside diameter.
- D. Shutoff valve: Equip supply line with manual ball valve located in machine room capable of withstanding 150 percent of design operating pressure.
- E. Pipe hangers: Support supply piping within 12" of every change of direction and space supports not over 10 feet apart. Secure vertical runs properly with iron clamps at sufficiently close intervals to carry weight of pipe and contents.
- F. Pipe sleeves: Install pipe sleeves where pipes pass through walls, floors, etc., Sleeves to be set during construction. After installation of piping, the sleeves shall be equipped with snug fittings inner lining of either fiberglass or mineral wool insulation and completely firestopped.

2.13 RUPTURE VALVE

- A. Combination manual shutoff valve and overspeed safety valve. Overspeed valve shall sense abnormally high oil flow and close off based on pressure drop, no electricity or control circuits shall be required. Closing speed shall be adjustable. Unit shall be provided with grooved inlet and outlet connections. Max flow rate 300 gpm.
- B. Manufacturer: Maxton Model OSV.

2.14 GUIDE RAILS

- A. Existing to remain.

2.15 PAINT

- A. Rust inhibitive primer and paint shall be used where painted surfaces are specified.

2.16 CYLINDER CASING

- A. Existing may remain at Contractor's discretion, or new casing shall be:
 - 1. Type: Heavy walled, smooth steel cylinder with $\frac{3}{8}$ " minimum wall thickness, complying with ASTM Designation A-53 welded and seamless pipe.
 - 2. Size: Diameter as required to permit accurate centering and plumbing of plunger and installation of Schedule 40 PVC Liner, but not less than 16" inside diameter.

PART 3 - EXECUTION

3.01 DELIVERY OF TOOLS, MATERIALS AND EQUIPMENT

- A. The Contractor shall assume responsibility and all costs associated with the delivery and removal of all materials and equipment. The Contractor shall furnish all trucking, rigging, and transportation for all items required to complete the project. In addition, the Contractor shall accept responsibility to protect the grounds, building, and building contents during associated deliveries and removals.

3.02 BARRICADES

- A. Solid barricades shall completely enclose entrances to the shaft from the public and shall have a keyed locked entrance on each floor. Each barricade shall completely contain all portions of the project for each individual landing to a height of not less than 8'-0" or to the ceiling. At no time shall the barricades be removed prior to the installation of fully functional safety interlocks, and installation of walls. At no time shall any entrance be left open to any elevator shaft. Contractor shall comply with any and all Occupational Safety and Health Standards for general industry (26 CFR 1911) and for the Construction Industry (29 CFR 1926.) Special attention shall be addressed to Sections 1926.502 Personal Fall Arrest Systems and especially 1926.502(d)(ii) regarding work in Elevator Shafts by all persons working inside the guarded areas. The Contractor shall be required to show documentation that each person who has access to the elevator entrances has been trained in the proper use of personal fall protection. The Owner reserves the right to require additional safety precautions at any time. A copy of the "Elevator Industry Field Employee's Safety Handbook" shall be required on the site at all times and an additional copy shall be provided to the Owner along with a job specific safety program prior to the beginning of any work. Perform work at all times in accordance with the minimum requirements of the "Elevator Industry Field Employee's Safety Handbook," published by Elevator World.

3.03 DUST PROTECTION

- A. Barricades shall be constructed so as to protect adjacent portions of the building from dust and debris. Barricades shall be arranged to avoid damage to existing building finishes.

3.04 INSTALLATION

- A. General: Install hydraulic elevator power unit, oil storage tank, piping and pumps in the machine room.
 - 1. Mount power unit bedplate and steel frame assembly, on floor of machine room. Bolt in place using appropriate vibration isolator. Install a data plate on the tank framing indicating the characteristics of the hydraulic fluid used, actual no-load and full load working pressures, and relief valve pressure setting. Permanently mark oil level in tank with car at lowest landing.
- B. Cylinder Well-Hole:

1. The existing jack hole and casing may remain at Contractor's discretion if enough annular space exists to install the new jack and PVC liner system.
2. If additional drilling of the hole is required, it shall include drilling through any materials including clay, small rocks or boulders, bedrock, and de-watering of the well hole; and the cost for performing such work shall be part of the allowance included in bid price. Where materials or drilling conditions are encountered from buried reinforced concrete, sewers, piping or other buried conduits or hydraulic head water outflow from the hole caused by artisan conditions, the work shall be temporarily stopped and the General Contractor and Owner promptly advised, pending further instructions or direction. If any additional operations are required resulting from such conditions, work shall be performed on a time and material basis at the Contractor's prevailing rates. (See Part 7 of this Section for additional requirements.)
3. The rigging of the hole drilling apparatus shall be made within available space afforded by the hoistway and corridor passages providing access to it. Except as noted, any part of the elevator system, which must be temporarily disassembled for the work, shall be reinstalled in place at the conclusion of the hole drilling. No part of the elevator system shall be used in conjunction with hole drilling operations, or as a means for structural support for such operations.
4. All excavation of the materials from the hole shall be promptly removed from the site at the completion of the boring effort. Corridor areas, loading docks or any adjacent spaces shall not be used as a means to store excavation materials. (See Part 7 of this Section for additional requirements.)
5. Prior to commencing rigging and drilling operations:
 - a. Secure a set of building outline drawings from the Owner. Arrange a meeting to coordinate with the General Contractor and Owner, a plan of securing corridor areas and stairway leading to such corridors, affected by the drilling work.
 - b. Upon approval by the Owner, adjacent corridors affected by the drilling work shall be adjacently barricaded off at each door entrance and stairway with conspicuous signage indicating alternate paths of egress from the building.
6. All areas affected by the drilling work shall be kept continuously clean and free of water, excavation materials and tools not immediately needed. No tools or devices shall be stored inside the building but shall be kept securely stowed in an enclosed storage truck/trailer unit provided by the Contractor. Water, excavation, and fill materials shall be cleaned from the building as it accumulates. (See Part 7 of this Section for additional requirements.)
7. In the event that contaminated or non-virgin excavation materials are encountered, the Contractor shall:
 - a. Contact the General Contractor.
 - b. The General Contractor shall notify the Owner and Engineer. Work in the area of the soil shall not proceed until approval by the Owner.
 - c. The General Contractor shall test the existence of contaminated materials and shall notify the NYS Department of Environmental Conservation.
 - d. The General Contractor will forward the remediation directives to the Contractor.
 - e. The Contractor shall employ a remediation contractor approved by Owner and Engineer to remove all spoils as directed by General Contractor.
 - f. Upon notification by the General Contractor of approval by the Owner, the new piston may be installed.
 - g. Costs for all remediation work shall be deducted from the allowance for drilling and remediation work as stated in the Form of Proposal. Any additional fees not covered by the allowance shall be approved by the Owner in writing.

C. Casing: Existing to remain. If a new casing is required, installation shall conform to the following:

1. Drive casing into well hole as the drilling is progressed to prevent cave-ins or undermining of building footings.
2. Install casing in nominally plumb position to enable plumb cylinder installation.
3. Casings may be installed in sections to facilitate installation.
4. Immediately upon being positioned, seal bottom of casing with quick setting concrete.
5. Check position of casing, correct any variation.

D. Cylinder and Plunger:

1. Remove existing cylinder and plunger, along with existing buffers and pit channels. Remove oil piping as needed for access and clearance. Notify Owner prior to any cutting, torching, jackhammering, or dust-producing work so that Owner can notify building occupants and shut down fire alarm systems.
2. Once cylinder and plunger are removed the Contractor shall:
 - a. Contact the General Contractor.
 - b. The General Contractor shall notify the Owner and Engineer. Work in the area of the cylinder hole shall not proceed until approval by the Owner.
 - c. The Contractor shall employ a remediation contractor approved by Owner and Engineer to evacuate cylinder casing and discard spoils.
 - d. Upon notification by the General Contractor of approval by Owner, the new piston may be installed.
 - e. Costs for all remediation work shall be deducted from the allowance for drilling work as stated in the Form of Proposal. Any additional costs for remediation and drilling in excess of the allowance shall be approved by the Owner in writing.
3. Install new cylinder and plunger plumb, centered accurately, and shimmed to proper elevation, taking care that the protective coating of the cylinder and the PVC liner are not damaged during installation.
4. Seal the top of casing around cylinder liner.
5. Fasten plunger to the bottom beams of the car platform sling, so arranged that the centerline of the plunger is equidistant between the bottom beams of the car sling and sling side stiles. Use platen plates in making the connections. Isolate plunger from platen to prevent corrosion.

E. Buffers: Install new buffers on the new pit channel assembly so that buffers land on car safety plank in approximately the same location as existing buffers.

F. Clean all oil spills/leaks; whether existing or as a result of the work of this Contract.

3.05 ELEVATOR EQUIPMENT

- A. Install equipment in strict accordance with manufacturer's printed installation instructions.
- B. All discarded materials are the sole responsibility of the Contractor to completely remove them from the site at their expense. Contractor shall be responsible for documenting compliance with project construction waste diversion plans.

3.06 TESTING

- A. The Contractor shall provide for all testing and inspection services. The Contractor shall provide for a reasonable amount of time to integrate the elevator operations with the work of other trades. The Contractor shall provide a unit cost within the Base Bid for additional labor where requested by the Owner. The Contractor shall provide a complete functioning elevator, approved by the AHJ, and is required to make any corrections directed by the AHJ to obtain final approval.

3.07 EXAMINATION

- A. Examine elevator areas, with installer present, for compliance with requirements, installation tolerances, and other conditions affecting performance of elevator work. Examine hoistways, hoistway openings, pits, and machine rooms, as constructed; verify critical dimensions; and examine supporting structure and other conditions under which elevator work is to be installed. Do not proceed with installation until unsatisfactory conditions have been corrected.
1. For the record, prepare a written report, endorsed by the installer, listing dimensional discrepancies and conditions detrimental to the performance of elevator work.

3.08 ADDITIONAL REQUIREMENTS

- A. Comply with manufacturer's instructions and recommendations.
- B. Welded Construction: Where welded construction is used, comply with AWS standards for workmanship and for qualifications of welding operators.
- C. Coordination: Coordinate elevator work with work of other trades for proper time and sequence to avoid construction delays. Use established benchmarks, lines, and levels to ensure dimensional coordination of the Work.
- D. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts designed to effectively prevent transmission of vibrations to structure and thereby eliminate sources of structure-borne noise from elevator system.
- E. Lubricate operating parts of systems, including ropes, if any, as recommended by manufacturers.
- F. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay installation of sills and frames until the car is operable in shaft. Reduce clearances to minimum, safe, workable dimensions at each landing.
- G. Leveling Tolerance: $\frac{1}{4}$ " (6 mm), up or down, regardless of load and direction of travel.
- H. Set sills flush with finished floor surface at landings. Fill space under sills solidly with non-shrink, nonmetallic grout.
- I. Provide minimum run-by and areas of refuge as specified in the latest issue of ASME A17.1.

3.09 FIELD QUALITY CONTROL

- A. Engineer's pre-inspection prior to formal acceptance testing: Prepare for and conduct testing for Engineer's pre-inspection prior to scheduling formal acceptance testing with the AHJ. Conform with Specification Section 14 28 00 - Elevator System Startup & Witnessed Testing. Demonstrate function of all buildings to elevator interfaces, including fire alarm shutdown, recall, lighting, ventilation, operation on emergency generator, etc. Do not bring in an Elevator Inspector until Contractor has demonstrated functionality of the above tests in the presence of the Engineer.
- B. Acceptance Testing: Upon nominal completion of elevator installation, and before permitting use (either temporary or permanent) of elevators, perform acceptance tests as required and recommended by ASME A17.1 and by the AHJ.
- C. Advise Owner, Architect/Engineer, and Authorities Having Jurisdiction in advance of dates and times that tests are to be performed on elevators.

3.10 DEMONSTRATION

- A. Instruct Owner's personnel in proper use, operations, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at times of failure in operation and other building emergencies. Train Owner's personnel in procedures to follow in identifying sources of operational failures or malfunctions. Confer with Owner on requirements for a complete elevator maintenance program.
- B. Make a final check of each elevator operation with Owner's personnel present and just prior to date of Substantial Completion. Determine that operating systems and devices are functioning properly.

3.11 PROTECTION

- A. Temporary Use: Do not use elevator for construction purposes unless cars are provided with temporary enclosures, either within finished cars or in place of finished cars, to protect finishes from damage.
- B. By Alternate:
 - 1. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevators. If, despite such protection, elevators become damaged, engage elevator installer to restore damaged work so that no evidence remains of correction work. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.
- C. Provide final protection and maintain conditions, in a manner acceptable to elevator manufacturers and installer, that ensure elevators are without damage or deterioration at the time of Substantial Completion.

3.12 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at date Elevator 2 is taken out of service, provide full maintenance service by skilled, competent employees of the elevator installer. Include monthly preventive maintenance, repair, or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Use parts and supplies as used in the manufacture and installation of original equipment.
- B. Perform maintenance, including emergency callback service, during normal working hours.

1. Include 24-hour-per-day, 7-day-per-week emergency callback service.
 - a. Response Time: 2 hours or less.
 2. Maintenance shall cover both elevators, including upon expiration of one (1) year warranty period for Elevator 2 modernization.
 3. Maintenance shall continue on both elevators until expiration of one (1) year warranty period on Elevator 1 modernization.
 4. Warranty start date shall be date elevator has passed all third party inspection and acceptance testing, all deficiencies have been corrected, and the elevator system is turned over to the owner for unrestricted public use.
 5. Provide as part of bid documentation labor and travel billing rates for non-covered service callbacks.
- C. Continuing Maintenance Service: Provide a continuing maintenance proposal from Installer to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms.
- D. Provide full maintenance service by skilled, competent employees of the elevator Installer for elevators used for construction purposes. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Use parts and supplies as used in the manufacture and installation of original equipment.
- 3.13 “AS-BUILT” DRAWINGS
- A. The Contractor shall be required to prepare and submit a set of Division 14 “As-Built” Drawings as the portions of work are completed and prior to application for final payment.
 - B. The “As-Built” Drawings shall include a full set of the ‘as bid’ or ‘conformed’ Contract Drawings for Division 14.
 - C. The submitted Drawings shall be in the form of full size as-bid first plus additional drawings and attachments following. The Drawings shall be clean, original paper copies of the Contract Drawings, marked up in red pencil or pen with the Contractor’s markups. For Floor Plans drawn at less than 1/4” scale, the field drawings shall be expanded to 1/4” scale to provide room for mark ups.
 - D. The Contractor shall maintain a dedicated set of Construction Drawings at a protected location at the job site for the continuous documentation for these as-builts. The Contractor shall record the actual installed locations of equipment, wiring, conduit/pathway, etc. Record any and all variations from the original Construction Drawings in neat, legible, hand drawn lines and text. Attach copies of Contractor’s field sketches and note where they pertain.
 - E. Confirm that all information provided to the Contractor in the Form of Request for Information (RFI) responses, accepted Requests for Proposal (RFPs), Change Orders and Supplemental Instructions (SIs) are properly conveyed on the Drawings. Show the actual changes made, do not just paste a copy of the RFI, RFP, ASI, or CO unless that document includes a full scale drawing which accurately represents the work actually installed.
 - F. Confirm that the room names and numbers shown on the As-Built’s are the actual room numbers and names posted on the rooms at the time of turnover.

- G. Confirm that equipment schedules accurately depict any changes made during construction.
- H. For work which becomes concealed as part of the project, keep an accurate record, and show on “As-Built” Drawings the actual installed location of any concealed work such as conduit, piping, etc. Provide location on Record Drawings for outside services by indicating actual dimensions from fixed reference points which will be available after completion of construction. “Tie” two (2) dimensions from different reference points to confirm locations of concealed work.
- I. For projects extending more than three months, provide the original “As-Built” to the Engineer as the work is completed on sections of the project and obtain a receipt from the Engineer. The Contractor shall be responsible for the safe keeping and maintenance of the “As-Built” Drawings throughout construction, and for maintenance of one (1) photocopy at the Contractor’s office for a period of not less than three (3) years following final acceptance.
- J. Provide the original copies of the “As-Built” Drawings to the Architect or Engineer in accordance with the provisions of the General Conditions and Division 1. Unless reproducible “As-Built” Drawings are required under the General Condition and Division 1, provide the original paper copy of “As-Built” Drawings to the Engineer.

3.14 OPERATION AND MAINTENANCE INFORMATION

- A. Submit Operation and Maintenance Manuals per Division 1. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Architect/Engineer will comment on whether content of Operation and Maintenance submittals is acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Initial Manual Submittal: Submit a draft copy of each manual at least 30 days before commencing demonstration and training. Architect/Engineer will comment on whether general scope and content of manual are acceptable.
- C. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.
 - 1. Correct or revise each manual to comply with Architect’s comments. Submit copies of each corrected manual within 15 days of receipt of Architect’s comments and prior to commencing demonstration and training.
- D. Comply with Division 1 for schedule for submitting Operation and Maintenance documentation.
- E. Format of Operation and Maintenance Manuals: Submit manuals in the form of a single composite electronic PDF file.
 - 1. Electronic Files: Use electronic files prepared by the manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size. “Recognize Text” shall be run on all scanned documents to provide a text searchable PDF.
- F. Organization and Requirements for Operation and Maintenance Manuals: Unless otherwise indicated, organize each manual into the format as described below, and as indicated in Division 1.

1. Title Page: Indicate Building Name, Project Title, and Owner's Project Number.
2. Table of Contents: Hyperlinked bookmarked information with links to each CSI Master Format specification section contained in manual.
3. Contact List: Indicating name and contact information for the following:
 - a. General Contractor.
 - b. Subcontractor.
 - c. Architect.
 - d. Architect's Subconsultants.
4. Project Warranties: Include the overall project warranty and hyperlinks to any special warranties included in equipment's specification sections.
5. Operations and Maintenance Information: Operations and Maintenance information for every CSI specification section included in project. Each section shall contain the final submittal that has been updated to include any architectural remarks, any special Contractor or manufacturer warranty associated with the equipment or system, the installation, Operations and Maintenance manuals for each piece of equipment, including any accessory components, all test reports for systems and equipment and parts list for each piece of equipment.
6. Include a typed guarantee from the Contractor with a 1 year guarantee stated as commencing on the date of final acceptance.
7. The Contractor shall include a complete copy of the O&M Manual checklist which follows this section as the last page of the O&M Manual.

O&M Manual Checklist Date _____
(Include completed copy of this Checklist in O&M Manual when submitted)
Project _____ Trade _____

Project Name _____

Submitted as an electronic file per Section 01 78 23 YES / NO

Composite electronic PDF file YES / NO

Minimum readable text size YES / NO

Title page "Recognize Text" turned on for all scanned documents YES / NO

.....
O&M Manual:

Cover Sheet listing:

Building Name

O&M Manual Table of Contents: Hyperlinked book-marked information with links to each CSI Master Format Specification Section in manual YES / NO

O&M Manual Contact List:

Contractor

Contractor Name _____
Contractor's Address _____
Contact person _____
Tel. & Fax #'s _____

Each Major Subcontractor

Contractor Name _____
Contractor's Address _____
Contact person _____
Tel. & Fax #'s _____

Project Manager

Name

Engineer

Name _____
Company Name _____
Contact person _____

Architect

Name _____
Company Name _____
Contact person _____

.....

O&M Manual - Remaining Pages:

Checklist Page 2

O&M Manual Project Guarantee & Warranties:

Typed guarantee from Contractor with 1 year guarantee stated as commencing on the date of final acceptance by the University. Date must be identified _____

Hyperlinks to any special warranties included in Equipment Specifications YES / NO

1.	Organized by CSI Specification Section number.	<u>YES / NO</u>
2.	Each CSI Specification Section included.	<u>YES / NO</u>
3.	Includes final submittal, updated to contain A/E remarks.	<u>YES / NO</u>
4.	Includes any special Contractor or manufacturer warranty.	<u>YES / NO</u>
5.	Includes the Installation, Operation and Maintenance (IOM) manuals for each piece of equipment, up to date for the version of equipment supplied.	<u>YES / NO</u>
6.	Includes IOM data for accessory data.	<u>YES / NO</u>
7.	Includes test reports for each piece of equipment.	<u>YES / NO</u>

Scan of spare parts list. _____

Scan of all test reports (i.e., fire alarm). _____

Scan of all inspections (i.e., plumbing, electrical). _____

Scan of all certification data. _____

Scan of facility lubrication chart. _____

Scan of facility valve chart. _____

Scan copy of complete temperature control and operating instructions. _____

Completed copy of checklist last page of O&M Manual. _____

END OF SECTION 14 25 00

DIVISION 14 CONVEYING EQUIPMENT

SECTION 14 28 00 - ELEVATOR SYSTEM STARTUP & WITNESSED TESTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SCOPE

- A. This Section includes the following:

- 1. Engineer's pre-inspection elevator testing of building interfaces.

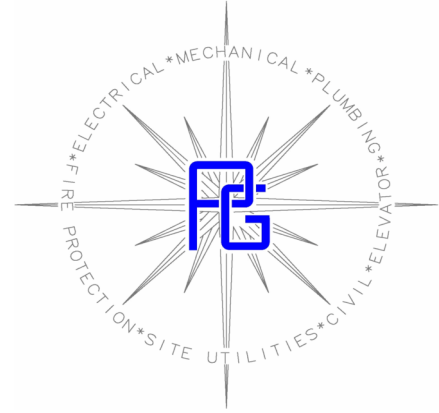
PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 WITNESSED TESTING

- A. At the completion of the elevator installation, prior to calling in for an elevator inspection, GC shall review and complete the attached pre-inspection checklist. Once GC is satisfied that all work is successfully completed, the GC shall notify the Engineer and Owner that the elevator is complete and shall submit the attached completion certification to the Engineer, suitably signed. The Engineer and Owner shall arrange to be present on site to witness the elevator operation. The following operations shall be verified:
 - 1. Normal operation, including independent service.
 - 2. Card security functionality if present.
 - 3. Operation on emergency power, including pre-transfer landing and emergency power indicator light functionality, if present.
 - 4. Recall and fire service operation, including primary and secondary recall, firefighter's hat functionality.
 - 5. Shunt trip operation.
 - 6. Emergency phone functionality.
 - 7. Remote elevator control panel functionality if present.
 - 8. Emergency two-way visual communication system.

END OF SECTION 14 28 00



Owner

Cornell University
Engineering & Project Management
102 Humphreys Service Building
Ithaca, NY 14853
Phone (607) 327-1709

Engineer

Peterson Guadagnolo Consulting Engineers PC
476 East Brighton Avenue
Syracuse, NY 13210
Phone (315) 476-8311

Pre-Inspection Checklist for New Elevator Installations & Modernizations

Notice: This checklist reflects the most common issues encountered when performing an Engineer's inspection. The Engineer's inspection does not preclude the Contractor from obtaining an AHJ approved elevator inspection. Violations not indicated below may appear during AHJ inspections. It is suggested that elevator industry personnel have access to a current set of applicable code books. The most common industry code books are: The ASME A17.1 Elevator Code 2022 Edition; The 2025 Building Code of New York State; NFPA 13 Sprinkler Code; NFPA 72 Fire Alarm Code; NFPA 70 National Electric Code.

Instructions:

Check each box when the item is completed. Note any variances received from The City of Ithaca or New York State. Submit the completed form to the Engineer prior to scheduling the Engineer's inspection.

-In the Machine Room and/or Control Room

- ☐ All non-elevator-related piping and equipment are prohibited from entering or passing through the machine room per ASME A17.1 section 2.8.1.
- ☐ Electrical disconnects must be lockable in the open position and properly located within sight of the elevator devices as outlined in NFPA 70 section 620.51. All disconnects must be properly fused or utilize a non-self-resetting circuit breaker.
- ☐ A dedicated circuit with lockable fused disconnect is required to be located in the machine room serving the car lighting per NFPA 70 section 620.22.
- ☐ A dedicated circuit shall service machine room lighting and receptacles. Receptacles in the machine room shall have GFCI protection by a GFCI-type receptacle NFPA 70 section 620.6.
- ☐ Warning signs shall be posted when there is power from more than one source per NFPA 70 section 620.52.
- ☐ Electrical clearances are to be provided and maintained in front of the controller and disconnect at all times. It is interpreted that machine room doors that swing into the electrical clearance area endanger worker safety and are prohibited.
- ☐ Machine rooms are to be properly lit, so the electrical control devices and machinery are well illuminated. The light switch is to be located in the machine room and placed near the machine room door jamb per ASME A17.1 section 2.7.9.1. The required lighting shall not be connected to the load side of a GFCI per NFPA 70 section 620.23.
- ☐ All electrical equipment, controllers, and machines are to be properly installed and grounded per NFPA 70 section 620.82. All electrical conduits are to be properly secured and routed in a workmanlike manner.
- ☐ An "ABC" type fire extinguisher is required to be located in the room per ASME A17.1 section 8.6.1.6.5.

- ❑ Holes around piping and structure penetrations in the machine room are to be properly filled and firestopped to maintain a fire rated enclosure.
- ❑ The machine room door is to be self-closing and self-locking per ASME A17.1 section 2.7.3.4.
- ❑ The clear headroom in the machine room shall be not less than 7 feet per ASME A17.1 section 2.7.4.1.
- ❑ Machine rooms are to be vented and/or heated by mechanical or natural means to ensure proper operating temperatures of the equipment at all times per ASME A17.1 section 2.7.9.2. If the elevator machine room is provided with standby power, the machine room HVAC shall be provided with standby power as well.
- ❑ Where sprinklers are provided in the elevator machine room, they shall be served by a dedicated branch line with non-retardable flow switch and control valve with tamper switch. Alternatively, a preaction sprinkler system may be installed. In either case, sprinkler activation in the machine room shall activate shunt trip operation.
- ❑ The circuit supplying the shunt trip device coil shall be served by emergency power, when available, and shall be monitored for power loss.

-In the Pit Area

- ❑ A pit ladder is required with a handrail at least 48 inches above the landing. The ladder is to be non-combustible and located near the jamb side of the hoistway door, the rungs are to have a clearance of not less than 4½ inches, spaced 12 inches apart and not less than 16 inches wide. See ASME A17.1 section 2.2.4.
- ❑ A pit stop switch is to be located adjacent to the pit ladder and 18 inches above the landing in order to be accessible before stepping onto the pit ladder. A second pit stop switch is required when the pit exceeds 67" in depth.
- ❑ A light for the pit is to be located so as to provide adequate lighting for the area. The switch is to be near the stop switch. The light is to be guarded. See ASME A17.1 section 2.2.5. The required lighting shall not be connected to the load side of a GFCI per NFPA 70 section 620.24.
- ❑ A dedicated circuit shall service pit lighting and receptacles. A GFCI type receptacle is required in pits per NFPA 70 section 620.6. When a sprinkler is present in the pit area, a weatherproof while-in-use cover is required. A permanently installed sump pump shall require GFCI protection per NFPA 70 section 620.6.
- ❑ Sprinklers are required in the pits of hydraulic elevators and are to be served by a dedicated branch line with flow switch and control valve with tamper switch. See NFPA 13 sections 8.15.5.1 and 8.15.5.2. Activation of sprinkler heads located not more than 24" off the pit floor shall not activate shunt trip operation.

-In the Hoistway

- ❑ All non-elevator-related piping and equipment are prohibited from entering or passing through the hoistway per ASME A17.1 section 2.8.1.
- ❑ All offsets or ledges within the hoistway greater than four inches are to be tapered to not less than 75 degrees per ASME A17.1 section 2.1.6.
- ❑ In general, sprinklers are not required in elevator hoistways and shall be prohibited. Where sprinklers are required, they are to be served by a dedicated branch line with non-retardable flow switch and control valve with tamper switch. Sprinkler activation in the elevator shaft shall activate shunt trip operation.
- ❑ Hoistway ventilation is generally not required; however, if provided it shall be activated by fire alarm initiating devices (smoke detectors/heat detectors) at each lobby. The circuit supplying the hoistway ventilation system (damper, hatch, etc.) shall be served by emergency power, when available, and shall be monitored for power loss unless the system is arranged to fail open upon loss of power.

-General, Operations, and Building Interface

- ❑ A hands-free emergency phone shall be provided in the elevator car and shall ring the Cornell University Department of Public Safety.
- ❑ Fire alarm initiating devices must be properly located in each elevator lobby and in the machine room. Activation of these devices shall initiate primary or alternate recall, as required.
- ❑ Smoke detectors and heat detectors are required in the hoistway when a sprinkler head is located in the hoistway. See ASME A17.1 section 2.27.3.2 & NFPA 72. Fire alarm initiating devices in the machine room or hoistway, if provided, shall initiate primary or alternate recall shall cause the visual signal in the car to illuminate intermittently per ASME A17.1 section 2.27.3.2.
- ❑ Smoke detectors shall not activate shunt trip. Shunt trip shall only be activated by heat detectors or by flow switch on branch lines serving machine room and hoistway (if provided).
- ❑ In general, glass is prohibited in elevator cars and hoistways.
- ❑ If card access security is provided, activation of recall and/or fire service shall bypass all lockouts and restrictions.
- ❑ If elevator machine is provided with standby power, the elevator shall be interlocked with the transfer switch feeding the elevator such that when the elevator is operating on emergency power, an indicator is lit at the primary recall floor. See ASME A17.1 section 2.27.2.3. Additionally, the elevator shall move to the nearest floor and open its doors prior to transfer switch operation.
- ❑ Loss of power to a group of elevators provided with emergency power shall cause sequential recall of elevators. Operation of elevators on emergency power shall be determined by the position of generator selector switch.

- ☐ If provided, remote elevator control panel shall be provided with position indicator, fire service switch, and generator selector switch, if required. Fire service switch at remote elevator control panel shall be On-Off only.
- ☐ Illumination at the landing sill shall be not less than 10 footcandles per ASME A17.1 section 2.11.10.2.
- ☐ All signage required by NFPA 70 and ASME A17.1 must be properly installed including the following examples: code data plates, fire service instructions, emergency identification numbering, hoistway door floor numbers, rope data tags, in-car capacity tags, crosshead data tags, governor rope data tags, full-load working pressures, and governor tripping speeds.

I certify that the above items have been verified and found to be in proper working order for the following elevator(s).

Elevator(s): _____

Certified by: Print Name: _____ Signature: _____

Company: _____

Date: _____ Phone: _____

Remarks:

DIVISION 21 FIRE SUPPRESSION

SECTION 21 00 00 - FIRE SUPPRESSION SYSTEM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.
- B. The Contract Drawings and the General Provisions of the Contract, including the General Conditions of the Contract for Construction, Supplementary Conditions, Special Conditions and Division 1 Specifications apply to the work of this Section.

1.02 WORK INCLUDED

The work of this Division shall include providing all materials, labor, services, permits and related work to furnish a complete, operating, tested, functioning, documented sprinkler system including all work shown, specified, or required for proper systems operation including but not limited to the following:

- A. Provide all City of Ithaca Permits and Inspections and pay all fees.
- B. Provide Submittals to Owner's Insurance Carrier and Ithaca Building Department and provide any required changes to obtain approval. Provide this work to allow timely construction.
- C. Provide coring and hole cutting for all fire suppression piping. Provide patching of openings for removed or rework according to structural and architectural drawing details. Include in Fire Protection Base Bid costs.
- D. Provide Fire Suppression Basic Materials and Methods. (Section 21 05 00)
- E. Exercise, lubricate and adjust packings on each fire protection valve and standpipe valve. Provide a listing to the Owner and Engineer of any valves which cannot be made to operate properly after lubrication and adjustment.
- F. Provide Firestopping and Smokestopping for Fire Suppression Systems. (Section 21 84 00)
- G. Provide flushing of all fire suppression piping provided under this Contract. This flushing shall be provided through the flushing connections provided as outlined in NFPA 25-Inspection, Testing & Maintenance of Water Based Fire Protection, latest Edition published at time of permit issue.
- H. Provide testing of all electrical and fire alarm devices.
- I. Provide Product Submittals and Fire Suppression Shop Drawings.
- J. Provide Owner's Operation Instruction.
- K. Provide Operation and Maintenance Manuals.
- L. Provide Fire Protection Contractor's Warranty and Guarantee and submit it to the Engineer following completion of the fire suppression installation.

- M. Provide “red-lined” As-Built Drawings, signed, and dated by the Contractor and submit them to the Engineer following completion of the fire suppression installation.
- N. Provide labeling of piping in mechanical spaces and on exposed piping indicating direction of flow, with label reading “Fire Protection Water” for sprinkler/standpipe systems on all exposed piping 2” and larger. Tags shall be wraparound tags securely fastened or stick-on style.
- O. Provide openings in existing construction as required for the work of this project.
- P. Provide protective covering over all books, furnishings, and equipment prior to installation work in any and all areas. Proper and adequate protection shall be coordinated with and approved by the Owner and General Contractor.
- Q. Provide surface cleaning of all piping scheduled to be painted. Coordinate this work with the General Contractor and the Painting Contractor.

1.03 RELATED WORK NOT INCLUDED

- A. The Electrical Contractor is responsible only for the electrical connections included under Division 26, 27, 28 and the Electrical Drawings. The Fire Protection Contractor shall provide all the other electrical work necessary for satisfactory operation of equipment furnished under Division 21 Fire Suppression.
- B. Painting of sprinkler pipes specifically listed by the Construction Manager (CM) as by others is the only sprinkler and standpipe painting not included in Division 21.
- C. Patch work shall be provided by the CM as outlined in the CM’s general specifications. The Fire Protection Contractor shall coordinate all fire protection related patch work with the CM.

1.04 DIVISION 21 -FIRE SUPPRESSION DESCRIPTION

- A. The technical specifications of this Contract are arranged for the convenience of the Owner and Designers into Divisions of Work. The Work of Division 21 - Fire Suppression is further described in Specification Sections of the 21 00 00 Series and on Contract Drawings of the “F” series.
- B. The organization of the work into Divisions shall not relieve the Prime Contractor from providing all of the work shown on the complete set of Drawings specified herein, whether or not the individual subcontractors correctly identify their respective responsibilities.

1.05 OTHER DIVISION SPECIFICATIONS APPLICABLE TO THIS WORK

- A. To the extent that the Work of the Division of Contract includes the work of other trades, the Contractor for this Division shall adhere to the requirements of other specification sections. All electrical work shall be performed in accordance with the Division 26, 27 and 28 specifications. All General Construction work shall be performed in accordance with the provisions of the appropriate Division 2 through Division 14 Sections. Fire detection work shall conform to the Division 28 sections.

1.06 CODES AND STANDARDS

- A. Sprinkler Systems - NFPA 13 - Latest issue recognized by the IBC as amended by NYS at time of Permit issue.

- B. Standpipe Systems - NFPA 14 - Latest issue recognized by the IBC as amended by NYS at time of Permit issue.
- C. Inspection Testing and Maintenance of Water Based Fire Protection Systems - NFPA 25 - Latest issue published at time of Permit issue.

1.07 APPROVAL CERTIFICATES

- A. The work of this Contract shall comply with the requirements of the City of Ithaca and the Owner's Insurance Carrier.
- B. The Contractor shall submit at least four (4) sets of the Contractor's working Drawings to the City of Ithaca Building Division and secure its approval. The Contractor shall submit four (4) sets of working Drawings to the Owner's Insurance Carrier and secure its comments. The Fire Protection Contractor shall provide all required fire protection permits prior to fire protection work commencing.
- C. Before seeking final approval of the installed system from the Authority Having Jurisdiction, the installing company shall furnish a written statement that the work covered by the Contract has been completed, flushed, and tested in accordance with the approved Plans and Specifications. This shall be the "Sprinkler Contractor's Certificate Covering Materials and Tests" described in NFPA 13. The Contractor shall provide a minimum of three original sets of Material & Test Certificates for each area to be signed by the Contractor and the Engineer or designated Owner's representative.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 21 00 00

DIVISION 21 FIRE SUPPRESSION

SECTION 21 05 00 - FIRE SUPPRESSION BASIC MATERIALS & METHODS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Work of Division 21 - Fire Suppression Systems Section applies to the Work of this Section.

1.02 WORK INCLUDED

- A. Provide Basic Materials and Methods.
- B. Provide labeling of piping in mechanical and exposed piping in non-public spaces. Provide pipe markers indicating direction of flow and labeled "Fire Sprinkler Water" on all piping 2" and larger. Pipe markers shall be wraparound type.
- C. Provide Firestopping and Smokestopping.
- D. Provide openings in existing construction as required for the work of this project.

1.03 SUBMITTALS

- A. Provide submittals for the following:
 - 1. Black Steel Pipe, Schedule 10 & Schedule 40, "Hot Dipped" Galvanized Schedule 40 Steel Pipe, CPVC Pipe.
 - 2. Fittings and Couplings.
 - 3. Valves, including Control Valves, Check Valves, Standpipe Valves, Drain, Test & Flushing Valves as well as Full Port. Ball Valves and Drain & Test Valves.
 - 4. Pipe Hangers, Supports and Brackets.
 - 5. Sprinkler Heads, Sprinkler Escutcheons, Sprinkler Cover plates, Head Guards, Head Cabinets and Head Wrenches.
 - 6. Signage.
 - 7. Pipe Markers.
 - 8. Wall Plates / Escutcheons.
 - 9. Firestopping and Smokestopping.
 - 10. Coring and Hole Cutting Methods for all Fire Protection Piping.
 - 11. Sleeves, Inserts and Openings.
- B. Before actual installation, the Contractor shall prepare complete detailed Construction Drawings for the various systems in a form required by the insurance organization having jurisdiction.
- C. Submittals shall be job specific and shall not include any spurious or catalog materials not related to the specific project. These Drawings shall indicate the location of existing and proposed ductwork and lights as shown on the Mechanical and Electrical Drawings and verified by the Contractor in the field. Comply with applicable Mechanical Coordination Drawing Requirements.

- D. The Contractor will be provided with one (1) set of Revit or AutoCAD Compatible Drawings of the building prepared by the Architect/Engineer. The Contractor shall field verify and confirm all dimensions and details on the AutoCAD Drawings prior to using the information on the Drawings. The Contractor shall note that the Drawings were prepared to identify the general Scope of the Work for bidding purposes and are not considered or intended to be the shop drawings. The pipe sizes shown on the Drawings are based upon the original building design which includes a 1½" loop main and individual 1" branches. For this project, individual runouts to each sprinkler are proposed to minimize the need for additional flushing connections and access doors.
- E. Hydraulic calculations shall only be required in the phase of construction which provides a building addition or substantial renovations. For those areas the Engineer's calculations shall be adjusted by the Contractor as required to meet the Construction Calculations. The Contractor shall field check the existing building construction and structural framing so as to avoid conflicts with the structure of the building and provide proper hanging and sprinkler coverage in all areas. The Contractor shall further review and check proposed structural drawings so as to be aware of all proposed structural changes and additions to the building.
- F. Submit pdf copies of Drawings for review by the Engineer of construction details.
- G. Shop drawings must include in addition to the information required by NFPA 13, the following:
 - 1. Room Names.
 - 2. Room Numbers.
 - 3. Door Openings.
 - 4. Door Swings.
 - 5. Room Dimensions.
 - 6. Critical Dimensions for placement of sprinkler heads, where a mechanic might misinterpret the Drawing.
- H. Provide Shop Drawings, Hydraulic Calculations and Submittals as required by Division 21 Specification Sections.

1.04 SIGNS AND NAMEPLATES

- A. Furnish and install approved enamel on metal identification signs at all new water flow alarms, control valves, drain valves and test valves as required in NFPA 13, latest issue. Provide additional nameplates on main control valves and supply water valves to identify their function and what they control.

1.05 EXTRA PARTS

- A. The Contractor shall provide a supply of extra sprinklers, cover plates and escutcheons together with a special sprinkler wrench for each type of head installed, to be housed in a steel cabinet. Sprinklers in cabinets shall include all types and ratings installed, including corresponding escutcheons or cover plates. Cabinets shall be located adjacent to the sprinkler valve header. Sprinkler cabinets shall be of sufficient size and quantity to house all items provided. Refer to the Fire Protection Contract Drawings for minimum quantities that shall be provided.

1.06 OPERATING INSTRUCTIONS

- A. Upon completion of the work of this Section, instruct a representative of the Owner fully in the operation and maintenance of all systems and equipment installed under this work.
- B. Operating Manuals: Include in the operating manuals the inspection schedule and report form as described in NFPA 25 Standard for the Inspection Testing and Maintenance of Water Based Fire Protection Systems. Also, include the "Contractors Material and Test Certificate for Above Ground Piping" as described in NFPA 13.

1.07 APPROVALS

- A. All materials and equipment furnished as a part of this work shall be Underwriters approved and/or FM approved.

PART 2 - PRODUCTS

2.01 PIPING

- A. BlazeMaster CPVC Interior Pipe and Fittings:
 - 1. CPVC pipe approved and listed for fire sprinkler systems.
 - 2. CPVC fittings and the specific pipe being provided approved and listed for fire sprinkler systems.
 - 3. Manufacturer's listed and approved solvent cement.
 - 4. All CPVC pipes, fittings, solvent cement, and hangers shall be BlazeMaster products approved and listed for use on fire sprinkler systems.
 - 5. All CPVC piping shall be installed above solid ceilings or soffits. No exposed CPVC piping in allowed.
- B. Steel pipe, Schedule 40 and Schedule 10:
 - 1. 2" and smaller pipe shall be Schedule 40.
 - 2. Black 2½" and larger pipe shall be Schedule 10.
 - 3. Manufacturer: Bull Moose, Wheatland Tube, or approved equal.
 - 4. Where hot-dipped galvanized is indicated or scheduled, piping shall be Schedule 40.
- C. Fittings:
 - 1. Grooved fittings for Schedule 40 and Schedule 10 black steel pipe and galvanized Schedule 40 pipe:
 - a. Type: Black ductile iron. Galvanized finish required for building exterior piping and exposed pipe in bathrooms.
 - b. Manufacturer: Victaulic, Gruv-lok or approved equal.
 - c. The use of Victaulic IGS fittings is not approved for use on this project.
 - 2. Grooved Couplings:
 - a. Type: Rigid style.
 - b. Manufacturer: Victaulic, Gruv-lok or approved equal.

- c. The use of Victaulic EZ couplings or similar products are not approved for use on this project.
- 3. Threaded fittings for Schedule 40, black or galvanized steel, threaded pipe:
 - a. Type: Black cast-iron Class 125, and/or black or galvanized malleable iron, Class 150.
 - b. Type: Galvanized BMI Class 150 for exposed pipe in bathrooms.
 - c. Manufacturer: Ward Manufacturing or approved equal.
- 4. Weld fittings/tee-lets for black steel pipe only, Schedule 40 and Schedule 10:
 - a. Fittings: Grinnell, Tube Turns or approved equal.
 - b. Tee-lets (thread-o-lets /groove-o-lets): Merit or approved equal.
 - c. Galvanized pipe shall not be welded.
- 5. Any piping or fittings on or through the building exterior walls shall be “hot dipped” galvanized Schedule 40 pipe with galvanized M.I. Class 150 fittings or galvanized groove fittings with galvanized couplings.

D. Joints:

- 1. As per NFPA 13.
- 2. Use of grooved joints on pipe 1¼" and larger shall be acceptable.
- 3. Threaded joints for 2" or smaller pipe is considered the norm.
- 4. Welded joints may be used on black steel pipe, Schedule 10 or Schedule 40 for pipe sizes 2" and larger.

2.02 VALVES

A. Drain and Flushing Valves:

- 1. Threaded Full Port Ball Valve: Watts Series FBV-3 or approved equal.
- 2. Drain and Test Valve: AGF Model 1000 or approved equal.

B. Standpipe Valves:

- 1. 2½" female x male angle hose valve with NST hose thread and cap: Potter Roemer 4065 or approved equal.

2.03 HANGERS, BRACKETS AND SUPPORTS

A. Hangers, supports and brackets shall be provided in accordance with the requirements of NFPA Standard 13.

- 1. Provide plated Clevis rings for pipe size 2½" and larger. Tolco Fig. 1 or approved equal.
- 2. Provide plated Clevis rings or loop rings for pipe 2" and smaller. Tolco Fig. 200 loop ring or approved equal.
- 3. Provide plated all-thread rod for all hanger attachments. Tolco or approved equal.
- 4. Provide drop-in anchors or epoxy anchors for attachment to concrete deck.
 - a. Hilti HDI anchors or approved equal where approved for use by the Structural Engineer.

5. Provide hanger attachments for steel beams and steel joists. Tolco Fig. 65 beam clamp or approved equal.
6. Provide plated riser clamps for fire protection risers. Tolco or approved equal.

2.04 SPRINKLERS

- A. All sprinklers provided for this Project shall be from the same manufacturer unless noted in the Contract Documents.

B. Pendant Sprinklers:

1. Exposed:
 - a. Description: Quick Response pendant sprinklers with glass bulb. Orifice shall be ½", K factor shall be 5.6, with ½" NPT. Temperature rating shall be 155°F unless noted on Plans. (Mechanical Rooms and Electrical Rooms shall be 200°F).
 - b. Make: Viking Microfast Quick Response Pendant Sprinklers, SIN#VK302 or approved equal.
 - c. Provide white finish in finished spaces where piping is exposed.
 - d. Provide brass or white finishes in the Mechanical Rooms.
2. Concealed Pipe with Pendant Head and One-Piece Flat Escutcheon:
 - a. Description: Quick Response pendant sprinkler with glass bulb. Orifice shall be ½". Temperature rating shall be 155°F. Provide one-piece flat escutcheon. Sprinklers and escutcheons finish shall be white unless otherwise indicated on the Contract Drawings. Verify finish with Architect.
 - b. Make: Viking Microfast Quick Response Pendant Sprinklers, SIN#VK302 or approved equal.
3. Concealed Pendant Sprinklers (with Large Diameter Cover Plates):
 - a. Description: Quick Response concealed pendant sprinkler glass bulb and drop away cover plate. Orifice shall be ½". The temperature rating shall be 155°F for the sprinkler and 135°F for the plate. K factor shall be 5.6.
 - b. Make: Viking Mirage Quick Response concealed pendant, SIN#VK462 or approved equal.
 - c. Cover plates shall be large diameter (3-5/16") with standard white finish unless otherwise indicated on the Contract Drawings. Verify finish with Architect.
4. Extended Coverage Concealed Pendant Sprinklers:
 - a. Description: Quick Response concealed pendant with glass bulb and drop away cover plate. K factor shall be 8.0. Thread size ¾" IPT. The temperature rating shall be 155°F for sprinkler and 135°F for cover plate.
 - b. Make: Viking Mirage Quick Response Extended Coverage concealed pendant, SIN#VK634 or approved equal.
 - c. Cover plates shall be large diameter style (3-5/16" O.D.) with standard white finish unless otherwise indicated on the Contract Drawings. Verify finish with Architect.

C. Sidewall Sprinkler:

1. Standard Coverage:
 - a. Description: Quick Response vertical or horizontal sidewall sprinkler with glass bulb. Orifice shall be $\frac{1}{2}$ ". Temperature rating shall be 155°F. Provide one-piece surface-mounted or recessed two-piece Viking F1 escutcheon as indicated on Contract Drawings. Sprinkler and escutcheon shall have white finish unless otherwise indicated on Contract Drawings.
 - b. Make: Viking Microfast Quick Response horizontal sidewall sprinkler, SIN#VK305 or approved equal. Viking Micromatic Quick Response Vertical Sidewall Sprinkler, SIN#VK306 or approved equal.
2. Concealed Standard Sidewall:
 - a. Description: Quick Response horizontal concealed sidewall sprinkler. Orifice shall be $\frac{1}{2}$ ". Temperature rating 165°F for sprinkler. 135°F temperature rating for cover plate.
 - b. Cover plate shall be standard white finish unless otherwise indicated on the Contract Drawings.
 - c. Make: Viking SIN#VK481 or approved equal.
3. Concealed Extended Coverage Sidewall:
 - a. Description: Quick Response extended coverage concealed horizontal sidewall sprinkler. $\frac{3}{4}$ " IPT, K=8.0. Temperature rating 165°F for sprinkler. 135°F temperature rating for cover plate.
 - b. Cover plate shall be standard white finish unless otherwise indicated on the Contract Drawings. Verify finish with Architect.
 - c. Make: Viking SIN#VK680 or approved equal.

D. Upright Sprinkler:

1. Quick Response:
 - a. Description: Quick Response upright sprinkler with glass bulb. Orifice shall be $\frac{1}{2}$ ". Temperature rating shall be 155°F. Rating for Mechanical Rooms shall be 200°F with brass or white finish. Provide white finish on exposed pipe in finished spaces.
 - b. Make: Viking Microfast Quick Response Upright Sprinkler, SIN # VK300 or approved equal.

E. Sprinkler Finishes:

1. Finishes for sprinklers in finished rooms shall be white or as scheduled. Refer to Contract Drawings for specific finishes in defined spaces. Verify all sprinkler finishes with Architect.
2. Finishes for sprinklers on exposed pipe in finished spaces shall be white.
3. Finish in Mechanical Rooms shall be brass or white.

F. Sprinkler Cabinets, Wrenches, and Head Guards:

1. Metal spare head cabinets of sufficient size and quantity to hold all spare sprinkler heads, cover plates, escutcheons, and head wrenches. Provide same manufacturer as sprinkler heads.
2. Head wrenches for each type of sprinkler provided. Provide same manufacturer as sprinkler heads.

3. Chrome-plated head guards approved for the type of sprinkler where they are employed.
4. All sprinklers at or below 7'-0" in elevation, shall be provided with guards.
5. All spare sprinklers shall be provided with the proper cover plate or escutcheon as applicable.

2.05 PIPE MARKERS AND/OR LABELS

- A. Seton Nameplate Co. or approved equal.
- B. Provide "Fire Protection Water" signage with direction arrows indicating water flow.
- C. Pipe markers shall be wrap-around or stick-on style.

2.06 VALVE SIGNAGE AND TAGS

- A. Seton Nameplate Co. or approved equal.

2.07 WALL AND CEILING PLATES

- A. Manufacturer: Argco plastic split ring F/C plate or approved equal.

2.08 FIRESTOPPING AND SMOKESTOPPING

- A. Hilti Firestop, Rectorseal Bio-Stop or approved equal.
- B. Provide firestopping details for each type of penetration being encountered on the project.

PART 3 - EXECUTION

3.01 PIPING

- A. Aboveground Piping:
 1. Support pipe using hanger spacing requirements in NFPA 13 and NFPA 14.
 2. Supports shall be in such a quantity and in such an arrangement as to sustain the loads and retain the piping securely in position. Hangers shall prevent the lateral movement of piping in the event of reactive forces due to sprinkler activation.
 3. Pitch all piping to low point drain connections for proper drainage.
 4. No holes are to be cut in the building structure without the prior review and approval of the Structural Engineer.

3.02 SLEEVES

- A. Special Requirements Regarding Sleeves:
 1. Provide sleeves on all gypsum drywall and concrete block walls unless permitted to be omitted per subparagraph 2 below.
 2. Where the listing of the firestop sealant shows an approval for the actual type of wall encountered, and that approval is without the requirement for a sleeve, wall sleeves may be omitted in the cases that the piping on at least one side of the wall is fully enclosed in a gypsum wallboard soffit.

3. If the pipe is passing through a wall and is exposed on both sides of the wall, a sleeve will still be required.
4. If the pipe is passing through a wall which is not smooth or may damage the pipe, a sleeve will still be required.
5. If the pipe is passing through a solid concrete or solid block wall, and the opening is smooth, sleeves may be omitted.
6. If the pipe is passing through a new floor or an existing floor of other than concrete construction, sleeves are required in all cases. Extend the sleeve to 1" above finished floor.
7. If the pipe is passing through an existing concrete floor, sleeves are desired unless placing the sleeve will require drilling an opening so large as to affect the structural integrity of the building. In cases where it is possible to core an opening in existing concrete floors, which will be large enough to admit a sleeve, it is desired to provide a sleeve which will extend ½" to 1" above finished floor level to assist in minimizing water migration to lower floors.

3.03 SPRINKLER SYSTEM

- A. Install a completely hydraulically calculated wet pipe system conforming to NFPA 13 and as indicated in Contract Documents. Hydraulic calculations shall include a minimum of 10% or 10 psig safety factor, whichever is greater, and correct allowance for inside and outside hose.
- B. All sprinklers shall be Quick Response type unless otherwise noted on the Contract Drawings.
- C. Provide pipe flushing connections where shown on Drawings. In general, flushing connections shall be provided at the end of all sprinkler cross mains and at the end of all sprinkler branch lines having two or more sprinklers.
- D. After completion of the fire protection piping work, flush the piping completely as described in NFPA 25, Inspection, Testing and Maintenance of Water Based Fire Protection Systems. It is the intention that all existing fire suppression mains, risers and all sprinkler piping provided under this Contract shall be flushed. The Engineer shall witness all flushing.
- E. Provide a hydrostatic test on sprinkler piping provided under this project where indicated in the Contract Documents. The test shall consist of a 200 psi test pressure, maintained for a minimum of 2 hours with no loss in pressure and no visible signs of leakage. The test shall be witnessed by the Engineer.

3.04 IDENTIFICATION OF VALVES

- A. All control, drain, and test connection valves shall be provided with permanently marked weather-proof metal or rigid plastic identification signs. The sign shall be secured with corrosion-resistant chain, or other approved means. The signs shall consist of red lettering, 1" in height on a white background.
- B. Wherever sprinkler control valves, drain valves or test valves are located above ceilings, a permanent tag labeled "Sprinkler Valve Above" shall be attached to the ceiling, below the valve location.

3.05 CERTIFICATES AND GUARANTEE

- A. At completion of the job and prior to final payment, the Fire Protection Contractor shall deliver to the Owner and Architect copies of Certificates of Approvals by all organizations having jurisdiction over this Project, and "Contractor's Material and Test Certificate" for both the sprinkler and standpipe system as required by NFPA 13.
- B. Provide letters of warranty and guarantee for work provided under this Contract.

3.06 EXTRA PARTS

- A. This Contractor shall provide extra sprinklers for each type used, together with matching escutcheons and cover plates, and a special sprinkler wrench for each type of head installed, to be housed in steel cabinets. Sprinklers in cabinets shall include all types and ratings installed. Cabinets shall be located in the Sprinkler Valve Room or as directed by Owner.
- B. Refer to Contract Drawing F001 for specific quantities required.
- C. Steel cabinets to be of sufficient size and quality to house all items listed in Part 3.6A.

3.07 INSPECTIONS, TESTS AND APPROVALS

- A. The Fire Protection Contractor shall provide adequate time and manpower to assist in any testing required for water flow devices and tamper switches that may be required by the Fire Alarm Contractor and the Authorities Having Jurisdiction for an approved fire alarm system.

3.08 HYDROSTATIC TEST

- A. The sprinkler system piping provided under this Contract shall be hydrostatically tested at a minimum of 200 psi for two (2) hours with zero leakage and no drop in pressure. The hydrostatic test pressure shall be measured at the low elevation point of the system being tested.
- B. The hydrostatic testing shall be coordinated with City of Ithaca Building Division, Owner and witnessed by the Engineer. Provide a minimum of 48-hour notice prior to testing required for witnessing parties.

3.09 FLUSHING OF PIPING

- A. Building sprinkler system piping provided under this project shall be flushed through each flushing connection after completion of piping installation. The flushing shall be in accordance with NFPA 25. It is the intention that all fire protection piping provided under this Contract be flushed and the flushing procedure be coordinated with City of Ithaca Building Division, Owner and witnessed by the Engineer. Provide a minimum of 48-hour notice prior to testing required for witnessing parties.

3.10 HANGERS, BRACKETS, SUPPORTS

Install all necessary hangers and supports to hold pipes and other apparatus in its permanently installed position per NFPA 13.

3.11 SPRINKLERS

- A. Pendant Sprinklers, Concealed and Recessed:
 - 1. Install in rooms with ceilings as shown on Plans.
- B. Sidewall Sprinklers:
 - 1. Install where indicated on the Drawings.
- C. Upright and Standard Pendant Sprinklers:
 - 1. Install in any unfinished area without a suspended ceiling or where indicated on the Drawings.
- D. Install sprinklers in accordance with manufacturer's instructions and per NFPA 13.
- E. All concealed style sprinklers shall be checked by the Engineer and verified for correct deflector orientation prior to cover plates being installed.
- F. Sprinkler heads shall not be painted. Provide temporary coverings to protect heads while painting of walls and ceilings is proceeding. Painted sprinkler heads shall be replaced.

3.12 SUBMITTALS

- A. Type - Provide Submittals for materials and equipment including product data of Shop Drawings, Coordination Drawings and Samples as scheduled in respective Sections of this Division. All Shop Drawings shall be submitted electronically through the Prime Contractor.
- B. Contractor Verification of Appropriateness of Submittal - The Contractor shall personally verify that the products depicted on the submittal are in conformance with the Contract and that the capacity and quantities are accurate. The Contractor shall thoroughly verify sizes, dimensions, and connection requirements. The Contractor shall then mark the Project Name, the Date, the Contractor firm name, the words "Checked for Compliance" and signature of the Contractor employee.
- C. Submittals which have not been checked and marked by this Division Contractor (and by the General Contractor if this Division Contractor is a subcontractor) will not be reviewed by the Engineer.
- D. Product Data -Provide submittals of product data for each product to be utilized on the Project. Submittals for equipment shall include detailed and dimensional literature and catalog data showing detailed compliance with the Contract documents. Submittals shall include a copy of the manufacturer's printed installation instructions for the equipment proposed. Submittals for electrically energized equipment shall show all electrical characteristics and inter-connection requirements. Where the product data shows products and materials of different sizes, the Contractor shall circle, arrow, or otherwise designate the specific equipment for this project. Submittals not so designated or full product line catalogs will be rejected.

- E. Engineer's Review of Shop Drawings -The Engineer's review of Shop Drawings signifies only that such drawings appear to be in substantial conformity with the Contract drawings and Specifications. Such a review does not relieve the Contractor from complying with the Plans and Specifications. The Engineer shall not verify quantities, nor shall he indicate approval of every detail on the submittal nor acceptance of any omission.

3.13 MARKING OF SUBMITTALS

- A. The Engineer shall return copies of the Submittals marked as follows:
1. "Reviewed for General Compliance Only - No Exception Taken" -Drawings bearing this comment have been found to be generally in conformance with the intent of the Plans and Specifications.
 2. "Reviewed for General Compliance Only - Make Noted Corrections" -Drawings bearing this comment have been found to be generally in conformance with the intent of the Plans and Specifications, with the exception of the noted items. A resubmittal to the Engineer is not required and it is understood the Contractor will make the noted corrections.
 3. "Reviewed for General Compliance Only - Revise and Resubmit" -Drawings bearing this comment have been found to contain a substantial departure from the Plans and Specifications. The Contractor must make a new corrected submittal.
 4. "Reviewed for General Compliance Only - Rejected" -Drawings bearing this comment depict materials, equipment or supplies which are not judged by the Engineer to meet the requirements of the Plans and Specifications. The Contractor shall provide a new submittal on alternative equipment.
 5. "Reviewed for General Compliance Only -Not Reviewed; Returned" -Submittals bearing this comment have not been reviewed and are returned to the Contractor.
 6. "Reviewed for General Compliance Only - Additional Submittal Required" -Submittals bearing this comment have been found to be generally in conformance with the intent of the Plans and Specifications; however, more information is required, and a resubmittal is required.

3.14 SAMPLES

- A. The Contractor shall, when required, submit to the Engineer for review typical samples of materials equipment and products. The Samples shall be properly identified by tag and shall be submitted sufficiently in advance of the time when they are to be incorporated into the work so that rejection thereof will not cause delay.

3.15 PROCEDURE AND SCHEDULE OF WORK

- A. Where work occurs within or attached to an existing structure perform all work only on an approved schedule. Do not interfere with the normal operation of existing systems. Do not shut off any heating, plumbing or electric facilities without permission of proper party in charge. Do as much as possible prior to the shutdown to minimize the shutdown time. The Contractor shall make temporary connections to enable an orderly progress of the work.

3.16 ORDER OF WORK

- A. If, in the judgement of the Architect, it becomes necessary at any time during construction in order to accelerate work and/or complete certain areas of project the Contractor shall concentrate his entire efforts and manpower to certain designated areas. The Contractor shall complete work in certain areas ahead of the rest of the work so same can be turned over to the Owner. The Contractor shall confer with the Architect, Engineers, and all other Contractors to agree upon schedule procedure. The Contractor shall follow this schedule diligently. Contractor shall expedite certain portions of work to avoid delaying other Contractors' work.

3.17 PROTECTION AND STORAGE OF MATERIALS AND THE WORK

- A. Protection from freezing -During construction and until final acceptance, protect from freezing all fixtures, equipment, and piping, both in building, trenches, etc. Any damage shall be replaced at Contractor's expense to meet Architect's approval.
- B. Materials and Equipment - Store on dry base six (6) inches above ground or floor. Protect them from rusting or other weather damage. Keep covered with waterproof covering. Protect against theft or damage from any cause or by any person; assume full responsibility; replace items stolen or damaged at no cost to Owner. Items subject to corrosion shall be kept in a building under cover or other weather-tight enclosure. Boilers or tanks shall not be stored outside for more than one month. Items subject to moisture damage shall be stored in a heated area, such as oil and gas burner controls, electrical devices, motors, etc.
- C. Store materials and equipment at site in an orderly manner, in such location that will not interfere with other work and will not obstruct access to building or existing buildings or facilities.
- D. After installation and until acceptance, protect from damage by plaster, concrete, paint, falling objects, other workmen. etc. Protect all finished surfaces of equipment, fixtures, unit cabinets, finned pipes, etc. Full responsibility rests with Contractor supplying equipment for replacing any equipment damaged or marred prior to final acceptance. The Contractor shall immediately replace any of his protective covering removed at any time by others.

3.18 CUTTING AND PATCHING

- A. Each Contractor shall do all cutting and hole coring required for installation of this work. He shall do all cutting and hole coring required for improperly located or sized sleeves or openings in new construction. He shall not cut waterproofed walls or floors except as directed. He shall not cut reinforcing steel or pierce structural members without special written permission of Architect. He shall cut in an approved manner to avoid damage to adjacent work.
- B. Patching shall be provided by the General Contractor or as indicated in the project general specifications. The Fire Protection Contractor shall coordinate any patching of sprinkler related work with the General Contractor.
- C. Each Contractor shall examine General Plans for new construction for proper clearances and inspect all existing pipe chases and crawl spaces that relate to or may affect the work they shall provide.

3.19 CLEAN UP

- A. Cleaning equipment -Clean all equipment, fixtures, and piping. Remove labels at completion of work. Do not remove permanently installed labels such as U.L. approval, etc. Remove all protective grease, paper, etc., using approved detergent and water. Remove rust, scale, etc. with wire brush, sandpaper, or other approved means. Clean all traps, vents, strainers, and scale pockets just prior to final acceptance. Leave ready for painting when directed.
- B. Disposal of Unused Materials -Clean up debris frequently and when directed by Architect. Remove from premises. Minimize dust generation while removing debris by wetting it down.
 - 1. Existing Buildings:
 - a. Material, equipment, etc. specified to be removed and not reused shall be removed from premises and becomes property of Contractor.
 - b. Material, equipment, etc., specified to be removed and remain the property of Owner shall be removed carefully, avoiding damage, and stored where directed.
 - c. Material, equipment, etc., specified to be removed and reused shall be removed carefully, avoiding damage, relocated as shown, and reconnected and put into operating condition.
- C. Disposal of Discarded Materials -The Division 21 Contractor shall make his own arrangements for the removal from site and legally approve disposal of all debris, packaging, unused materials, and refuse that is generated by his portion of the Project. The Division 21 Contractor shall not discard any materials in the receptacles maintained by the Owner.

3.20 AS-BUILT DRAWINGS

- A. Maintain a dedicated set of Construction Drawings at a protected location at the Job Site for the recording of actual installed locations of piping, ductwork, equipment, and accessories. Record exact locations of underground piping and structures. Record any and all variations from the original Construction Drawings in neat, legible hand drawn lines and text. Attach copies of field sketches and Engineer's supplementary instructions where they occur.
- B. Keep an accurate record and show on As Built Drawings the actual installed location of any concealed work such as underground piping and under-slab piping, valves in crawl spaces, etc. Provide location on As-Built Drawings for outside services by indicating actual dimensions from fixed reference points which will be available after completion of construction. "Tie" two (2) dimensions from different reference points to confirm locations of concealed work. Indicate top and bottom elevations, and station number of any utilities crossed as part of this work.
- C. Drawings: Legibly mark to record actual construction:
 - 1. Depths of elements in relation to other existing facilities.
 - 2. Horizontal and vertical locations of utilities and appurtenances, referenced to permanent surface improvements.
 - 3. Field changes of dimensions and detail.
 - 4. Changes made by Supplemental Instruction or by Change Order.
 - 5. Details not on original Contract Drawings.

- D. Provide the original of the As Built to the Engineer for review and reproduction by the Engineer. Provide the original copy for the Engineer's files. The Contractor shall retain a second photocopy to be retained by the Contractor. The Contractor shall be responsible for the safekeeping and maintenance of the As Built throughout construction, and for the maintenance of one (1) photocopy at the Contractor's office for a period of not less than one (1) year following final acceptance. The Contractor shall mark each drawing of their submittal "As-Built" with the date of submission, the name of the firm and the signature of the preparer. An electronic copy of the As-Built Drawing shall be forwarded to the Owner.
- E. The Contractor shall make the As-Built Drawings available to the Engineer for review and use throughout the project at various times decided upon by the Engineer.

3.21 OPERATION AND MAINTENANCE INFORMATION

- A. Submit Operation and Maintenance Manuals per Section 01 33 00 "Submittal Procedures". Submit reviewed manual content formatted and organized as required by this Section.
 - 1. The Architect/Engineer will comment on whether content of Operation and Maintenance submittals is acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Initial Manual Submittal: Submit a draft copy of each manual at least 30 days before commencing demonstration and training. Architect/Engineer will comment on whether the general scope and content of manual are acceptable.
- C. Final Manual Submittal: Submit each manual in the final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. The Architect will return a copy with comments.
 - 1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.
- D. Comply with Section 01 77 00 "Closeout Procedures" for schedule for submitting Operation and Maintenance documentation.
- E. Format of Operation and Maintenance Manuals: Submit manuals in the form of a single composite electronic PDF file.
 - 1. Electronic Files: Use electronic files prepared by the manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size. "Recognize Text" shall be run on all scanned documents to provide a text searchable PDF.
- F. Organization and Requirements for Operation and Maintenance Manuals: Unless otherwise indicated, organize each manual into the format as described below, and as indicated in Figure 1: O&M Manual Diagram, in Section 01 78 23.
 - 1. Title Page: Indicate Building Name, Project Title, and Owner Project Number.

2. Table of Contents: Hyperlinked bookmarked information with links to each CSI Master Format specification section contained in manual.
3. Contact List: Indicating name and contact information for the following:
 - a. Construction Manager or General Contractor.
 - b. Subcontractor.
 - c. Architect.
 - d. Architect's Subconsultants.
4. Project Warranties: Include the overall project warranty and hyperlinks to any special warranties included in equipment's specification sections.
5. Operations and Maintenance Information: Operations and Maintenance information for every CSI specification section included in project. Each section shall contain the final submittal that has been updated to include any architectural remarks, any special Contractor or manufacturer warranty associated with the equipment or system, the installation, Operations and Maintenance manuals for each piece of equipment, including any accessory components, all test reports for systems and equipment and parts list for each piece of equipment.
6. Include a typed guarantee from the Contractor with a 1 year guarantee stated as commencing on the date of final acceptance.
7. The Contractor shall include a complete copy of the O&M Manual checklist which follows this section as the last page of the O&M Manual.

O&M Manual Checklist

(Include a completed copy of this Checklist in O&M Manual when submitted)

Project _____

Date _____

Trade _____

Project Name _____

Submitted as an electronic file per Section 01 78 23
YES / NO

Composite electronic PDF file
YES / NO

Minimum readable text size
YES / NO

Title page “Recognize Text” turned on for all scanned documents
YES / NO

.....

O&M Manual:

Cover Sheet listing:

Building Name

O&M Manual Table of Contents: Hyperlinked book-marked information with links to each CSI Master Format Specification Section in manual
YES / NO

O&M Manual Contact List:

<u>Contractor</u>	<u>Each Major Subcontractor</u>
Contractor Name _____	Contractor Name _____
Contractor’s Address _____	Contractor’s Address _____
Contact person _____	Contact person _____
Tel. & Fax #'s _____	Tel. & Fax #'s _____

Project Manager

Name _____

<u>Engineer</u>	<u>Architect</u>
Name _____	Name _____
Company Name _____	Company Name _____
Contact person _____	Contact person _____

.....

O&M Manual - Remaining Pages:

Checklist Page 2

O&M Manual Project Guarantee & Warranties:

Typed guarantee from Contractor with 1 year guarantee stated as commencing on the date of final acceptance by the University. Date must be identified _____

Hyperlinks to any special warranties included in Equipment Specifications YES / NO

1.	Organized by CSI Specification Section number.	<u>YES / NO</u>
2.	Each CSI Specification Section included.	<u>YES / NO</u>
3.	Includes final submittal, updated to contain A/E remarks.	<u>YES / NO</u>
4.	Includes any special Contractor or manufacturer warranty.	<u>YES / NO</u>
5.	Includes the Installation, Operation and Maintenance (IOM) manuals for each piece of equipment, up to date for the version of equipment supplied.	<u>YES / NO</u>
6.	Includes IOM data for accessory data.	<u>YES / NO</u>
7.	Includes test reports for each piece of equipment.	<u>YES / NO</u>

Scan of spare parts list.	_____
Scan of all test reports (i.e., fire alarm).	_____
Scan of all inspections (i.e., plumbing, electrical).	_____
Scan of all certification data.	_____
Scan of facility lubrication chart.	_____
Scan of facility valve chart.	_____
Scan copy of complete temperature control and operating instructions.	_____
Completed copy of checklist last page of O&M Manual.	_____

END OF SECTION 21 05 00

DIVISION 21 FIRE SUPPRESSION

SECTION 21 84 00 – FIRESTOPPING AND SMOKESTOPPING FOR FIRE SUPPRESSION SYSTEMS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Provide firestopping and smokestopping for Fire Suppression Systems to comply with The Building Code of New York State Section 714 Penetrations.
- B. Provide submittals and installation detail sheets.
- C. Coordinate products to be used with the General Contractor and other trades so as to provide one product that will be used by all trades on this project. Submit on this elected product only.

1.02 SUBMITTALS

- A. Provide a schedule of each type of penetration together with the proposed method of protecting that penetration type. Schedule shall include the following details:
 - 1. Penetrated items (e.g., wall, floor, roof).
 - 2. Construction of items (e.g., metal studwall with gypsum wallboard).
 - 3. Fire rating of items (e.g., 1 hour wall).
 - 4. Description of penetrating items (e.g., 1" to 3" Schedule 40 pipe).
 - 5. Identification of penetrating seal to be used in this case (e.g., Rectorseal Biostop pipe collar).
 - 6. UL or FM detail sheet (e.g., per attached example).
 - 7. UL or FM system number (e.g., WL1200).
- B. The submittal shall include complete details for each penetration covered by this Division.
- C. It is intended that the submittal include each detail in full for each system used, so that it is clear that the installing Contractor has the correct reviewed information in the field.

1.03 QUALITY ASSURANCE

- A. Firestopping Materials: Provide penetration seal assemblies whose fire-resistance ratings have been determined by testing in the configurations required and which have fire-resistance ratings at least as high as that of the fire-rated assembly in which they are to be installed.
 - 1. Comply with all applicable codes including but not limited to:
 - a. American Society of Testing and Materials (ASTM.)
 - b. ASTM E 84 Test Method for Surface Burning Characteristics of Building Materials.
 - i. ASTM E 119 Method of Fire Tests of Building Construction Materials.
 - ii. ASTM E 814 Test Method for Fire Tests of Through Penetration Firestops.
 - iii. ASTM C 665 (Corrosion & Microbial Resistance Portions) Standard Specification for Mineral-Fiber Thermal Insulation for Light Frame Construction and Manufactured Housing.

- iv. ASTM E 90 Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.
- 2. Listed by Underwriters Laboratories (UL) and /or Factory Mutual Research Corporation for each specific intended application:
 - a. UL Building Materials Directory.
 - b. UL Fire Resistance Directory.
 - c. UL 2079 Test.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Firestopping and smokestopping materials shall allow normal expansion and contraction (intumescent) of the penetrating item without failure of the penetrations seal and shall be heat absorbing (endothermic). Products may not emit hazardous, combustible, or irritating by-products during installation or curing. Products shall not require special tools for installation.

2.02 MASONRY EXEMPTION

- A. The Contractor shall note BCNSY Section 714.4.1 Exemption, which states:
 - 1. Exception: Where the penetrating items are steel, ferrous, or copper pipes, tubes or conduits, the annular space between the penetrating item and the fire-resistance-rated wall is permitted to be protected by either of the following measures:
 - a. In concrete or masonry walls where the penetrating item is a maximum 6-inch (152 mm) nominal diameter and the area of the opening through the wall does not exceed 144 square inches (0.0929 m²), concrete, grout or mortar is permitted where installed the full thickness of the wall or the thickness required to maintain the fire-resistance rating.
 - b. The material used to fill the annular space shall prevent the passage of flame and hot gases sufficient to ignite cotton waste when subjected to ASTM E119 or UL 263 time-temperature fire conditions under a minimum positive pressure differential of 0.01 inch (2.49 Pa) of water at the location of the penetration for the time period equivalent to the fire-resistance rating of the construction penetrated.

2.03 MANUFACTURERS

- A. Manufacturers: Provide products complying with requirements of the Contract Documents and made by one of the following:
 - 1. Rectorseal.
 - 2. Hilti, Inc.
 - 3. 3M Fire Protection Products.
 - 4. BlazeMaster.

2.04 FIRESTOPPING PRODUCTS

- A. Provide firestopping products which:

1. Provide firestopping systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain fire resistance rating of assembly.

- a. F-rated systems in accordance with ASTM 814.
- b. T-rated systems in accordance with ASTM 814.

B. Firestopping Flamespread Performance Requirements:

1. Provide products with flame-spread ratings of less than 25 and smoke-development rating of less than 50 as determined in accordance with ASTM E 84.

C. Firestopping UL Performance Requirements:

1. Provide products with UL ratings specified for assembly indicated as determined in accordance with UL listing.

D. FM approval in lieu of UL shall be accepted by the Owner.

E. Where a specific firestopping product is identified on the Drawings, either that product or a similar product which has been tested in the exact application shown on the Drawings shall be employed, after review by the Engineer.

F. Firestop caulk shall be Hilti Firestop, Rectorseal Biostop 500+, or approved equal, except where otherwise shown on the drawings.

2.05 SMOKESTOPPING PRODUCTS

A. Provide smokestopping products which:

1. Allow normal expansion and contraction movement of the penetrating item without the failure of the penetration seal.
2. Maintain at least the smoke resistance of the barrier penetrated.
3. Firestop caulk shall be Hilti Firestop, Rectorseal Biostop or approve equal.

PART 3 - EXECUTION

3.01 INSTALLATION AND QUALITY ASSURANCE

- A. Install firestopping materials in exact accordance with the manufacturer's instructions and conditions of the testing; provide all accessory materials required.
- B. Provide the services of a factory representative of the fireproofing product to review the installation practices and conduct training of the applications.
- C. The installer shall be trained to perform work.
- D. Inspection: The Authority Having Jurisdiction (AHJ) shall have a final inspection review of all work performed. Contractor shall make modifications to completed and uncompleted work as directed by the AHJ at the Contractor's expense.

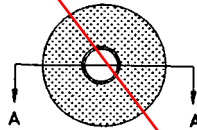
- E. Refer to the Certified Installation Instructions sheet on the following page for an example of an acceptable installation method.

3.02 FIRESTOPPING AND SMOKESTOPPING ITEMS

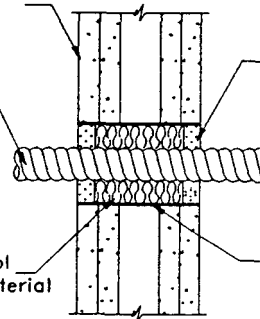
- A. Under Division 21, provide and pay for all firestopping materials, assemblies, and labor to provide complete firestopping and smokestopping.
- B. Provide firestopping of penetrations at each fire-rated floor, wall, or roof assembly of the following components:
 - 1. Sprinkler, standpipe, and bulk main piping provided by Division 21.

Attachment(s): Example Detail Sheet

END OF SECTION 21 84 00

RECTORSEALSystem No.
WL1200**FIRESTOPS**500+GW-92
Wall Penetration
1, 2 Hr. Rating1 layer of 5/8"
UL Classified
Gypsum Wallboard
for 1 Hr. Rating
or
2 layers of 5/8"
for 2 Hr. RatingMax. 1" Corrugated
Stainless Steel Tubing
(PVC Coated)1/2" depth
Metacaulk® 1000

PLAN

Mineral Wool
Backing MaterialSteel Sleeve/
Wire Mesh

SECTION A-A

EXAMPLE**SYSTEM CONFIGURATION INFORMATION**

PRODUCT(S)			PENETRATING ITEM(S)			HOLE SIZE	ANNULAR SPACING			ADDITIONAL INSTALLATION MATERIALS AND AIDS			BACKING MATERIAL		ASTM E 814 RATING	
FILL MAT'L	MIN. THICK.	OTHER	TYPE	SIZE	INSULATION	MAX.	MIN.	MAX.		WIRE MESH	STEEL SLEEVE	OTHER	TYPE	DEPTH	T	F
500+	1/2" both sides	none	PVC Coated Corrugated Stainless Steel Tubing	up to 1"	none	3"	1/4"	1 1/2"		No. 8 steel wire mesh	min. 20 gauge	none	minimum 4.0 pcf mineral wool	N/A	0 0	2 1

INSTALLATION INSTRUCTIONS

These instructions are for the installation of through-penetration fire stop system 500+GW-92 in minimum 4 1/2 inch thick steel or wood stud fire rated gypsum wallboard partitions as listed by Underwriters Laboratories Inc. Refer to above drawings and System Configuration Information for component details.

Step Procedure

- 1 Cut hole in wall in required size to accommodate pipe penetrations and allowable annular spacing. Do not exceed maximum specified hole diameter.
- 2 Install - 1 inch PVC Coated Corrugated Stainless Steel Tubing. Support pipe rigidly on both sides of wall.
- 3 Install specified wire mesh or minimum 20 gauge steel sleeve cut to size, formed to hole shape centered inside wall around tubing and allowed to spring back snugly against periphery of hole.
- 4 Install backing material by tightly packing annular space in between and around tubes with specified mineral wool flush with wall. Recess mineral wool 1/2" on both sides of wall.
- 5 Apply a 1/2" depth of Biostop™ 500+ into annular space around tubing on both sides of wall. Tool surface to a smooth defect-free finish.

JOBNAME:

ARCHITECT:

CUSTOMER:

CUSTOMER ORDER NO:

CONTRACTOR:

REPRESENTATIVE:

REPRESENTATIVE ORDER NO:

RECTORSEAL

2601 SPENWICK HOUSTON, TEXAS 77055

REVISION NUMBER: 121499

SHEET NUMBER: OF

DIVISION 23 HEATING, VENTILATING AND AIR-CONDITIONING

SECTION 23 00 00 - HVAC GENERAL PROVISIONS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes general administrative and procedural requirements for Division 23 - Heating, Ventilating and Air Conditioning work.

1.02 DIVISION 23 - DESCRIPTION

- A. The technical specifications of this Contract are arranged for the convenience of the Owner and Contractor into Divisions of work. The work of Division 23 - HVAC, is further described in Specification Sections of the 23 00 00 Series and on Contract Drawings of the "M" series.
- B. The organization of this work into Divisions shall not relieve the Prime Contractor from providing all of the work shown on the complete set of drawings or specified in the complete set of Specifications, whether or not the individual subcontractors correctly identify their respective responsibilities.

1.03 OTHER DIVISION SPECIFICATIONS APPLICABLE TO THIS WORK

- A. The Work of Section 23 05 00 - HVAC Basic Materials and Methods applies to the work in this Section.
- B. To the extent that the work of this Division or Contract includes the work of other trades, the Contractor for this Division shall adhere to the requirements of other specification sections. All General Construction work shall be performed in accordance with the provisions of the appropriate Division 01 through Division 19 Section. All electrical work shall be performed in accordance with the appropriate Division 26 Sections.

1.04 WORK INCLUDED

The work of this Division shall include providing all materials, labor, services, permits and related work to furnish a complete, operating, tested, functioning, documented HVAC System including all work shown, specified, or required for proper system operation including but not limited to the following:

- A. Provide HVAC Basic Materials and Methods. (Section 23 05 00)
- B. Provide HVAC Insulation. (Section 23 07 00)
- C. Provide HVAC Ducts And Casings. (Section 23 31 00)
- D. Provide HVAC Air Inlets & Outlets. (Section 23 37 00)
- E. Provide Split System Air Conditioners. (Section 23 62 00)
- F. Provide Firestopping and Smokestopping for HVAC Systems. (Section 23 84 00)
- G. Provide demolition and removal of existing equipment, ductwork and piping where shown, removal of all debris from site and proper disposal of same.

- H. Provide maintenance of system in good condition until final acceptance.
- I. Provide openings in existing and new construction as required for the work of this division.
- J. Patch openings in existing and new construction caused by removals or rework by this division.
- K. Provide submittals for the work of this division. As a minimum, provide submittals for all items identified in the respective sections. Do not submit full catalogs. Submit project specific items.
- L. Provide Owner's Operation Instruction.
- M. Provide Operation and Maintenance Manuals in the form of a single composite electronic PDF file.
- N. Provide Warranty.
- O. Provide "As-Built" Drawings.

1.05 WORK SPECIFIED ELSEWHERE

- A. The work of Temperature Control (Division 25 - Integrated Automation) shall be provided by the Owner but is specified in Division 25. Refer to Specification Section 23 09 00 for installation of IAC-furnished valves, dampers, and equipment.

1.06 SPECIAL CHARACTER OF MYRON TAYLOR JANE FOSTER

- A. The highest degree of quality of materials and professionalism of workmanship is required for the HVAC System.
- B. The Contractor shall initiate and maintain a worker instruction and quality monitoring campaign throughout the duration of the project directed at enlisting each worker in maintaining the highest quality of work and the maximum protection of the existing and proposed facilities from unintentional, neglectful, or intentional damage and to provide the best possible HVAC system for the building and equipment.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Provide products as specified in Division 23.

PART 3 - EXECUTION

3.01 GENERAL

- A. Conform to Division 23 Specifications for installation and execution of work.

END OF SECTION 23 00 00

DIVISION 23 HEATING, VENTILATING AND AIR CONDITIONING

SECTION 23 05 00 - HVAC BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.01 DIVISION 23 – DESCRIPTION

- A. The Technical Specifications of this Contract are arranged for the convenience of the Owner and Contractor into divisions of work. The Work of Division 23, HVAC, is further described in Specification Sections of the 23 00 00 Series and Contract Drawings of the M series.
- B. The organization of this Work into Divisions shall not relieve the Prime Contractor from providing all of the work shown on the complete set of Drawings or specified in the complete set of Specifications, whether or not the individual subcontractors correctly identify their respective responsibilities.

1.02 OTHER DIVISION SPECIFICATIONS APPLICABLE TO THIS WORK

- A. To the extent that the Work of this Division or Contract includes the work of other trades, the Contractor for this division shall adhere to the requirements of other Specification Sections. All General Construction work shall be performed in accordance with the provisions of the appropriate Division 1 through Division 19 Sections.

1.03 WORK INCLUDED

- A. Provide Mechanical Basic Materials and Methods.
- B. Provide Dielectric Pipe Fittings/Unions.
- C. Provide Escutcheons.
- D. Provide Fire Wall Sealant.
- E. Provide Hangers, Riser Clamps, Attachments and Rods.
- F. Provide Identification Systems.
- G. Provide Pipe and Fittings.
- H. Provide Delivery, Storage and Protection of Equipment and Materials.
- I. Provide Sleeves.
- J. Provide Valves.
- K. Provide Piping Layout Coordination.
- L. Provide Miscellaneous Painting.
- M. Provide Equipment Installation.
- N. Provide Noise and Vibration Free Installation.

- O. Provide Adjustment and Initial Lubrication.
- P. Provide Maintenance of systems in good condition until final acceptance.
- Q. Provide Permits and Inspections.
- R. Provide As-Built Drawings.
- S. Provide One (1) Year Warranty.

1.04 PERMITS AND INSPECTIONS

- A. Division 23 shall be responsible for applying, obtaining and meeting the requirements of all permits and inspections required by authorities having jurisdiction for the work of Division 23. Division 23 shall pay all fees associated with these permits and inspections.

1.05 LAWS AND REGULATIONS

- A. Division 23 shall conform with all Federal, State, County, and Municipal Laws, Ordinances and Regulations. Comply with the Occupational Safety and Health Act (OSHA).

1.06 CONTRACTOR EXAMINATION OF THE SITE

- A. It shall be the responsibility of each prospective Contractor to visit the project site and to examine existing conditions. The Contractor shall be responsible to include under this Division all effort, materials, supplies, temporary installations, and other work to relocate, remove or modify existing work as required to complete the work of this Division.

1.07 PLANS AND SPECIFICATIONS

- A. It shall be the responsibility of the Contractor to examine the complete project documents including Plans and Specifications thoroughly prior to bid and to notify the Architect/Engineer of any uncertainties or apparent omission, conflicts, or discrepancies between the Plans and Specifications. In any case of a conflict between the Plans and Specifications or between two Specification sections it shall be assumed that the larger capacity or quantity, or higher quality, shall govern until a determination can be made by the Architect/Engineer.
- B. Plans and Specifications are of abbreviated form. Omitted words or phrases shall be inferred.
- C. Plans and Specifications are complementary. Provide all work which is either shown or specified or both.
- D. Where provided on the Drawings, typical details shall be assumed to be applied to each installation of the equipment whether or not specifically identified at each point in the Plans.
- E. The Division 23 Contractor shall assume that all work on the Mechanical Drawings is included in his work unless specifically noted otherwise.

1.08 DEFINITIONS

Where used in the Plans and Specifications the following words and corresponding definitions shall apply:

- A. Provide - Contractor shall supply, install, start-up, and maintain until final acceptance.
- B. Furnish - Submit, receive approval, purchase, and turn over. Do not include the costs to install if furnish only is indicated. Include one year guarantee on material furnished.
- C. New- Work occurring as part of this Project, usually employed on a drawing to distinguish from existing work. All work shown on the Drawings shall be assumed to be new unless specifically identified as existing.
- D. Exist - Existing work.
- E. Shown - Shown on the Plans.
- F. Specified - Specified on the Technical Specifications.
- G. HV - The Contractor performing the Division 23 - Heating and Ventilation work. In the Plans and Specifications, the words "By Div 23" and "By HV" or "By H&V" shall be considered synonymous.
- H. Elect or EC - the Contractor performing Division 26 work. In the Plans and Specifications, the words Div 26", "By EC" and "By Elect" shall be considered synonymous.
- I. Plumb, Plumbing, or - Plg - The Contractor performing the Division 22 - Plumbing work. In the Plans and Specifications, the words "By Plumb" or "By Plumbing" or "By Plg" shall be considered synonymous.
- J. FP - The Contractor performing Division 21 - Fire Protection. In the Plans and Specifications, the words "By Div 21 – FP" or "By FP" shall be considered synonymous.

1.09 RELATED WORK NOT INCLUDED

- A. Electrical connections by Electrical Contractor specifically shown in their Contract. Division 26 Contractor is responsible only for the electrical connections included under Division 26 and the Electrical Drawings. Division 23 Contractor shall provide all other electrical work necessary for satisfactory operation of equipment furnished under Division 23.

1.10 REGULATIONS GOVERNING ASBESTOS

- A. If any material which appears to possibly contain asbestos is encountered, the Contractor shall notify the Project Manager and the Architect/Engineer and shall take steps to stop work in the immediate area and protect workers and the public from exposure. See Division 1.

PART 2 - PRODUCTS

2.01 ACCESS DOORS

- A. Cast Brass: Rough finish escutcheons shall be of cast brass construction, solid type with set screw. CS&B No. 13 or equal by Grinnell, Elcen.
- B. Chrome Plated: Chrome plated escutcheons shall be of cast brass construction with polished chrome plated finish, split type with springs, CS&B Cadwell No. 40, or equal by Grinnell, Elcen.

2.02 GASKETS

- A. Gaskets for Flanged Joints: ANSI B16.21 raised-face steel flanges, unless otherwise indicated.
- B. All gaskets to be made with non-asbestos materials.
- C. Gaskets for Condensate and Water Service shall be standard non-asbestos composition gaskets as recommended by valve manufacturers.

2.03 BALANCING VALVE

- A. Description: Y pattern, globe style balance valve with handwheel positioning, and vernier or numeric position readout. 100% positive leakproof shutoff. Hidden memory stop.
- B. Threaded or soldered bronze body – Sizes ½" – 2".
- C. Cast-iron body flanged for size 2½" – 6".
- D. Sizing table: Provide valves sized according to the table below to provide a pressure drop of 2 ft wg in full open position:

GPM Flow	Size	Connection
0-4.1	½"	Sweat or Thread
4.2-6.0	¾"	Sweat or Thread
6.1-8.2	1"	Sweat or Thread
8.3-20	1¼"	Sweat or Thread
20.1-29	1½"	Sweat or Thread
29.1-40	2"	Sweat or Thread
40.1-102	2½"	Flanged
102.1-125	3"	Flanged
125.1-210	4"	Flanged
210-300	5"	Flanged
300.1-430	6"	Flanged

- E. Manufacturer: Tour Anderson.

2.04 DIELECTRIC PIPE FITTINGS/UNIONS

- A. Construction: Fittings and unions to be rated at 250 PSI at 180°F and be designed to meet the requirements of ANSI B16.39, including hydrostatic strength, tensile strength, and air pressure testing. All pipe threads to be in accordance with ANSI B2.1 and solder joints to meet national plumbing standards.
- B. Make: Watts No. 3001-3008 and 3110-3200, or equal by Epco, Eclipse.

2.05 FIRE WALL SEALANT

- A. Intumescent, hand moldable putty.
- B. Make: 3M Fire Barrier Moldable Putty or equal by Flamesafe, Dow Corning.

2.06 HANGERS, RISER CLAMPS, ATTACHMENTS AND RODS

A. Hangers:

- 1. Regular: Adjustable clevis type, black steel construction, Carpenter, and Paterson Fig. 100. Type 1, PHD Fig. 451, or equal by M-Co.
- 2. With Insulation Shield: Adjustable clevis type, black steel construction, galvanized steel saddle welded to lower strap, Carpenter, and Paterson Fig. 100SH. Type 1 plus Type 40, PHD Fig. 170, or equal by M-Co.

B. Riser Clamps:

- 1. Riser clamps shall be of steel construction, two-piece type, Carpenter, and Paterson Fig 126. Type 42, PHD Fig 550, or equal by M-Co.

C. Attachments:

- 1. C-Clamps: Clamps shall be of steel construction with locking nut Carpenter and Paterson Fig. 47 clamp. Type 23, PHD Fig 250, or equal by M-Co.

D. Beam Clamps: Beam clamps shall be of malleable iron construction, Carpenter, and Paterson Fig. 15. Center Beam Type 21, or equal by M-Co, PHD.

E. Hanger Rod:

- 1. The hanger rod shall be steel, full threaded type, Carpenter and Paterson Fig. 94 or machine thread eye rod, Fig. 33, or equal by M-Co.
- 2. Rods:

Pipe Sizes	Rod Diameter
Up to 2"	$\frac{3}{8}$ "
2½" to 3"	$\frac{1}{2}$ "
4" and 5"	$\frac{5}{8}$ "
6"	$\frac{3}{4}$ "
8" to 12"	$\frac{7}{8}$ "

F. Floor Supports:

- 1. Floor support hanger devices shall not be used.

G. Wall Hangers:

- 1. Angle iron or unistrut type wall brackets shall not be used.

2.07 IDENTIFICATION SYSTEMS

A. Equipment Labels:

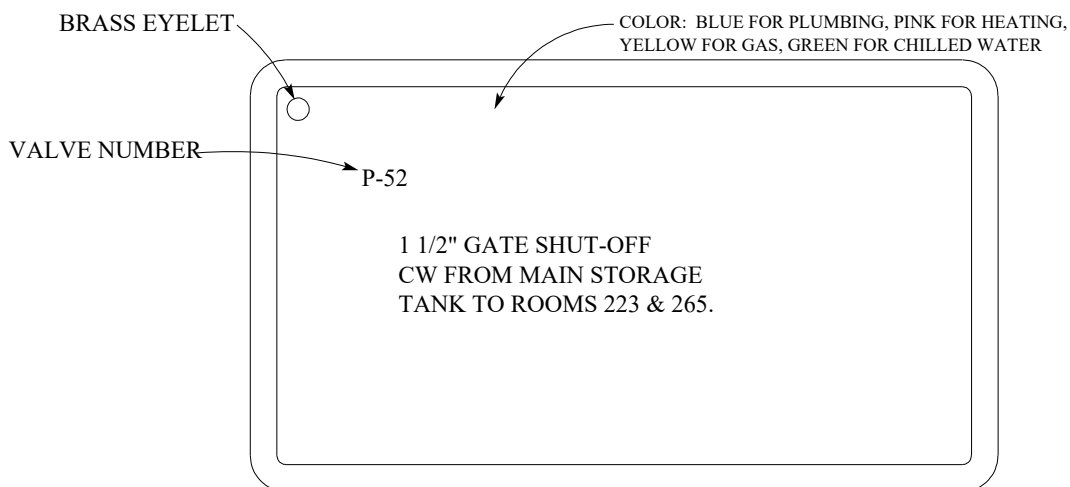
1. Small: Labels shall be adhesive backed plastic tape with embossed letters in contrasting color. Tape shall be $\frac{3}{8}$ " wide.
2. Large: Labels shall be adhesive backed plastic tape with embossed letters in contrasting color. Tape shall be $\frac{3}{4}$ " wide.
3. Make: Seton Name Plate Company.

B. Piping Markers:

1. Pipe markers shall be adhesive type indicating pipe contents and sizes on a colored background conforming to American National Standards Institute (ANSI) Standard A13.1.
 - a. Hot water - yellow with black lettering.
 - b. Chilled water - green with white lettering.
 - c. Steam - yellow with black lettering.
 - d. Condensate - yellow with black lettering.
 - e. Condenser water - green with white lettering.
 - f. Glycol hot water - yellow with black lettering.
2. Make: Seton Name Plate Company - Setmark, or equal by Dover, Brady.

C. Valve Tags:

1. Tags: Tags shall be $1\frac{3}{4}$ " x $3\frac{1}{4}$ " laminated with two 0.020" thick plastic sheets with matte finish and with a brass eyelet in the corner. Typed information shall include appropriate alphanumeric code (prefixed with the letter "H" for heating etc.), system designation, the fluid in the pipe, and size and function of the valve.
2. Make: Dover Enterprises, Syracuse, NY, phone: (315) 446-1550 or approved equal by Seton Name Plate Company or others.



D. Ceiling Markers:

1. Provide $\frac{3}{8}$ " diameter, round, colored sticker on ceiling grid t-bar to indicate locations of HVAC equipment and valves. Coordinate colors with SU Fix-It.

2.08 SLEEVES

- A. Sheet Metal Sleeves: 10-gauge, galvanized sheet metal, round tube closed with welded longitudinal joint.
- B. Steel Sleeves: Schedule 40 galvanized, welded steel pipe, ASTM A53, Grade A.
- C. Sleeves are to be tack welded in each quadrant and caulked.

2.09 STRAINERS

- A. Cast-iron strainer rated for 40 psig and 340°F low pressure steam. Spirax/Sarco cast-iron Model CI-125, Keckley Style "A", or approved equal. Provide nipple and cap.
- B. Cast steel strainer rated for 125 psig and 500°F. Spirax/Sarco 150# flanged Model SLF, Keckley Style "SA" or approved equal. Provide nipple and cap.
- C. Bronze strainer, stainless steel mesh, Spirax/Sarco Model TBT, Keckley Style "E" or approved equal, with sweat tubing connections. Provide bronze strainer and plug.

2.10 PIPE

A. Copper Pipe:

1. Type:
 - a. Type L, ASTM B 88.
 - b. Type ACR, ASTM B 280.
2. Fittings: Wrought or cast solder type pressure fittings.
3. Make: Anaconda or equal by Mueller, Revere.
4. Unions:
 - a. Description: Cast brass with solder ends. Working pressure: 200 PSI W.O.G.
 - b. Make: Nibco or equal by Mueller, Revere.
5. Solder and Flux:
 - a. Solder shall be in solid wire form of Type II 95-5 tin antimony solder conforming to ASTM B-32, Grade 5A. Flux shall be zinc chloride or a mixture of zinc and ammonium chlorides. Solders containing lead shall not be used. 96.5-3.5 and 95-5 tin/silver solders may be used.
 - b. Make: Silverbrite or equal.

B. Steel Pipe:

1. Schedule 40 weight, seamless black finish, ASTM A-53.
 - a. $37\frac{1}{2}^\circ$ beveled ends for welding.

- b. Threaded ends.
- 2. Schedule 80 weight, seamless black finish, ASTM A-53.
- 3. Electric Resistance Welded (ERW) pipe may be substituted only for hydronic heating and cooling systems.
- 4. Schedule 40 weight, seamless, black finish, ASTM A-106 (high temperature) for steam lines above 50 psig.
- 5. All steel pipes shall be of United States or Canadian manufacture and shall be stamped with the country of origin.
- 6. Fittings:
 - a. Welded Fittings: factory forged, seamless construction, butt weld type, 37½° beveled ends. Where branch connections are two sizes or smaller than main size, use of “Weldolets”, “Threadolets” or “Sockolets” is acceptable, if welded per manufacturer’s instruction. Mitered elbows, “shaped” nipples, and job fabricated reductions not acceptable unless specifically called for.
- 7. All weld fittings are to be of North American manufacture and shall be marked with country of origin.

C. Miscellaneous Piping Material/Products:

- 1. Welding Materials: except as otherwise indicated, provide welding materials to comply with installation requirements.
 - a. Comply with Section II, Part C, ASME Boiler and Pressure Vessel Code for Welding Materials.
- 2. Gaskets for flanged joints: ANSI B16.20 raised face for steel flanges, unless otherwise indicated.
- 3. All gaskets to be made with non-asbestos material.
- 4. Bolts: hex head machine bolts and nuts.
 - a. Condensate: Carbon Steel, ASTM A307-Grade B bolts, ASTM A 563-Grade nuts.
 - b. Steam, Hot Water, Chilled Water: Carbon alloy steel SAE 429-Grade 5 bolts.
- 5. Pipe Thread Sealant: Loctite 567 PST or Loctite 592 PST.

2.11 VALVES

A. Gate Valves:

- 1. Cast-iron, 125 psig, 340°F. Make: Stockham class 125 iron gate valve, figure G624.
- 2. Cast steel, 125 psig, 500°F. Make: Stockham class 125 cast steel gate valve, Model 1822.

B. Ball Valves:

- 1. Two Piece: Full port (¼” through 1”), conventional port (1¼” through 2”), brass or bronze body, stainless steel ball, 150 psig sat. Steam, 600 psig W.O.G., two-piece construction, blow-out proof stem, removable operation handles screwed: Design Valve: threaded ends, Nibco Fig. T-585-70-66, soldered ends; Nibco Fig. S-585-70-66, Jamesbury.

2. Union End: Bronze body, chromium plated brass ball, single union end with O ring seal, 150 psig sat. Steam, 600 psig W.O.G., blow-out proof stem, removable operation handle, soldered ends, Design valve; Apollo, Fig. 70-403.
3. Drain Valves: Bronze ball valve with hose end thread, vacuum breaker and cap. Make: Apollo 78-200 series with dust cover and chain, with Watts 8A vacuum breaker.

C. Butterfly Valves:

1. Butterfly valves for general use with line sizes 2½" and larger. Bubble tight shut off rating: 175 psi, ANSI class 125 wafer body type butterfly valve with epoxy coated cast iron body, aluminum bronze disc. 304 S.S. stem and EPDM interchangeable valve seat. Gear operator with hand wheel. Bray series 30, Jamesbury, Lunkenheimer or Contramatics.

D. Check Valves, Domestic Water System:

1. Bronze body, Class 125 swing check valve.
2. Stockham Model B-309 with solder ends.
3. Stockham Model B-319 with threaded ends.

E. Ball Valves, (Small):

1. ¾" and ½" screwed, with lever operator unless otherwise specified. Steam and Condensate: Full port carbon steel body ball valve with modified Teflon seats and 316 stainless steel ball and trim suitable for 800 psi at 500°F (21-2236MT) Jamesbury "Clincher."

2.12 NEW PRODUCTS, SINGLE MANUFACTURER

- A. All equipment, materials and products furnished shall be new unless specifically shown to be reused. All materials shall be new and of the best quality of their respective kinds. The work, when completed, will be accepted in an undamaged and perfect condition only. Where equipment, materials and products are used for the same purpose, they shall be provided by the same manufacturer.

2.13 QUALITY ASSURANCE

- A. All equipment, materials and products shall conform to the applicable ANSI, ASA, NFPA, UL, AGA and/or ARI standard. All electrical equipment shall be UL or ETL Listed.

2.14 WARRANTY

- A. Provide a one-year manufacturer's warranty on all equipment, materials, and products. Where shown or specified, provide manufacturer's extended warranty.

2.15 SUBSTITUTIONS FOR SPECIFIED EQUIPMENT, MATERIALS AND PRODUCTS

- A. Design Equipment - The design of this Project is based upon the use of the specified equipment, materials, and products. The Plans are prepared on the basis of the arrangement, size, capacity, and characteristics of the design equipment.

- B. Specified Alternate Equipment - In the event the Contractor elects to use equipment named as an alternate manufacturer herein, the Contractor shall verify that the equipment is of the same capacity, arrangement, size, and characteristics as the design equipment and shall make all incidental changes in his work and coordinate and pay for any changes in work made necessary by deviations from the design capacity, arrangement, size and characteristics of the alternate manufacturer's equipment.
- C. Substitutions of Unspecified Equipment, Products and Materials - Unspecified equipment, products and materials may be added to the List of Specified Alternate Equipment, Products and Materials at the request of any bidder by written application at least five (5) days prior to the bid date.
- D. Addition of an unspecified equipment product of material to the List of Alternate Manufacturers will occur at the determination of the Engineer if there is sufficient time to review the proposed substitution prior to bid date and to issue addenda to all Contractors. In no case will substitutions be approved to individual bidders. Substitution requests will not be acted upon within the last five (5) days prior to bid date.
- E. Addition of unspecified equipment, products and materials to the List of Alternate Manufacturers does not relieve the Contractor from his obligation described in subparagraph B to verify that the equipment is of the same arrangement, capacity, size, and characteristics and to pay for any modifications required in his and other Contractors' work made necessary by the use of this equipment.
- F. By submission of his bid for this Project, the Contractor acknowledges the authority and prerogative of the Engineer and Owner to evaluate proposed substitutions as to suitability for the Project and the Contractor agrees to abide by the Engineer's decision if unspecified equipment, products, and material are disallowed by the Engineer.

2.16 DELIVERY, STORAGE AND PROTECTION

- A. All materials shall be delivered to the site in their original, unopened labeled containers.
- B. All materials shall be stored in a clean, dry area as required by the Owner.
- C. All materials shall be properly protected from weather, damage, and theft. The contractor shall be responsible for the proper care and protection of all materials, equipment, etc., on site.

PART 3 - EXECUTION

3.01 QUALITY OF WORK

- A. All work shall be executed in accord with recognized standards of workmanship. All work shall be installed in a neat and orderly manner. If, in the judgment of the Engineer, the workmanship is not acceptable, the work in question is to be removed and reinstalled in a manner satisfactory to the Engineer.
- B. Furnish at site during construction a competent and experienced foreman. He/she shall have complete charge of all field work of this Contract. He/she shall be authorized to act for the Contractor in his/her absence, and to represent the Contractor with the Engineer or Owner. The Project foreman shall not be changed during the Project except for single day occurrences for personal needs. It is essential that the same foreman be provided for the duration of the Project to maintain continuity on the job site. The Owner shall view any departure from this requirement by the Contractor as an indication of the Contractor's unwillingness to meet the needs of the Owner.

- C. The project foreman shall be present at site whenever any Contractor or subcontractor employees are working at the site. In the event of absence by the project foreman, the Prime Contractor shall designate an Assistant Foreman and advise the Owner and Engineer of the designated individual's name. The Assistant Foreman shall have been working on the site for a minimum of five (5) working days prior to being designated acting foreman and shall be designated at least two (2) working days prior to becoming acting foreman.
- D. All personnel employed by or subcontracted by the Contractor shall at all times be suitably clothed and shall conduct themselves in a professional manner. Shirts shall be worn at all times. Any employee found to have been making gestures or harassing remarks to the staff, students or general public shall be disciplined by the Contractor and removed from the site.
- E. No radios or other portable sound equipment shall be played on the site.

3.02 SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION

- A. The Contractor shall be solely responsible for compliance with all applicable safety and health regulations including, but not limited to, U.S. Department of Labor Safety and Health Regulations for Construction. Construction employees are required to comply with the most stringent rule or standard in the event of dual or concurrent State and Federal jurisdiction. Detailed information on this subject may be obtained from the Office of Information Services, Occupational Safety and Health Administration, U.S. Department of Labor, Washington, D.C. 20210.
- B. No obstructions are to be placed on or around fire hydrants or fire department connections that could make them inaccessible or inoperative for firefighting purposes.
- C. All temporary construction sheds, trailers, and flammable liquid storage areas belonging to Contractors shall be placed on the construction site to minimize any danger to Owner's property and the public. Construction trailers and sheds shall require the pre-approval of the Owner.
- D. Conduct of the work shall be such that pestilence does not occur. To prevent influx of rats, vermin and other pestilence, the Contractor shall retain an approved exterminating firm until such time that the danger of pestilence has passed as approved by the Engineer. Contractors shall remove all garbage and trash from the site daily.

3.03 FIRE SAFETY

- A. Fire Watch: Provide a fire watch wherever welding, brazing, cutting, or other processes involving an open flame or potential for generating sparks is used. A fire watch shall consist of a person with a 10-pound carbon dioxide fire extinguisher. While on fire watch, the person assigned shall have no other duties or assignments.
- B. Fire Blanket: In addition to providing a fire watch, have available an approved fire blanket to cover any combustible materials in the immediate area.

3.04 INSPECTIONS

- A. The Engineer or Owner may visit the site at intervals appropriate to the stage of construction according to the General Conditions. The periodic observation or inspection of the general project progress shall not be construed as supervision of actual construction, nor make the Engineer or Owner be responsible for providing a safe place for performance of work by the Contractors or Contractor's employees or those of suppliers of Contractors or for access, visits, use, work, travel, or occupancy by any person.

3.05 SUBMITTAL

- A. Type - Provide Submittals for materials and equipment including product data of Shop Drawings, Coordination Drawings and Samples as scheduled in respective Sections of this Division. All Shop Drawings shall be submitted electronically through the Prime Contractor.
- B. Contractor Verification of Appropriateness of Submittal - The Contractor shall personally verify that the products depicted on the submittal are in conformance with the Contract and that the capacity and quantities are accurate. The Contractor shall thoroughly verify sizes, dimensions, and connection requirements. The Contractor shall then mark the Project Name, the Date, the Contractor firm name, the words "Checked for Compliance" and signature of the Contractor employee.
- C. Submittals which have not been checked and marked by this Division Contractor (and by the General Contractor if this Division Contractor is a subcontractor) will not be reviewed by the Engineer.
- D. Product Data - Provide submittals of product data for each product to be utilized on the Project. Submittals for equipment shall include detailed and dimensional literature and catalog data showing detailed compliance with the Contract documents. Submittals shall include a copy of the manufacturer's printed installation instructions for the equipment proposed. Submittals for electrically energized equipment shall show all electrical characteristics and inter-connection requirements. Where the product data shows products and materials of different sizes, the Contractor shall circle, arrow, or otherwise designate the specific equipment for this project. Submittals not so designated or full product line catalogs will be rejected.
- E. Engineer's Review of Shop Drawings - The Engineer's review of Shop Drawings signifies only that such drawings appear to be in substantial conformity with the Contract drawings and Specifications. Such a review does not relieve the Contractor from complying with the Plans and Specifications. The Engineer shall not verify quantities, nor shall he indicate approval of every detail on the submittal nor acceptance of any omission.

3.06 MARKING OF SUBMITTALS

- A. The Engineer shall return copies of the Submittals marked as follows:
 - 1. "Returned Not Reviewed" - Submittals did not meet the requirements for Contractor verification or did not have submittal properly designated as identified in the previous paragraph. Material is returned to Contractor. Resubmittal is required.
 - 2. "Reviewed for General Compliance Only - No Exception Taken" - Submittals bearing this comment have been found to be generally in conformance with the intent of the Plans and Specifications.
 - 3. "Reviewed for General Compliance Only - Make Corrections Noted" - Submittals bearing this comment have been found to be generally in conformance with the intent of the Plans and Specifications, with the exception of the noted items. A resubmittal to the Engineer is not required and it is understood the Contractor will make the noted corrections.
 - 4. "Reviewed for General Compliance Only - Revise and Resubmit" - Submittals bearing this comment have been found to contain a substantial departure from the Plans and Specifications. The Contractor must make a new corrected submittal.
 - 5. "Reviewed for General Compliance Only - Rejected" - Submittals bearing this comment depict materials, equipment or supplies which are not judged by the Engineer to meet the requirements of the Plans and Specifications. The Contractor shall provide a new submittal on alternative equipment.

3.07 SAMPLES

- A. The Contractor shall, when required, submit to the Engineer for review typical samples of materials equipment and products. The Samples shall be properly identified by tag and shall be submitted sufficiently in advance of the time when they are to be incorporated into the work so that rejection thereof will not cause delay.

3.08 MANUFACTURER'S DIRECTIONS

- A. In the case where any manufactured article, material, or equipment is specified, then the Contractor must install, apply, connect, erect, use, clean and condition it in strict accordance with the manufacturer's directions.

3.09 SLEEVES, INSERTS AND OPENINGS

- A. Provide sleeves for all piping systems. Set all sleeves and inserts in place ahead of new construction. Cooperate with other trades. The contractor shall correct all omitted or improperly located sleeves without additional compensation.

3.10 SUPPORTS AND HANGERS

- A. Supports: Investigate thoroughly Plans and Shop Drawings related to work to determine how equipment and piping are to be supported, mounted, or suspended. Provide extra steel, bolts, inserts, pipe stand brackets, or any other items required for proper support. Provide supporting accessories where required, whether or not shown on the Drawings. Where directed, furnish drawings showing supports, etc., for approval.

3.11 NOISE AND VIBRATION

- A. Install all equipment to be free of transmission of noise and vibration to occupied spaces. Arrange isolated equipment so that it does not contact members of the building structure, ceiling grids, piping, conduits, or ductwork.

3.12 OPERATION AND MAINTENANCE INFORMATION

- A. Submit Operation and Maintenance Manuals per Section 01 33 00 "Submittal Procedures". Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Architect/Engineer will comment on whether content of Operation and Maintenance submittals is acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Initial Manual Submittal: Submit a draft copy of each manual at least 30 days before commencing demonstration and training. Architect/Engineer will comment on whether general scope and content of manual are acceptable.
- C. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.

1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.
- D. Comply with Section 01 77 00 "Closeout Procedures" for schedule for submitting Operation and Maintenance documentation.
- E. Format of Operation and Maintenance Manuals: Submit manuals in the form of a single composite electronic PDF file.
 1. Electronic Files: Use electronic files prepared by the manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size. "Recognize Text" shall be run on all scanned documents to provide a text searchable PDF.
- F. Organization and Requirements for Operation and Maintenance Manuals: Unless otherwise indicated, organize each manual into the format as described below, and as indicated in Figure 1: O&M Manual Diagram, in Section 01 78 23.
 1. Title Page: Indicate Building Name, Project Title, and SU Project Number.
 2. Table of Contents: Hyperlinked bookmarked information with links to each CSI Master Format specification section contained in manual.
 3. Contact List: Indicating name and contact information for the following:
 - a. Construction Manager or General Contractor.
 - b. Subcontractor.
 - c. Architect.
 - d. Architect's Subconsultants.
 4. Project Warranties: Include the overall project warranty and hyperlinks to any special warranties included in equipment's specification sections.
 5. Operations and Maintenance Information: Operations and Maintenance information for every CSI specification section included in project. Each section shall contain the final submittal that has been updated to include any architectural remarks, any special Contractor or manufacturer warranty associated with the equipment or system, the installation, Operations and Maintenance manuals for each piece of equipment, including any accessory components, all test reports for systems and equipment and parts list for each piece of equipment.
 6. Include a typed guarantee from the Contractor with a one-year guarantee stated as commencing on the date of final acceptance.
 7. The Contractor shall include a complete copy of the O&M Manual checklist which follows this section as the last page of the O&M Manual.

3.13 INSTRUCTION OF OWNER'S DESIGNATED REPRESENTATIVE

- A. After submission and acceptance of the Operating and Maintenance information and prior to final acceptance of the Project, provide a scheduled instruction period for the Owner's designated representative. The instruction period shall be sufficient to cover the contents of the Operating and Maintenance portfolio, a walk-through of the Project and a review of all systems.
- B. At the conclusion of the instruction period, provide approved copies of the accepted Operation and Maintenance Manual to the Owner's representative and obtain a signed receipt.

3.14 GUARANTEE

- A. Prior to application for final payment, the Contractor shall provide a written guarantee covering all portions of the work of this Division. The guarantee shall include all work and materials for a period of one (1) year from the date of final acceptance. The guarantee shall provide for the repair or replacement of any defective equipment, materials, products, or work at no cost to the Owner.
- B. Items or work which are repaired or replaced under this guarantee shall be covered under an extended guarantee by the Contractor so that the replaced products or work shall have performed satisfactorily without repair or replacement for a period of one (1) year.
- C. The failure of any manufacturer to provide a one (1) year warranty, or the failure of any manufacturer or vendor to honor a warranty shall not relieve the Contractor from his obligation to provide a complete parts and labor guarantee on all work provided under his Contract for a period of one (1) year.
- D. Supplemental Guarantees - Supplemental Guarantees and extended warranties may be included under this Contract as part of specific specification sections.

3.15 GUARANTEE PERIOD

- A. During the guarantee periods, the Owner may respond to emergency situations. Emergency situations for the purposes of this section are those situations determined to be potentially harmful to the surrounding personnel, equipment, or environment. In cases where work is performed by the Owner's employees, the Contractor will be charged for all labor and material needed to complete emergency repairs, if the repairs are determined to be the result of faulty material or workmanship. The performance of these repairs by the Owner shall not void any Contractor guarantee.
- B. The act of the Owner in responding to any emergency situation shall not relieve the Contractor from the obligation to respond to the emergency and from correcting any problems as part of the original Project cost.
- C. The Owner shall begin preventive maintenance programs immediately following final inspections. Preventive maintenance activities will not relieve Contractor from any equipment warranties.

3.16 AS-BUILT DRAWINGS

- A. Maintain a dedicated set of Construction Drawings at a protected location at the Job Site for the recording of actual installed locations of piping, ductwork, equipment, and accessories. Record exact locations of underground piping and structures. Record any and all variations from the original Construction Drawings in neat, legible hand drawn lines and text. Attach copies of field sketches and Engineer's supplementary instructions where they occur.
- B. Keep an accurate record and show on As Built Drawings the actual installed location of any concealed work such as underground piping and under-slab piping, valves in crawl spaces, etc. Provide location on As-Built Drawings for outside services by indicating actual dimensions from fixed reference points which will be available after completion of construction. "Tie" two (2) dimensions from different reference points to confirm locations of concealed work. Indicate top and bottom elevations, and station number of any utilities crossed as part of this work.
- C. Drawings: Legibly mark to record actual construction:
 - 1. Depths of elements in relation to other existing facilities.

2. Horizontal and vertical locations of utilities and appurtenances, referenced to permanent surface improvements.
 3. Field changes of dimensions and detail.
 4. Changes made by Supplemental Instruction or by Change Order.
 5. Details not on original Contract Drawings.
- D. Provide the original of the As Built to the Engineer for review and reproduction by the Engineer. Provide the original copy to the Engineer for the Owner with one (1) photocopy of the Engineer's files. The Contractor shall retain a second photocopy to be retained by the Contractor. The Contractor shall be responsible for the safekeeping and maintenance of the As Built throughout construction, and for maintenance of one (1) photocopy at the Contractor's office for a period of not less than one (1) year following final acceptance. The Contractor shall mark each drawing of his submittal "As-Built" with the date of submission, the name of the firm and the signature of the preparer.

3.17 EXAMINATION OF ACTUAL CONDITIONS

- A. Before ordering any material or doing any work, the Contractor shall verify all measurements at the site and shall be responsible for the contingencies which may be encountered. No extra compensation will be allowed on account of a difference between actual dimensions and measurements at the site and those indicated on the Drawings. Any difference which may be found should be submitted to the Engineer for consideration before proceeding with the work.
- B. The contractor shall work accurately to benchmarks and to proper elevations and dimensions established by the Contractor. The contractor shall check the conditions and details of the work in relation to the progress of the work.
- C. The Contractor shall lay out the work, establishing heights and grades for all piping work included in these specifications in strict accordance with the intent of the Drawings, the physical conditions of the Project and the finished site grades. He shall be responsible for the accuracy of the work and that the work meets all physical conditions of the Project and the requirements of these specifications.
- D. Prefabrication of piping, conduit, etc. may be performed only at the risk of the Contractor. Changes to the prefabricated piping required by the actual site conditions shall be made by the Contractor without extra compensation from the Owner.
- E. Due to the scale of Drawings, it is not possible to indicate all offsets, fittings, changes in elevation, etc. which may be required. Make all such changes in piping, location of equipment, etc., to accommodate work to obstacles encountered, at no increase in compensation. If requested, submit at least five (5) copies of Drawings detailing all major deviations or changes. All changes must be approved before installation.
- F. Plans show general arrangements of piping and connections. Install work substantially as indicated. Verify exact locations and elevations on job.
- G. Thoroughly coordinate work with that of other Contractors.
- H. Should either Engineer's details, field conditions, a change in equipment or Shop Drawing information necessitate an important rearrangement, report same to Engineers, and obtain approval before proceeding.
- I. No compensation shall be awarded for extra work because the above precautions have not been followed. In the event of conflicts, the Engineer's decision is final. The contractor shall be fully responsible for unauthorized changes.

3.18 BARRIERS

- A. The Contractor shall furnish, erect, and maintain barricades, fences, railings, enclosures, guard lights, danger signals, warnings, cribbing, shoring, and other such precautions necessary to protect all installations and structures in the area of the work to insure the safety of the public and to avoid damage or injury to any and all persons and property. Warning lights shall be of blinker type, battery or electrically operated.
 - 1. The Contractor shall be solely and without exception, responsible for safety on the project site.
 - 2. All barricade and security measures shall be implemented before work starts.

3.19 PROTECTION

- A. The Contractor shall provide adequate protection to the work, his workmen, the General Public, and private property.
- B. The Contractor shall use all means and precautions necessary to insure on-site safety during construction. All OSHA construction requirements covering a project of this type shall be required of the Contractor.
- C. All fencing and security measures must be implemented before work starts.
- D. The Contractor shall use all means and precautions to insure the safety of the occupants of the buildings during construction. Occupied portions of the buildings shall have a minimum of two exits available at all times.

3.20 LAYING OUT WORK

- A. The Plans are in part diagrammatic. Contractor shall verify rough-in dimensions with Shop Drawings and with the Architectural Plans. Conform to dimensions shown on the Plans in preference to scaling from the Mechanical Drawings. Provide all fittings and appurtenances required for proper system operation.
- B. Contractor shall allow for thickness of finishes when roughing in his work. He shall not rough-in without obtaining accepted Shop Drawings for the actual equipment to be installed.
- C. Due to the scale of Drawings, it is not possible to indicate all offsets, fittings, changes in elevation, etc. which may be required. Make all such changes in piping, ductwork, conduit system, location of equipment, etc., to accommodate work to obstacles encountered, at no increase in compensation. If requested, submit at least five (5) copies of Drawings detailing all major deviations or changes. All changes must be approved before installation.
- D. Plans show general arrangements of piping and connections. Install work substantially as indicated. Verify exact locations and elevations on job. Before installing work, consult other Plans, details, and Contractors to determine headroom and work interferences. Examine Architectural Plans for exact location of equipment, fixtures, and outlets. Where not definitely located, obtain information from Architect.

- E. Thoroughly coordinate work with that of other Contractors. Raise piping and drip where necessary. Vent all air pockets in water piping, even though not so indicated. Determine the exact route and/or location of each pipe before fabrication and installation. Furnish in writing to Architect any information necessary to permit the work of other trades to be installed properly and without delay. Maintain maximum head room. If plumbing work cannot be installed at least 7'-0" above the floor (in mechanical spaces or basement and higher in finished spaces dependent on ceiling height), consult with the Engineers and obtain approval before proceeding. If directed by Architect or Engineers, prepare composite Drawings and sections (scale not less than $\frac{1}{4}" = 1"$), clearly showing installation of work in relation to work of other trades.
- F. Should an Architect's details, field conditions, change in equipment or Shop Drawing information necessitate an important rearrangement, report same to Engineers, and obtain approval before proceeding.
- G. Install piping, etc. to avoid interferences with removal of coils, filters, belt guards or any operating part of all systems, or operation of overhead or swinging doors. Maintain easy and safe access to valves, controllers, motor starters, and other equipment requiring frequent operation. Maintain opening of access doors, switch boxes, motor starters, panel boards, etc. Maintain a clear walking space.
- H. No compensation awarded for extra work because above precautions have not been followed. In the event of conflicts, the Engineer's decision is final. Contractor fully responsible for unauthorized change.

3.21 MISCELLANEOUS PAINTING

- A. Paint all hangers and exposed or unpainted or ungalvanized iron work in the HVAC Systems with two brush coats of black rust preventative paint. Touch up any damaged surfaces of factory painted equipment.

3.22 EQUIPMENT INSTALLATION

- A. It is required of each equipment manufacturer, through the Contractor, to carefully check Plans and Specifications as some affect their particular equipment. Report to Engineers, any discrepancies or contradictions as applied to their particular equipment which prevents proper functioning, servicing, etc. before or at the time when Shop Drawings are submitted. Furnish manufacturer's printed installation instructions for each piece of equipment. Thoroughly instruct Contractors' personnel on the job, exactly how their equipment shall be installed, connected, lubricated, started up, operated, etc., so that all factory instructions are rigidly followed.
- B. Install, test, start and operate all equipment only as instructed by manufacturer and in presence of manufacturer's representative, as directed. Follow instructions of manufacturer as noted above. Provide mock-up installation of certain typical equipment, if required, such as fixtures, chair carriers, countersinks, etc. as directed, and obtain Architect's and Engineer's approval before proceeding with actual installation of same.
- C. Contractor shall provide as recommended by manufacturer all necessary incidental valves, fittings, piping, wiring, etc., not supplied by manufacturer or other Contractors, for proper apparatus operation. Contractors shall provide accurate information to other Contractors for required services to equipment, such as water supply and waste connections, masonry openings, wiring requirements, etc. Such information shall be complete and correct for each particular job.
- D. If required by Engineers, Contractor shall submit satisfactory evidence that equipment, systems, etc. have been installed strictly in accordance with manufacturer's recommendations, have been properly aligned, are properly adjusted, have been properly tested, lubricated, balanced, etc.

- E. As soon as installed, lubricate, and leave in good working order, all motors, bearings, etc., in accordance with manufacturer's instructions.
- F. Lubrication Chart - Provide 8½" x 11" lubrication chart, typed in capital letters, mounted in wood frame under clear plastic. Hang where directed. HVAC Contractor shall provide a chart listing all motors. Other Contractors supply information on motors furnished by them.
- G. List following information:
 - 1. Name and location of equipment.
 - 2. Type of lubrication recommended by manufacturer.
 - 3. Lubrication period recommended by manufacturer.

3.23 EQUIPMENT CHECKOUT AND TESTING

- A. Notify Engineers when installation(s) is/are ready for testing, as specified with ample time in advance. Provide all metered and unmetered services, tools, equipment, and manpower necessary to perform tests.
- B. Perform all equipment testing as specified as recommended by manufacturer and directed by Engineers. Demonstrate that all operating and safety devices are in proper working order.
- C. Perform necessary operating and pressure testing for all piping and equipment which shall be buried underground, before backfilling; installed in or under slabs, before pouring; buried in building walls, before being buried and installed above furred ceilings before ceiling installation.

3.24 ESCUTCHEONS

- A. Every un-insulated pipe penetrating a wall, ceiling or floor surface exposed to view shall be provided with an escutcheon.
- B. Units in unfinished spaces (boiler rooms, etc.) shall be of the rough finish type.
- C. Units in finished spaces shall be of the chrome plated type.
- D. Units shall be of sufficient diameter to cover sleeves and where used with extended sleeves shall be of sufficient depth to fit over the sleeve and reach the finish surface snugly.

3.25 HANGERS AND SUPPORTS

- A. All components shall be selected for a minimum safety factor of 5.
- B. Units shall be capable of supporting pipes under all operating conditions and shall allow free expansion and contraction of piping.
- C. All rigid hanger assemblies shall provide for vertical movement after installation by means of threaded adjustment.
- D. Piping systems subject to shock loads shall be supported by units' incorporation shock-absorbing devices of approved design.
- E. Hanger rods shall be subjected to tensile loads only. Where axial or lateral movement is anticipated, suitable linkages shall be provided.

- F. Units shall be designed and installed so that pipe movement will not cause them to become disengaged.
- G. Units shall be spaced to permit drainage and so that there will be limited sag between hangers. Spacing shall also be such as will prevent excessive bending stresses from concentrated loads between supports.
- H. Units in contact with copper pipe shall be copper clad.
- I. Support units from the building structural system, NOT from metal roof decks.
- J. Units supporting insulated pipe carrying liquids or gases at temperatures ABOVE OR BELOW AMBIENT shall be furnished with pipe covering protection saddles sized in accordance with the associated pipe and the specified insulation thickness. See 2.4B.
- K. Insulation shields shall be galvanized steel, formed to fit the adjoining insulation, extending through a 180° arc and shall conform with the following table:

PIPE SIZE	GAUGE	LENGTH
½" to 2½"	18	8"

- L. Welded attachments shall be of materials comparable to the pipe.
- M. All units, including pipe attachments, structural attachments, hanger rods, bracing, all necessary accessories, and their installation shall be in accordance with NFPA 13 - Installation of Sprinkler Systems, latest issue.
- N. Maximum horizontal support intervals shall be as follows:
 - 1. Steel pipe 1¼" and smaller: 8' – 0".
 - 2. Steel pipe 1½" and larger: 10' – 0".
 - 3. Copper tubing 1½" and smaller: 5' – 0".
 - 4. Copper tubing 2": 8' – 0".
 - 5. Cast-iron pipe - support at each bell, 5' – 0".
 - 6. No-hub c.i. pipe: At each joint for 3" pipe at each side of each joint for 4" and over pipe.

3.26 IDENTIFICATION SYSTEMS (General Installation Requirements):

- A. Coordination: Where identification is to be applied to surfaces which require insulation, painting or other covering or finish, including valve tags in finished mechanical spaces, install identification after completion of covering and painting.
- B. Equipment:
 - 1. General: Install engraved plastic laminate sign or plastic equipment marker on or near each major item of mechanical equipment and each operational device, as specified herein if not otherwise specified for each item or device. Provide signs for the following general categories of equipment and operational devices.
 - a. Meters, gauges, thermometers, and similar units.
 - b. Fuel-burning units including water heaters.
 - c. Pumps and similar motor-driven units.
 - d. Storage tanks and pressure vessels.

- e. Strainers, filters, humidifiers, water treatment systems and similar equipment.
- 2. Lettering Size: Minimum ¼" high lettering for name of unit where viewing distance is less than 2'- 0", ½" high for distances up to 6'-0", and proportionately larger lettering for greater distances. Provide secondary lettering ⅔" to ¾" of size of principal lettering.
- 3. Test of Signs: In addition to name of identified unit, provide lettering to distinguish between multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.

C. Piping:

- 1. After piping has been painted or insulated, apply pipe labels as specified above.
- 2. Space labels on 15 centers in mechanical rooms. Space at 25 centers elsewhere and at each side of partitions and interior walls. Also, at each branch and riser take off and adjacent to each valve (except at fixtures and equipment).

D. Valves Identification:

- 1. General: Provide valve tag on every valve, cock, and control device in each piping system; exclude check valves, valves within factory-fabricated equipment units, plumbing fixture faucets, convenience hose bibs, and shut-off valves at plumbing fixtures, and similar rough-in connections of end-use fixtures and units. List each tagged valve in valve schedule for each piping system.
- 2. Provide a valve tag chart, framed, and securely fastened to the wall, using anchors and fasteners, where directed by the Owner.
- 3. Submit list of valve tags, including wording, for approval BEFORE ordering.

E. Ceiling Markers:

- 1. Place sticker on nearest ceiling grid t-bar below any operational HVAC equipment (e.g., balance valves, isolation valves, vents, drains, strainers, filters, fans, coils, etc.)

3.27 PIPE SCHEDULE

Service	Size	Pipe	Fittings	Joints
Hydronic Heating, Chilled Water Cooling, Glycol Heating Systems	2" and smaller	Type "L" Copper	Wrought Copper Pressure Fitting	Sweat, Solder, threaded
	3½" and larger	Schedule 40 Steel	Butt-Welded	Welded
Steam in Buildings	2½" and larger	Schedule 40 Steel	Butt-Weld Fittings, Standard Weight	Welded
	2" and smaller	Schedule 40 Steel, Threaded	Threaded	Threaded

Service	Size	Pipe	Fittings	Joints
Condensate in Buildings	2½" and larger	Schedule 80 Steel	Butt-Weld Fittings, Extra Heavy	Welded
	2" and smaller	Schedule 80 Steel, Threaded	3000 lb. Forged Steel Threaded for HP Condensate, 300 lb. Cast-Iron Threaded for LP Condensate	Threaded
Refrigeration		ACR Copper	Wrought Copper Pressure Fitting	Brazed
AHU Drains & AC Unit Drains		Type "L" Copper	Wrought Copper	95/5 No-Lead Solder

3.28 SEALING SLEEVES

- A. All openings in floors and all openings in full height walls shall be firestopped in a manner equal to or superior to the surrounding construction.
- B. All penetrations in fire rated walls or floor assemblies shall be fitted with 3M brand fire barrier penetration sealing systems 7902/7904, CP-25 caulk or 303 putty and installed in accordance with instructions provided.

3.29 SLEEVE INSTALLATION

- A. Where drilling through floors and walls has been allowed, sleeves may be installed after drilling.
- B. Where sleeves have been omitted or improperly located, pay for cutting and patching as required to make corrections.
- C. Install as follows:
 - 1. Sleeves through walls, partitions and ceilings shall terminate flush with exterior surfaces.
 - 2. In any mechanical room whose floor does not rest upon a slab on grade, sleeves shall extend to 4" above the finished floor.
 - 3. Sleeves through finished floors shall be terminated ¼" above the finished floor.
 - 4. Use sheet metal sleeves for pipe 6" and larger. Use Schedule 40 steel pipe sleeves for pipe smaller than 6".
 - 5. The Mechanical Contractor shall identify and plug all abandoned openings in an acceptable manner.

3.30 SLEEVE SIZES

- A. Insulated pipe shall pass through sleeves of sufficient size to pass both pipe and insulation. Generally, this will mean the interior of the sleeve shall be at least 2" larger than the exterior diameter of the pipe passing through it.

- B. Bare pipe shall pass through sleeves whose interior diameter will be that of a pipe two sizes larger than that of the pipe passing through it.

3.31 VALVES

- A. Install valves where required for proper operation of piping system. Locate valves to be accessible.
- B. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward or horizontal plane unless approved by the Owner and Engineer.
- C. Select and install valves with ends to match piping system requirements.
- D. Select and install valves with renewable seats, except where otherwise indicated.
- E. Install swing check valves in horizontal position with hinge pin horizontally perpendicular to center line of pipe. Install for proper direction of flow.

3.32 STRAINERS

- A. Install Y-type strainers full size of pipeline shown on the Drawings, in accordance with manufacturer's installation instructions. Install pipe nipple, cap and shutoff valve in strainer blow-down connection, full size of connection. Locate strainer in pipe ahead of steam trap serving steam main drips.

3.33 VALVE CHART

Service		Size	Type	
Hydronic Heating, Chilled Water and Glycol Hot Water		¼" thru 2"	Standard Port	Two Piece Bronze Body with Chrome Brass Ball
		2½" and Larger	Butterfly Valve	
		Indoors at Heating/Cooling Terminal Units	Single Piece, Stainless Ball, Union End	
		Drain & Air Bleed Valves	Hose End Ball Valve	
Steam	Low Pressure (to 15 psi)	2" and smaller	Class 300 Bronze Gate or Jamesbury Clincher Ball Valve	
		2½" and larger	Class 125 Cast-Iron Gate Valve	
	Medium Pressure (15 to 50 psi)	2" and smaller	Jamesbury Clincher	
		2½" and larger	Class 125 Cast-Iron Gate Valve	
	High Pressure	⅜" to ½" Strainer Blowdown Service	Screwed Carbon Body Ball Valve	

Service		Size	Type
	50 to 115 psig and first valve inside building (any pressure)	¾" to 2" Isolating Service	Class 300 RP&C Gate Valve
		¾" to 2" Throttling Service	Class 300 RP&C Globe Valve
		2½" and larger	Cast Steel Gate Valve
Steam Condensate Low and Medium Pressure Systems		½" to 2"	Bronze Body, Solid Copper-Nickel Disk Gate Valve
		2½" and Larger	Cast-Iron Body Butterfly Valve
Steam Condensate Check Valves		½" and Larger Check Valves	Class 300 Bronze Body Check Valve
Steam Gauge and Blow-off Valves		⅜" to ½"	Screwed Carbon Body Ball Valve
Steam Condensate High Pressure System and First Valve inside Building		⅜" to ½"	Screwed Carbon Body Ball Valve
		¾" to 2"	Class 300 Steel Gate Valve
		2½" and Larger	Cast-Iron Gate Valve

O&M Manual Checklist

Date _____

(Include completed copy of this Checklist in O&M Manual when submitted)

Project _____

Trade _____

Project Name _____

Submitted as an electronic file per Section 01 78 23

YES / NO

Composite electronic PDF file

YES / NO

Minimum readable text size

YES / NO

Title page "Recognize Text" turned on for all scanned documents

YES / NO.....
O&M Manual:

Cover Sheet listing:

Building Name

O&M Manual Table of Contents: Hyperlinked book-marked information with links to each CSI Master Format Specification Section in manual YES / NO

O&M Manual Contact List:

Contractor

Contractor Name _____

Contractor's Address _____

Contact person _____

Tel. & Fax #'s _____

Each Major Subcontractor

Contractor Name _____

Contractor's Address _____

Contact person _____

Tel. & Fax #'s _____

Project Manager

Name _____

Engineer

Name _____

Company Name _____

Contact person _____

Architect

Name _____

Company Name _____

Contact person _____

O&M Manual - Remaining Pages:

Checklist Page 2

O&M Manual Project Guarantee & Warranties:

Typed guarantee from Contractor with 1 year guarantee stated as commencing on the date of final acceptance by the University.

Date must be identified _____

Hyperlinks to any special warranties included in Equipment Specifications

YES / NO

1.	Organized by CSI Specification Section number.	<u>YES / NO</u>
2.	Each CSI Specification Section included.	<u>YES / NO</u>
3.	Includes final submittal, updated to contain A/E remarks.	<u>YES / NO</u>
4.	Includes any special Contractor or manufacturer warranty.	<u>YES / NO</u>
5.	Includes the Installation, Operation and Maintenance (IOM) manuals for each piece of equipment, up to date for the version of equipment supplied.	<u>YES / NO</u>
6.	Includes IOM data for accessory data.	<u>YES / NO</u>
7.	Includes test reports for each piece of equipment.	<u>YES / NO</u>

Scan of spare parts list.

Scan of all test reports (i.e., fire alarm).

Scan of all inspections (i.e., plumbing, electrical).

Scan of all certification data.

Scan of facility lubrication chart.

Scan of facility valve chart.

Scan copy of complete temperature control and operating instructions.

Completed copy of checklist last page of O&M Manual.

END OF SECTION 23 05 00

DIVISION 23 HEATING, VENTILATING AND AIR-CONDITIONING

SECTION 23 07 00 - HVAC INSULATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The Contract Drawings and the General Provisions of the Contract, including the General Conditions of the Contract for Construction, Supplementary Conditions, Special Conditions and Division 1 Specification Sections apply to the work of this Section.

1.02 WORK INCLUDED

- A. Furnish and install all insulation materials for the complete duct, piping and equipment systems as required for proper system operation.
- B. This Section includes semirigid and flexible insulation for ducts, plenums, and breechings; insulating cement; field-applied jackets, accessories; and sealing compounds.
- C. This Section also includes preformed, rigid, and flexible pipe insulation; field-applied jackets; accessories and attachments; and sealing compounds for above ground, interior and exterior mechanical piping systems as listed in Part 3 application schedules. This section also includes mechanical equipment insulation requirements.

1.03 REFERENCES

- A. American Society of Testing and Materials (ASTM):
 - 1. B 209 Aluminum and Aluminum-Alloy Sheet and Plate.
 - 2. C 533 Calcium Silicate Block and Pipe Thermal Insulation.
 - 3. C 534 Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tube Form.
 - 4. C 547 Mineral Fiber Pipe Insulation.
 - 5. C 553 Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
 - 6. C 612 Mineral Fiber Block and Board Thermal Insulation.
 - 7. C 795 Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
 - 8. E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. American National Standards:
 - 1. A 117.1 Accessible and Usable Buildings and Facilities.

1.04 SUBMITTALS

- A. Sustainable Design Submittals Provisions:
 - 1. Refer also to Section 01 81 13 Sustainable Design Requirements.
 - 2. Credit EQ 4.1: Printed product data for adhesives and sealants indicating VOC content in g/L.

- B. Product Data: Submit manufacturer's product data for insulating materials proposed to be used that identify thermal conductivity, thickness, jackets (both factory and field applied, if any) for each type of product indicated. Provide manufacturers' installation requirements for each type of insulation. Show compliance with necessary industry standards and listing agencies.

1.05 QUALITY ASSURANCE

- A. With the exception of duct liners, all insulating materials required for ducting, plenums, and breaching piping and equipment shall be furnished and installed under this contract. The execution of the work shall be in strict accordance with the best practices of the trade, the manufacture's requirements, and the intent of this specification.
- B. Fire-Test-Response Characteristics: As determined by testing materials identical to those specified in this Section according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and sealer and cement material containers with appropriate markings of applicable testing and inspecting agency.
 - 1. Insulation Installed Indoors: Flame-spread rating of 25 or less, and smoke-developed rating of 50 or less.
 - 2. Insulation Installed Outdoors: Flame-spread rating of 75 or less, and smoke-developed rating of 150 or less.
- C. Inspection: Perform the following field quality-control inspections, after installing insulation materials, jackets, and finishes, to determine compliance with requirements:
 - 1. Inspect fittings and valves randomly selected by the Project Manager.
 - 2. Remove fitting covers from 20 elbows or 1 percent of elbows, whichever is less, for various pipe sizes.
 - 3. Remove fitting covers from 20 valves or 1 percent of valves, whichever is less, for various pipe sizes.
- D. Insulation applications will be considered defective if sample inspection reveals noncompliance with requirements. Remove defective Work and replace with new materials according to these Specifications.
- E. Reinstall insulation and covers on fittings, valves, ducts, and equipment uncovered for inspection according to these Specifications.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Packing: Ship insulation materials in containers marked by manufacturer with appropriate ASTM specification designation, type, and maximum use temperature.
- B. Insulation materials shall be kept dry and protected from the weather at all times until installation is complete. Insulation material found to be wet or damaged shall be replaced by the contractor at no cost to the Owner.
- C. Insulation materials shall be new and undamaged.

PART 2 - PRODUCTS

2.01 INSULATION MATERIALS

- A. Mineral-Fiber Board Thermal Insulation: Glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IB, for use up to 450 deg. F, with a factory-applied jacket manufactured from foil, reinforcing scrim, and kraft paper (FSK). Minimum density of 3 lb./cu.ft., maximum conductivity (K) of 0.40 (BTU-in./hr.-sq.ft.-deg. F) at 300 deg. F, 0.23 K or less at 75 deg. F. Johns Manville Mat-faced Micro-Aire Type 800 or equal in Owens-Corning.
- B. Mineral-Fiber Blanket Thermal Insulation: Glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II, for use up to 250 deg. F, with a factory-applied jacket manufactured from either foil, reinforcing scrim, and kraft paper (FSK) or with a factory applied white or black metalized polypropylene-skrim-kraft (PSK). The (PSK) jacket is to be used in exposed areas where the structure is to be painted. Minimum density of 3/4 lb./cu.ft., maximum conductivity of 0.43 (BTU-in./hr.-sq.ft.-deg. F) at 200 deg. F. Moisture absorption less than 1% by volume, moisture transmission 0.02 perms. Johns Manville Microlite XG or equal in Owens-Corning.
- C. Ductboard Insulation ISO Board (Outdoor): Insulated sheathing, polyisocyanurate foamboard insulation ISO, additionally jacketed with a layer of glass mesh embedded in two heavy coats of weather barrier mastic, similar to Mon-ECO Industries 55-50.
- D. Fiberglass "Pipe & Tank" Insulation: For ductwork, semi-rigid fiberglass board in roll form. Comply with ASTM C 795, Type II, for use up to 850 deg. F with a factory-applied jacket manufactured from foil, reinforcing scrim, and kraft paper (FSK). Maximum conductivity of 0.45 (BTU-in./hr.-sq.ft.-deg. F) at 300 deg. F.
- E. Pipe and Tank Insulation: For equipment and tanks, semi-rigid fiberglass board in a roll form faced with factory applied vapor retarder jacket (ASJ). Comply with ASTM C 795, Type II, for use to 850 deg. F. Maximum conductivity, 0.26 (BTU-in./hr.-sq.ft.-deg. F) at 100 deg. F.
- F. Preformed Pipe Insulation: Glass fibers bonded with thermosetting resin. Comply with ASTM C 547, Type I-Molded, for use up to 850 deg. F, with factory-applied, all-purpose, vapor-retarder jacket (ASJ), with self-sealing adhesive lap (SSL). Minimum 3 lbs./cu.ft. density, maximum 0.23 (BTU-in./hr.-sq.ft.-deg. F) at 75 deg. F thermal conductivity. Manville APT, Owens-Corning 25 ASJ or approved equal in CSG.
- G. Vapor-Retarder Mastics: Fire- and water-resistant, vapor-retarder mastic for indoor applications. Comply with MIL-C-19565C, Type II.
- H. 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. Armaflex 25/50 cemented with factory recommended adhesive. Covered with aluminum jacketing for abuse and/or exterior locations. Maximum thermal conductivity per ASTM C-177, C-158 0.27 @ 75 deg. F, 0.276 @ 90 deg. F, water permeability per ASTM E-96, 0.17 perm-in. Armstrong Armaflex II sheet and roll insulation with Armstrong 520 adhesive.
 - 1. Adhesive: As recommended by insulation material manufacturer.
 - 2. Ultraviolet-Protective Coating: As recommended by insulation manufacturer.

- I. Calcium Silicate Insulation: Flat, curved, grooved block or preformed pipe sections of non-combustible, inorganic, hydrous calcium silicate with a non-asbestos containing fibrous reinforcement. Comply with ASTM C 533, Type I.
- J. Standard PVC Fitting Covers: Factory-fabricated fitting cover system consisting of one-piece, pre-molded, PVC covers with fiberglass inserts manufactured from 20mils thick, high-impact, ultraviolet-resistant PVC.
 - 1. Shapes: 45- and 90-degree, short- and long-radius elbows, reducers, end caps, soil-pipe hubs, traps, mechanical joints, roof drains, and P-trap and supply covers for lavatories for the disabled.
 - 2. Adhesive: As recommended by insulation material manufacturer.
- K. Steam Piping Fittings:
 - 1. Fittings to 2" - insulating finishing cement with 4-ounce canvas and lagging finished.
 - 2. Fittings above 2" - mitered sections of insulation - troweled insulating cement with 4-ounce canvas and lagging finished.
 - 3. Provide label on all cement finished fittings with legend "Non-Asbestos Insulation". Mark adjacent insulation with the date in black permanent marker.

2.02 FIELD-APPLIED JACKETS

- A. Aluminum Jacket: Stucco-embossed finished sheets manufactured from 0.016" thick aluminum alloy complying with ASTM B209 and having an integrally bonded 1-mil thick, heat-bonded polyethylene and kraft paper moisture barrier over entire surface in contact with insulation. Fittings shall be preformed 45 and 90 degree short and long radius elbows; same material and thickness as jacket.
- B. PVC Jacket: White, 25/50 rated per ASTM E 84, UV resistant, minimum thickness 0.020" for insulation O.D. up to 18" and 0.030" for insulation O.D. above 18" with fittings complying with "Standard PVC Fitting Covers" above.

2.03 ACCESSORIES AND ATTACHMENTS

- A. Tape: Tape for sealing joints in the insulation shall be a minimum of 3" wide, pressure sensitive and of the same type of material as the insulation jacket it is used on.
- B. Bands: $\frac{3}{4}$ " wide, 0.007" aluminum, or stainless steel, ASTM A666, Type 304, 0.020" thick.
- C. Wire: 0.008" nickel-copper alloy; 0.062", soft-annealed, stainless steel; or 0.0062", soft-annealed, galvanized steel.
- D. Screws: Stainless steel sheet metal screws.
- E. Anchor Pins and Washers: Anchor pins and washers shall be weld attached and shall have a holding capacity of 100 lb. for direct pull perpendicular to the attached surface, and shall have a pin length sufficient for insulation thickness indicated:
 - 1. Weld attached: Copper-coated steel pin for capacitor-discharge welding and a minimum 1½" diameter galvanized steel washer.

PART 3 - EXECUTION

3.01 INSULATION

- A. Coordination and Preparation: For ductwork, schedule insulation application after sealing and leak testing duct systems. For piping schedule, insulation application after completion of piping testing. Clean and dry surfaces to receive insulation. Keep insulation dry during application and finishing. All surfaces shall be clean and dry. Surfaces shall be free of loose scale, dirt, oil, water, weld, spotter, burns, and rust before installation.
- B. Hangers: Confirm that piping and ducts are at correct elevation and grade prior to insulating. Provide high density or phenolic block inserts for below ambient piping and welded saddles for other piping at each hanger before insulating, for all piping 2" and larger. Insulation shields shall be permitted only for piping 1½" and smaller sizes and then only if the shield does not noticeably compress the insulation. Insulation shields shall be 16-gauge galvanized steel, a minimum of 6" long.
- C. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions: with smooth, straight, and even surfaces: and free of voids throughout the length of the ducts and fittings. Covering shall be continuous. The covering shall be neatly terminated at each end of unions with plastic material troweled on a bevel, but unions shall not be covered. Covering shall be neatly finished at pipe anchors, fittings, etc.
- D. At all points where existing lines or ducts are broken to cut in new connections, the insulation shall be repaired to its original condition.
- E. Apply insulation over fittings and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
- F. Hangers and Anchors: Seal penetrations in insulation at hangers, supports, anchors, and other projections with vapor-retarder mastic. Apply insulation continuously around hangers and attachments.
- G. Interior Walls and Partition Penetrations: Apply insulation continuously through walls and partitions, except fire-rated walls and partitions.
- H. Fire-Rated Wall and Partitions: Terminate insulation at fire/smoke damper sleeves for fire-rated wall and partitions penetrations. Apply insulation continuously through walls and floors unless not allowed by firestop system.
- I. Handicap Lavatories: Cover all exposed lavatory supply and waste fittings with insulation and removable PVC covers to comply with ANSI Std. A117.1 requirements.

3.02 PROTECTION

- A. Coordinate with other trades to cause no delays in applying insulation; be aware of testing, painting, hanger installation and heat tracing requirements. Coordinate clearance requirements with piping installer for insulation application.
- B. Protect work of other Contractors and SNL from dirt and debris caused by the insulation work. Remove rubbish daily and at the conclusion of work.
- C. Do not insulate over nameplates or sight /light glasses.

- D. Coordinate with pump layout to insure pressure switches and gauges are extended outside of pump insulation boxes.

3.03 MINERAL-FIBER BLANKET INSULATION APPLICATION – FOR DUCTS & PLENUMS

- A. Blanket Applications for Ducts and Plenums: Follow manufacturer's recommendations for "Stretch-Outs" using a maximum compression of 25%. Duct wrap shall be installed to allow maximum fullness at corners (avoid excessive compression). Secure blanket insulation with anchor pins and speed washers to prevent sagging. Do not over compress.
- B. Apply adhesive to ducts to assist with installation and as required by the manufacturer.
- C. On rectangular and oval ducts, install anchor pins and speed washers to the bottom of horizontal ducts 24" and larger and all sides of vertical ducts 24" and larger:
 - 1. Space 18" o.c. each way. Apply additional pins to hold insulation tightly against surface at cross bracing.
 - 2. Impale insulation over anchors and attach speed washers. Do not over compress insulation during installation.
 - 3. Cut excess portions of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
- D. Insulation shall be butted tightly at joints and vapor barrier facing shall be overlapped a minimum of 2". All seams shall be stapled approximately 6" on center with outward cinching ½" staples, then sealed immediately with minimum 3" wide pressure sensitive tape having the same facing as the insulation. Do not use staples in public or exposed locations. Apply tape with a moving pressure using a squeegee or other appropriate sealing tool. For systems operating at below ambient, use vapor barrier adhesive, seal all joints, and butter all staples to maintain water vapor integrity of piping system.
- E. Apply insulation on duct elbows and transition with a full insulation segment for each surface. Apply mitered sections of rigid insulation to curved fittings in outdoor ducts.
- F. Apply vapor-retarder mastic or matching pressure sensitive tape to open joints, breaks, and punctures.

3.04 MINERAL-FIBER BOARD INSULATION APPLICATION FOR DUCTS & PLENUMS

- A. Board Applications for Ducts and Plenums: Secure board insulation with adhesive and anchor pins and speed washers.
- B. All corners shall be reinforced with a minimum of 2 x 2 aluminum corner angle, secured in place with matching foil tape.
- C. Apply adhesive to ducts to assist with installation and as required by the manufacturer.
- D. Install anchor pins and speed washers to the sides ducts as follows:
 - 1. On duct sides with dimensions 18" and smaller, along longitudinal centerline of duct. Space 3" maximum from insulation end joints, and 16" o.c.
 - 2. On duct sides with dimensions larger than 18". Space 16" o.c. each way, and 3" maximum from insulation joints. Apply additional pins and clips to hold insulation tightly against surface at cross bracing.

3. Cut excess portions of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
- E. Insulation shall be butted tightly at joints. Cover joints immediately with minimum 3" wide with pressure-sensitive tape having same facing as insulation. Apply tape with a moving pressure using a squeegee or other appropriate sealing tool.
- F. Apply insulation on rectangular duct elbows and transition with a full insulation segment for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Apply insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
- G. Apply vapor-retarder mastic or matching pressure sensitive tape to open joints, breaks, and punctures.

3.05 MINERAL-FIBER "PIPE AND TANK" INSULATION APPLICATION

- A. "Pipe and Tank" Applications for Ducts and Fittings: Secure insulation to ducts with adhesive and lapped seams with pressure sensitive tape.
- B. Insulation shall be butted tightly at joints and vapor barrier facing shall be overlapped a minimum of 2". All seams shall be stapled approximately 6" on center with outward cinching ½" staples, then sealed with minimum 3" wide pressure sensitive tape having the same facing as the insulation.
- C. Apply insulation on round and oval duct elbows and transitions with individually mitered gores cut to fit the fitting. Cover the insulation at the fitting with glass cloth, overlapping the duct insulation by 2" and seal with vapor barrier mastic.

3.06 MINERAL-FIBER INSULATION APPLICATION – PIPES & TUBES

- A. Apply insulation to straight pipes and tubes as follows: use preformed pipe insulation when able. Use pipe and tank insulation for larger diameter piping where preformed insulation is not available. To meet the required thickness, apply multiple layers of insulation with longitudinal and end seams staggered.
 1. Keep adhesive and contact surfaces clean and free of dirt and moisture. Seal immediately once adhesive is exposed. Seal circumferential joints with a minimum 3" wide tape and secure with two outward clinching staples at the overlap. Rub the longitudinal joints firmly with a squeegee and secure with 2 outward clinching staples evenly spaced in each 3-foot section of insulation.
 2. Where vapor retarders are indicated; seal staples and any penetrations in the insulation with vapor-retarder mastic. Apply vapor retarder to ends of insulation at intervals of 15 to 20 feet to form a vapor retarder between pipe insulation segments.
 3. Taper the ends of insulation at terminations. Seal all raw edges of insulation with mastic.
- B. Apply insulation to flanges as follows:
 1. Apply preformed pipe insulation to the outer diameter of pipe flange.
 2. Make width of insulation segments the same as overall width of the flange and bolts, plus twice the thickness of the pipe insulation.
 3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with a collar fabricated for preformed pipe insulation.
 4. Fill all voids and seal all raw edges of insulation with vapor retarder mastic.
- C. Apply insulation to fittings and elbows and mechanical grooved couplings as follows:

1. Apply mitered sections of pipe insulation, or glass-fiber blanket insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire, tape, or bands.
2. Cover fittings with standard PVC fitting covers. Secure the fitting covers by wrapping the ends with minimum 1½" wide PVC tape. Overlap a minimum of 2" and do not stretch the last 2" of tape. Secure the throat with a stainless steel tack.
3. On systems requiring a vapor barrier, seal the throat with vapor barrier mastic (the PVC fitting cover is to act as the vapor barrier).

D. Apply insulation to valves and specialties as follows:

1. Apply premolded pipe insulation sections of the same material as straight segments of pipe insulation, sized and cut to fit around the valve body, over the flanges, and around the bonnet. Fill all voids and seal all raw edges in insulation with vapor retarder mastic. Caulk around valve stem cutout.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation. For check valves, arrange insulation for access to strainer basket without disturbing insulation.
3. Apply insulation to flanges as specified for flange insulation application.

3.07 CALCIUM SILICATE INSULATION APPLICATION

A. Apply insulation according to the manufacturer's written instructions and as follows:

1. Secure single layer of insulation to the duct or pipe with stainless-steel bands at 12" intervals. Tighten bands without deforming the insulation material.
2. Apply two-layer insulation with joints tightly butted and staggered at least 3". Secure inner layer with 0.062" soft annealed, stainless-steel wire. Secure outer layer with stainless-steel bands.
3. On exposed applications, without metal jacket finish insulation with a skim coat of mineral-fiber, hydraulic-setting cement to surface of installed insulation. When dry, apply a flood coat of lagging adhesive and press on one layer of glass cloth or tape. Overlap edges at least 1". Apply finish coat of lagging adhesive over glass cloth or tape. Thin the finish coat to achieve a smooth finish.

3.08 FIELD-APPLIED JACKET APPLICATION – DUCTWORK ALUMINUM JACKET

- A. Exterior: Apply aluminum jacketing to all external ductwork that is insulated. Cover all fittings and specialties with aluminum jacketing.
- B. Apply metal jacket with 2" overlap at longitudinal seams and end joints. Secure jacket with stainless-steel sheet metal screws 6" o.c. and at end joints. Overlap longitudinal seams arranged to shed water and seal end joints with weatherproof mastic.

3.09 GENERAL APPLICATION REQUIREMENTS – PIPING

- A. Apply insulation to piping systems using materials, thickness and jackets listed in the schedule at the end of this section.
- B. Piping exposed to the weather: Any piping subject to freezing and any piping with heat tracing shall have the insulation thickness increased by an additional 2" mineral insulation of the same finish as specified for the particular service when not subject to freezing.

- C. Insulate all steam and condensate return piping, all hydronic heating, cooling, heat recovery and cooling coil condensate piping. Insulate all mains, branches, fittings, flanges, and valves.
- D. Items Not Insulated: Unless otherwise indicated, do not apply insulation to the following systems, materials, and equipment:
 - 1. In steam, hot water, domestic and non-potable service only: Flexible connectors, unions, pressure reducing valves, balancing valves, flow control valves, steam traps, and in sizes less than 1½", valves and strainers.
 - 2. Fire-suppression piping.
- E. Refrigeration Piping:
 - 1. Insulate all refrigeration suction lines between the compressor unit and the cooling coils with 25/50 Armaflex.
 - 2. Insulate all refrigeration discharge lines in occupied spaces with ASJ fiberglass, to protect against incidental contact.

3.10 FIELD-APPLIED JACKET APPLICATION – PIPING

- A. Interior: Apply either aluminum or PVC jacketing to exposed insulated pipe, valves, fittings, and specialties, at an elevation of 8 feet or less above finished floor in mechanical/electrical rooms, penthouses, and services aisles/pipe chases. Fittings of aluminum jacketed piping may be either aluminum or standard PVC fitting covers. Jacketing for piping in existing areas shall match existing jacketing.
- B. Exterior: Apply aluminum jacketing to all external piping that is insulated. Cover all fittings, valves, and specialties with aluminum jacketing.
- C. Apply metal jacket where indicated, with 2" overlap at longitudinal seams and end joints. Secure jacket with aluminum bands or sheet metal screws on 12" centers and at end joints. On piping exposed to the weather, overlap longitudinal seams arranged to shed water and seal end joints with weatherproof mastic.
- D. Apply PVC jacketing where indicated, with 2" overlap at longitudinal seams and at fitting covers, the maximum the cover allows. Seal longitudinal seams by joining with PVC welding solvent. Seal circumferential ends with 1½" PVC tape.

3.11 GENERAL APPLICATION REQUIREMENTS – DUCTWORK & PLENUMS

- A. Insulate the following plenums and duct systems:
 - 1. Indoor concealed and exposed supply-, return-, and outside-air ductwork.
 - 2. Outdoor exposed supply and return ductwork.
 - 3. Boiler breeching and connector ductwork.
- B. Items Not Insulated: Unless otherwise indicated, do not apply insulation to the following systems, materials, and equipment:
 - 1. Fibrous-glass ducts.
 - 2. Interior metal ducts with duct liner.
 - 3. Factory-insulated flexible ducts.
 - 4. Factory-insulated plenums, casing, terminal boxes, and filter boxes and sections.

5. Flexible connectors.
6. Vibration-control devices.
7. Testing agency labels and stamps.
8. Nameplates and data plates.
9. Access panels and doors in air-distribution systems.

3.12 GENERAL APPLICATION REQUIREMENTS – EQUIPMENT

- A. Hot Water Converters, Chilled Water Heat Exchangers, Chilled Water Chemical Feeders, Hot Water Storage Tanks, Condensate Receivers, Flash Tanks, Separators and Blow-Off Tanks (unless furnished with factory-insulation equal to the following):
 1. Insulate with 1½" fiberglass preformed pipe or "pipe and tank" insulation. Secure insulation with banding on vessels 3 foot in diameter and larger. Finish with aluminum jacketing and secure with metal bands or sheet metal screws. Secure jacketing with stainless steel banding on vessels 6 foot in diameter and larger.
- B. Steam Condensate Pumps (unless factory insulated jacket is provided with pump): Insulate with a removable, reusable custom fit cover manufactured from Teflon-impregnated cloth with double sewn and binded seams and 1" thick fiberglass. Suitable for continuous temperatures to 500°F.
- C. Chilled Water and Process Chilled Water Pumps (Operating at 45°F or less or as indicated on the Drawings):
 1. Base Mounted and In-Line Pumps: Insulate with 1" Armaflex applied with adhesive to the casing and piping of the pumps.
- D. Roof and Overflow Drains:
 1. Wrap roof drain sump with 1½" thick fiberglass blanket and cover with a pre-molded PVC cover.

3.13 FINISHES

- A. Paint insulation in finished or occupied spaces.
- B. Flexible Elastomeric Thermal Insulation: After the adhesive has fully cured, apply two coats of the insulation manufacturer's recommended protective coating.

3.14 STENCILING

- A. Stencil or mark flow direction and type of piping at 20-foot intervals.
- B. Existing or Newly Installed Insulation Repair:
 1. Repair damaged sections of existing or newly installed mechanical insulation whether previously damaged or damaged during this construction period. Use insulation of same thickness as existing insulation, install new jacket lapping and seal over existing.
 2. Replace damaged insulation which cannot be repaired satisfactorily.

C. Insulation Thickness Schedule:

1. See Contract Drawings for Insulation Thickness Schedule.

END OF SECTION 23 07 00

DIVISION 23 HEATING, VENTILATING AND AIR CONDITIONING

SECTION 23 31 00 – HVAC DUCTS AND CASINGS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Provide a complete, operating, tested, functioning, documented ductwork system including all work shown, specified, or required for proper system operation.
- B. Galvanized steel ductwork for supply air, return air, outside air, and general building exhaust air.
- C. Double-wall, round spiral ductwork for exposed ductwork unless stated or shown otherwise on the Mechanical Plans.
- D. Duct Shop Drawings and Coordination Drawings.
- E. Manual Dampers.
- F. Ductwork accessories include duct hardware, dampers, duct access doors and turning vanes.
- G. Provide duct sound lining.

1.02 REFERENCES

- A. Applicable provisions of the following Codes and Trade Standard Publications shall apply to the work of this Section, and are hereby incorporated into, and made a part of the Contract Documents.
- B. Material standards shall be as specified or detailed hereinafter and as follows:
 - 1. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.
 - 2. NFPA 90B - Installation of Warm Air Heating and Air Conditioning Systems.
 - 3. SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual.
 - 4. SMACNA (DCS) - HVAC Duct Construction Standards - Metal and Flexible.
 - 5. UL 181 - Factory-Made Air Ducts and Connectors.
 - 6. ASTM A 653/A 653M - Standard Specification for Steel Sheets, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.

1.03 SUBMITTALS

- A. See Division 1 for Additional Requirements.
- B. Product Data: Provide data for duct materials, duct connectors and all accessories. Include sound attenuator test data in accordance with ASTM E477.

- C. The Sheet Metal Contractor shall submit duct fabrication standards and methods of installation, in compliance with SMACNA and these Specifications, for review and approval by the Engineer, clearly indicating the combination of metal gauges and reinforcement intended for use for each pressure classification. Duct fabrication shall not be allowed until a satisfactory review of this Standard has been performed, and fabrication drawings have been reviewed and coordinated. MERELY SUBMITTING COPIES OF THE SMACNA PRESSURE CLASS TABLES DOES NOT COMPLY WITH THIS REQUIREMENT.
- D. Provide scaled ductwork coordination drawings for all floors and systems in accordance with Section 23 05 01 - HVAC Coordination Drawing Requirements.
- E. Manufacturer's Installation Instructions: Indicate special procedures for glass fiber ducts.
- F. Manufacturer's Certificate: Certify that installation of glass fiber ductwork meets or exceeds recommended fabrication and installation requirements.
- G. Project Record Documents: Record actual locations of ducts, duct fittings and all accessories. Record changes in fitting location and type. Show additional fittings used.
- H. Diffusers and grilles submittals shall indicate airflow rate (cfm), throw length to 50 fpm, blow pattern, and NC values for each individual diffuser or grille.

1.04 QUALITY ASSURANCE

- A. All ducts and fittings shall be manufactured by a sheet metal fabrication company whose primary business experience is the manufacture of commercial and industrial quality ducts and fittings.
- B. Sheet Metal Contractor shall have adequate experience of building ductwork of the types required for this Project as well as successful experience with projects of similar scope. Bids from sheet metal shops which do not meet the specified requirements shall not be acceptable.

1.05 ENVIRONMENTAL REQUIREMENTS

- A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
- B. Maintain temperatures within acceptable range during and after installation of duct sealants, including throughout the full curing time.

PART 2 - PRODUCTS

2.01 GALVANIZED STEEL DUCTWORK

- A. Galvanized steel duct fabricated from quality zinc coated galvanized sheet steel, of lock forming quality.
- B. Shop fabricated according to the current edition of the SMACNA HVAC duct construction standards for 2" w.g. duct pressures minimum. See Drawings for additional requirements.
- C. All supply, return, and general exhaust ductwork shall be sealed with Hardcast Aluma-Grip AFT-701 brand duct sealant. Seal all joints, seams, connections, transverse joints, longitudinal joints, both field and shop formed joints. Also, apply all connections to equipment, diffusers, and flex joint connector joint to the rigid duct.

2.02 SOUND LININGS

- A. Fiberglass sound lining, where noted or scheduled on Drawings or listed in Part 3 of this Section.
- B. Minimum Thickness:
 - 1. In ductwork: 1".
 - 2. In plenums: 1½".
- C. Flamespread Rating: 25.
- D. Smoke Developed Rating: 50.
- E. Suitable for Duct Velocity of 6,000 fpm.
- F. Thermal Conductivity: 0.24 BTU in/hr/sf/°F.
- G. Noise Reduction Coefficient for 1" Thickness: 0.70.
- H. Basis of Design: Johns Manville Linacoustic RC.

2.03 NON-HARDENING CAULKING

- A. Guaranteed to be permanently elastic.
- B. Similar to Tremco Polybutene.

2.04 MANUAL DAMPERS

- A. Provide volume dampers on all terminal duct branches upstream of a diffuser, register or grille. Volume dampers shall have elevated locking dials to clear duct insulation. Damper quadrant lock shall be Rossi Ever-Lock, Rossi Twistlock, or approved equal. Dampers shall be a minimum of 1-gauge heavier than the ductwork. Single blade dampers shall have axles with synthetic bearings.
- B. Volume dampers with any dimension greater than 16" shall be multi-blade dampers. This applies to supply, return, and exhaust air duct systems.

2.05 DOUBLE-WALL ROUND DUCT

- A. Double-wall round duct shall be provided with perforated inner liner surrounded by a layer of sound lining and covered by a solid outer shell.
 - 1. Inner liner shall be a minimum of 24 gauge with 3/32" diameter perforations staggered on 3/16" centers.
 - 2. Liner shall be as per Part 2.04.
 - 3. Outer shell shall be as per Part 2.14.

2.06 MOTORIZED DAMPERS

- A. Motorized dampers to be Tamco Series 9000 or equivalent. Dampers shall be of airfoil design and galvanized construction; they shall either parallel or opposed blade type with metal compressible jamb seals and extrude vinyl blade edge seals on all blades. Blades shall rotate on stainless steel sleeve bearings. Maximum damper blade length shall be 60". Leakage rate shall not exceed 8 cfm/square foot at 1" w.g. and 12 cfm/square foot at 4" w.g.

2.07 TURNING VANES

- A. Shop fabricated or factory fabricated turning vanes. Vanes shall be welded to the vane runner.
- B. Special continuous vane elbows shall be shop fabricated according to the dimensions and details shown on the plans for discharge elbows.

2.08 DUCT ACCESS DOORS

- A. Provide an access door for all control dampers, fire dampers, smoke dampers and combination fire/smoke dampers.
- B. Door construction shall be die formed of minimum 22 ga. galvanized steel ultra-low leakage flat oval doors with camlock fasteners, and safety chain. Access doors for supply air, outdoor air, and below ambient duct systems shall be double wall insulated, min. 1" thick. Access doors shall be 18" x 10" where duct size permits. For smaller ducts, provide the next smaller size available. Install in accessible locations only. Bulb type seal shall be integrally fastened to door.
- C. Frame construction shall be die formed of minimum 22 ga. galvanized steel.
- D. Allowable leakage maximum 0.133 cfm for 18" x 10" at 8" w.g.
- E. Make: Nailor Industries Ultra Low Leakage Access Doors, Model 0800 flat oval.

2.09 DUCT FLEXIBLE CONNECTION

- A. Provide flexible connection of 4" minimum fabric width:
 - 1. Between ductwork and the inlets and outlets of all fans except those listed below. For the fans listed below, provide a flexible inlet connector and a rigid/sealed outlet connection.
 - a. Hazardous exhaust.
 - 2. Equipment equipped with fans.
 - 3. All ductwork that crosses building expansion joints, as identified on the Architectural and Structural Drawings.
- B. The connections shall be placed as close to the equipment as practical except at fan suction connections and the clear gap at rest shall be not less than 3". At fan suction connections, locate flexible duct connection at least three (3) duct diameters away from fan inlet connection.
- C. There shall be no tension of the fabric under static or dynamic loads.

- D. All fabric for flexible duct connections to equipment shall be a minimum of 22 oz. Glass fabric, double coated with neoprene, fire retardant, waterproof, airtight, and approved UL, similar to Ventfabrics or Ventglass.
- E. Exterior flexible connection shall be an insulated type similar to Duro Dyne.
- F. Flexible connections shall be fabricated from approved flameproofed fabric conforming to NFPA 90A. Asbestos shall not be acceptable.
- G. Flexible connections shall be installed further upstream from fan powered equipment (in the main duct size) to prevent obstruction of the fan inlet due to suction of the fabric into the airstream.
- H. Ductwork shall be increased in size where the flexible connections are located to prevent fully drawn in connections from blocking any duct area. Submit detail for review.

2.10 DIFFUSERS AND GRILLES

- A. Diffusers and grilles as scheduled on the Plans with minimum performance noted.

2.11 DUCT SHOP DRAWINGS

- A. Duct Coordination Shop Drawings shall be provided for this project. Shop Drawings shall be $\frac{3}{8}$ " scale. Engineer shall provide $\frac{3}{8}$ " scale base plan produced from contract drawing. Sheet metal contractor shall field verify and dimensions and create new $\frac{3}{8}$ " plan using Engineer's plan and Contractor's field verification data.

2.12 SPIRAL DUCT

- A. Materials:
 - 1. Unless otherwise specified, all spiral duct and fittings shall be a minimum of G-60 galvanized sheet metal in accordance with ASTM A653 and A924 specifications. Gauges are to be in accordance with current SMACNA standards (Reference 1.1.3).
- B. Construction: Spiral duct shall be round spiral lock seam construction, of gauges in accordance with SMACNA guidelines. Duct shall be continuous unjoined lengths.
- C. Fittings shall be fabricated standing seam sealed fittings. Elbows shall be gored with 1.5 bend radius. Diverging flow fittings shall be constructed with a radiused entrance to branch taps. All taps shall be made with factory fabricated fittings. All fittings on the lined insulated duct shall be lined and insulated.
- D. Access doors on spiral ductwork shall be bolted access doors.

2.13 DUCT ACCESS PLATES

- A. Fixed removable screwed plates with gasket.

2.14 ROLLED MASTIC DUCT SEALANT

- A. Premium quality indoor/outdoor heavy duty pressure sensitive duct joint rolled sealer "Gray Matter" butyl adhesive / sealant. Aluminum backed, 30 mil thick modified butyl adhesive / sealant, peel strength >10 lbs. per linear inch. 720 psi tensile strength with 560% elongation, 24 hour full bonding time.

- B. Service temperature: –20°F to 180°F.
- C. Application temperature: 35°F to 110°F.
- D. Mold and mildew resistant.
- E. Surface Burning Characteristics:
 - 1. Flamespread: 25.
 - 2. Smoke Developed: 50.
- F. SMACNA pressure Classes ½, 1, 2, 3, 4, 6 and 10" w.g.
- G. Seal Classes SMACNA A, B, C.
- H. Manufacturer: Carlisle, "Hardcast Aluma-Grip AFT-701".

PART 3 - EXECUTION

3.01 SEALING

- A. Seal all ductwork as it is being assembled. Seal all joints - longitudinal and transverse. Seal all joints with equipment with flex connectors.
- B. Seal all ductwork to SMACNA seal Class "A".

3.02 DUCT HANGER AND SUPPORTS

- A. Provide suitable angle iron/strap hangers and supports inside the mechanical shafts, mechanical rooms and in ceilings of the buildings, and on the roof(s) as shown on the Drawings (Architectural/HVAC). This work shall be performed as required by job conditions as instructed by the Architect in the field to support all air distribution ductwork and devices in both horizontal and vertical planes.
- B. When hanging and supporting the ductwork, the following shall be complied with:
 - 1. Except as otherwise note, ductwork up to 42" in greatest dimension shall be hung by using sheet metal bands secured as a minimum at two locations to the vertical sides of the ductwork and at one location under the duct. All support systems shall be compatible with the building structure and roofing system as approved by the Architect.
 - 2. Where ductwork major axis dimension is larger than 42", ductwork shall be hung by using threaded rods of not less than 3/8" soft steel secured to angle iron trapeze support frame around ductwork with threaded nuts for securement and adjustment.
 - 3. Ductwork shall be securely attached to the building construction. The hanger design and spacing shall be governed by the major duct dimension and shall be in accordance with SMACNA Duct Manual, except as modified hereinbefore. Vertical ductwork shall be supported at each floor level in an approved manner using angles or channels attached to the ducts. The installation, when complete and under operating condition, shall be free from chatter or vibration. If necessary to achieve this, additional support and/or bracing shall be furnished without extra cost to the Owner. Supports and bars and similar items shall be primed and painted structural steel. Touch up with aluminum paint on any surface where galvanizing is destroyed on indoor ductwork, zinc primer on exposed ductwork with a final coat of aluminum paint. Provide vibration isolation hangers specified under Vibration Isolation Section 23 83 00 of these Specifications.

4. The Sheet Metal Contractor shall provide all supplemental steel required to support the ductwork in shafts, mechanical rooms or on the floor where structural steel is not properly positioned. Beam clamps shall be double sided.
5. The maximum hanger spacing shall be 10'-0" on centers and additionally on each side of an elbow or change-in-direction fitting.

3.03 DUCTWORK PROTECTION DURING CONSTRUCTION

- A. Provide temporary polyethylene film seal end cap for HVAC openings to prevent contamination of the HVAC ductwork interior prior to start-up of the HVAC system.
- B. On duct sizes 6" in diameter to 14" in diameter or 16 to 47 linear inches for square or rectangular ducts, the polyethylene film seal shall be capable of extending at least 8" beyond the opening of the duct and shall be attached to the duct by means of an elastic band sewn around the circumference of the film seal. The polyethylene film shall be a minimum of 2 mil (0.002") thickness and the elastic band shall be a minimum of 1/4" thick.
- C. On duct sizes 14" in diameter to 38" in diameter or 48 to 119 linear inches for square or rectangular ducts, the polyethylene film seal shall be capable of extending at least 12" beyond the opening of the duct and shall be attached to the duct by means of an elastic band sewn around the circumference of the film seal. The polyethylene film shall be a minimum of 2.5 mil (0.0025") thickness and the elastic band shall be a minimum of 3/8" thick.
- D. Make: Ductcap Products Inc.

3.04 DUCT CLEANING

- A. Clean dust and debris from the interior and exterior of all new ducts using wet rags and vacuums.
- B. Cover the open ends of ductwork when installation does not proceed for more than one day. This requirement shall apply to each individual run of duct, such that no duct section shall remain open or unconnected for more than 8 hours.

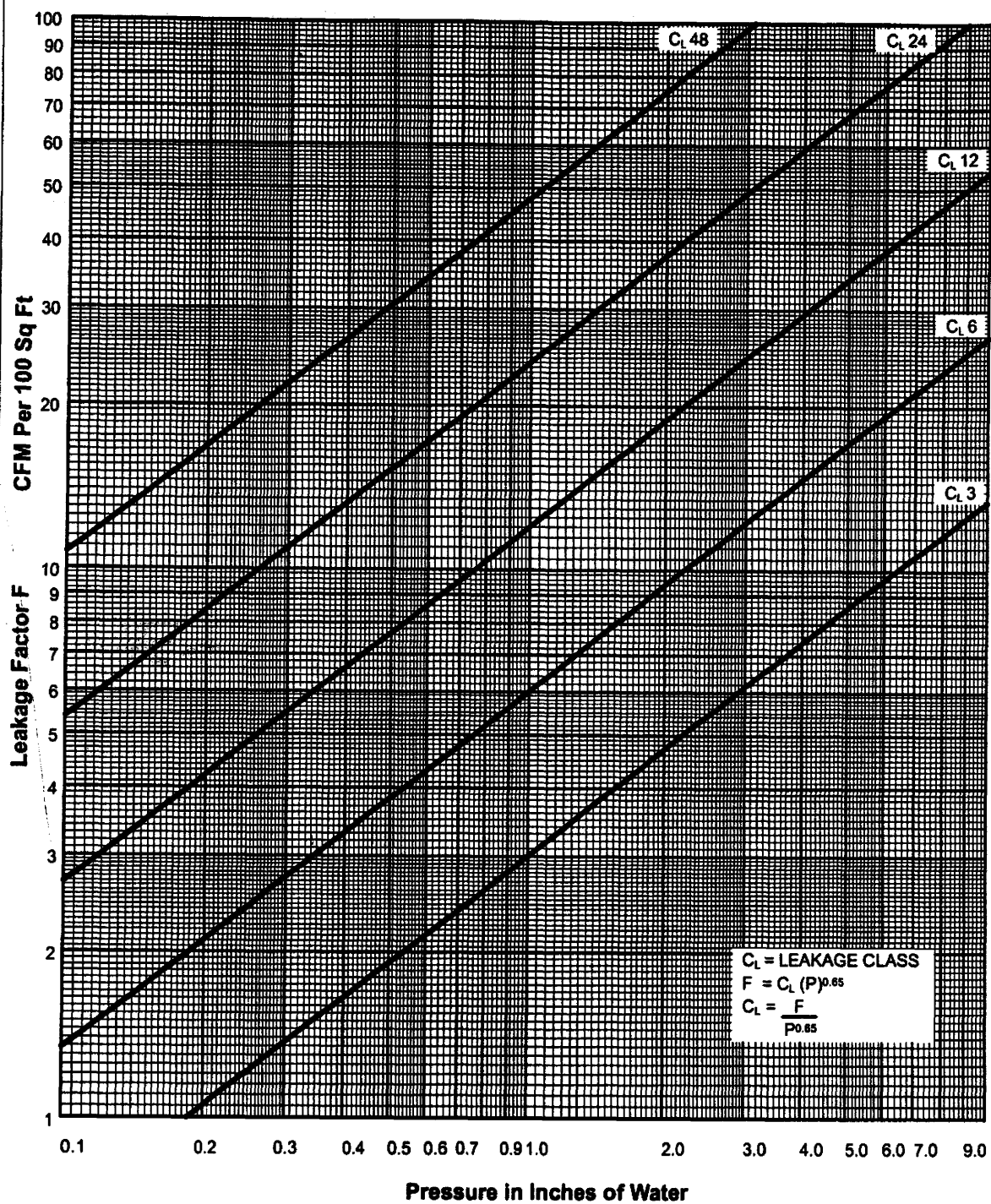
3.05 SOUND LININGS

- A. Adhere the duct liner to duct wall with full coverage of adhesive conforming to ASTM C919.
- B. Secure Insulation with mechanical fasteners per SMACNA, NAIMA or duct liner manufacturers' recommendations. The pin length shall be such as to limit compression of liner.
- C. All exposed edges of duct liner shall be factory or field coated. For systems with air flow in excess of 4000 fpm (20 m/sec) a metal nosing must be installed at all liner leading edges.
- D. Repair all unprotected penetrations, tears, and rips in the surface of the liner with liner adhesive meeting ASTM C919 or Johns Manville Superseal or provide continuous sheetmetal edge protectors at entering and leaving edges of lined duct sections.
- E. Dimensions of lined ductwork are clear inside dimensions after lining has been installed.
- F. Extent of ductwork sound linings shall be as indicated on the Drawings.

3.06 SOUNDPROOF CONSTRUCTION FOR DUCT PENETRATIONS

- A. Required for openings between ductwork and equipment room walls, also floors (except in shafts).
- B. Soundproofing: Pack openings with fibrous glass blanket or board for full depth of penetration and caulk each side of opening with non-hardening, non-aging caulking compound.

END OF SECTION 23 31 00



SEE TABLE 4-1 FOR ASSOCIATED DUCT CONSTRUCTION CLASS
 SEE APPENDIX E FOR TABULAR FORM OF FIGURE 4-1

FIGURE 4-1 DUCT LEAKAGE CLASSIFICATION

DUCT CLASS	½", 1", 2" wg	3" wg	4", 6", 10" wg
SEAL CLASS	C	B	A
SEALING APPLICABLE	TRANSVERSE JOINTS ONLY	TRANSVERSE JOINTS AND SEAMS	JOINTS, SEAMS AND ALL WALL PENETRATIONS
LEAKAGE CLASS			
RECTANGULAR METAL	24	12	6
ROUND METAL	12	6	3

Table 4-1 Applicable Leakage Classes

NOTES:

1. Leakage classes in Table 4-1 apply when the designer does not designate other limits and has specified Seal Class C for ½" and 1" wg. See text on sealing in the HVAC-DCS manual.
2. Unsealed rectangular metal duct may follow Leakage Class 48.
3. Fibrous glass duct may follow Leakage Class 6 (at 2" wg or less).
4. Unsealed flexible duct leakage average is estimated to be Class 30. Sealed nonmetal flexible duct is an average of Class 12.
5. See SMACNA *HVAC Duct Systems Design Manual* Table 5-1 for longitudinal seam leakage rates.
6. Although Seal Class A or B might be assigned for lower pressures, the leakage class may not conform to those associated with the higher pressure. Other construction details influence results.
7. Leakage Class (C_L) is defined as being the leakage rate (cfm/100 s.f.) divided by $P^{0.65}$ where P is the static pressure (in wg). When P is numerically equal to 1" the leakage rate is C_L . See Figure 4-1.
8. The duct pressure classification is not the fan static pressure nor the external static pressure (on an HVAC unit) unless the system designer has made such an assignment in his contract documents. Unless construction class is otherwise specified it means a static pressure classification in the SMACNA HVAC-DCS. Those classifications pertain to maximum operating pressure in the duct as follows:
 - 0.5" wg maximum
 - 0.6" to 2" wg maximum
 - 1.1" to 2" wg maximum
 - 2.1" to 3" wg maximum
 - 3.1" to 4" wg maximum
 - 4.1" to 6" wg maximum
 - 6.1" to 10" wg maximum

DIVISION 23 HEATING, VENTILATING AND AIR CONDITIONING

SECTION 23 37 00 - HVAC AIR INLETS & OUTLETS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections apply to this Section.

1.02 SUMMARY

- A. This Section includes requirements for HVAC air inlets and outlets.

1.03 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in the manufacture of air outlets and inlets of types and capacities required, whose products have been in satisfactory use in similar service for not less than five (5) years.
- B. Codes and Standards:
 - 1. Test and rate air outlets and inlets in accordance with American Refrigeration Institute (ARI) 650 "Standard for Air Outlets and Inlets".
 - 2. Test and rate air outlets and inlets in accordance with American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) 70 "Method of Testing for Rating the Air Flow Performance of Outlets and Inlets".
 - 3. Test and rate air outlets and inlets in certified laboratories under requirements of Air Diffusion Council (ADC) 1062 "Certification, Rating and Test Manual".
 - 4. Provide air outlets and inlets bearing ADC Certified Rating Seal.
 - 5. Install air outlets and inlets in accordance with National Fire Protection Association (NFPA) 90A "Standard for the Installation of Air Conditioning and Ventilating Systems".

1.04 REFERENCES

- A. ADC 1062, Certification, Rating and Test Manual.
- B. AMCA 500, Test Method for Louvers, Dampers and Shutters.
- C. ARI 650, Standard for Air Outlets, and Inlets.
- D. ASHRAE 70, Method of Testing for Rating the Air Flow Performance of Outlets and Inlets.
- E. American Society for Testing and Materials (ASTM) B 221.
- F. NFPA 90A, Standard for the Installation of Air Conditioning and Ventilating Systems.

1.05 SUBMITTALS

- A. Submit manufacturer's technical product data for air outlets and inlets including the following:

1. Schedule of air outlets and inlets indicating drawing designation, room location, number furnished, model number, size, and accessories furnished.
2. Data sheet for each type of air outlet and inlet, and accessory furnished; indicating construction, finish, and mounting details.
3. Indicate for each unit the neck size, neck velocity, noise criteria (NC) value with accessories installed and at the applied airflow and the throw to 50 fpm terminal velocity.

B. Submit samples of each type of finish furnished.

C. Submit maintenance data, including cleaning instructions for finishes, and spare parts lists. Include this data, product data, and shop drawings in maintenance manuals.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver air outlets and inlets wrapped in factory-fabricated fiber-board type containers. Identify on outside of container type of outlet or inlet and location to be installed. Avoid crushing or bending and prevent dirt and debris from entering and settling in devices.
- B. Store air outlets and inlets in original cartons and protect from weather and construction work traffic. Where possible, store indoors; when necessary to store outdoors, store above grade and enclose with waterproof wrapping.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Provide diffusers of one of the following:

1. Anemostat Products Div.; Dynamics Corp. of America.
2. Krueger Mfg. Co.
3. Titus HVAC.
4. Price Industries, Inc.
5. Greenheck Fan Corporation.

B. Provide registers and grilles of one of the following:

1. Anemostat Products Div.; Dynamics Corp. of America.
2. Krueger Mfg. Co.
3. Titus HVAC.
4. Price Industries, Inc.
5. Greenheck Fan Corporation.

2.02 CEILING AIR DIFFUSERS

- A. General: Except as otherwise indicated, provide manufacturer's standard ceiling air diffusers where shown; of size, shape, capacity, and type indicated; constructed of materials and components as indicated, and as required for complete installation.
- B. Performance: Provide ceiling air diffusers that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device as listed in manufacturer's current data.

- C. Ceiling Compatibility: Provide diffusers with border styles that are compatible with adjacent ceiling systems, and that are specifically manufactured to fit into ceiling module with accurate fit and adequate support. Refer to general construction drawings and specifications for types of ceiling systems which will contain each type of ceiling air diffuser.
- D. Types: Provide ceiling diffusers of type, capacity, and with accessories and finishes as listed on diffuser schedule. The following requirements shall apply to the nomenclature indicated on schedule:
1. Diffuser Faces:
 - a. Square: Square housing, core of square concentric louvers, square or round duct connection.
 - b. Linear Slot: Extruded aluminum continuous slot, single or multiple.
 - c. Linear Bar: Extruded aluminum with fixed deflection bars parallel to the long dimension.
 2. Diffuser Mountings:
 - a. Flush: Diffuser housing above ceiling surface with flush perimeter flange and gasket to seal against ceiling.
 - b. Lay-In: Diffuser housing sized to fit between ceiling exposed suspension tee bars and rest on top surface of tee bar.
 3. Diffuser Patterns:
 - a. Adjustable linear: Manual adjustable core with concentric rings or louvers, fully adjustable for horizontal to vertical air flow and fully adjustable for 1- or 2-direction flow as indicated on drawings.
 - b. 1 Way: Fixed louver face for 1-direction air flow, direction indicated on Drawings.
 - c. 2 Way: Fixed louver face for 2-direction air flow, directions indicated on Drawings.
 - d. 3 Way: Fixed louver face for 3-direction air flow, directions indicated on Drawings.
 - e. 4 Way: Fixed louver face for 4-direction air flow, directions indicated on Drawings.
 4. Diffuser Dampers:
 - a. Diffuser dampers shall not be provided. It is a requirement of this project that upstream duct volume dampers be provided. Only provide diffuser mounted dampers where specifically indicated on the Drawings.
 5. Diffuser Accessories:
 - a. Equalizing grid: Provide for all ceiling diffusers.
 6. Diffuser Finishes:
 - a. Finishes shall be as indicated on the Drawings.
 - b. If the finish is not specified, the default finish shall be White Enamel: Semi-gloss white enamel finish.
 - c. The Contractor is responsible for verifying all finish and color selections with the Architect prior to order of material.

2.03 GRILLES

- A. General: Except as otherwise indicated, provide manufacturer's standard grilles where shown; of size, shape, capacity, and type indicated; constructed of materials and components as indicated, and as required for complete installation.
- B. Performance: Provide grilles that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device and listed in manufacturer's current data.
- C. Provide grilles with border styles that are compatible with adjacent wall or ceiling systems, and that are specifically manufactured to fit into construction with accurate fit and adequate support. Refer to general construction drawings and specifications for types of construction which will contain each type of grille.
- D. Types: Provide grilles of type, capacity, and with accessories and finishes as listed on air distribution schedule. The following requirements shall apply to the nomenclature indicated on schedule:
 - 1. Materials:
 - a. Aluminum Construction: Manufacturer's standard extruded aluminum frame and adjustable blades.
 - 2. Grille Faces:
 - a. Horizontal Straight Blades: Horizontal blades, individually adjustable or fixed, at manufacturer's standard spacing. See Drawings.
 - b. Vertically Straight Blades: Vertical blades, individually adjustable or fixed, at manufacturer's standard spacing. See Drawings.
 - c. Eggcrate Blades: Eggcrate grilles at manufacturer's standard spacing.
 - 3. Grille Dampers:
 - a. Opposed Blade: Adjustable opposed blade damper assembly, key operated from face of register.
 - 4. Grille Accessories:
 - a. Operating Keys: Tools designed to fit through register or grille face and operate volume control device.
 - 5. Grille Finishes:
 - a. Finishes shall be as indicated on the Drawings.
 - b. If the finish is not specified, the default finish shall be White Enamel: Semi-gloss white enamel finish.
 - c. The Contractor is responsible for verifying all finish and color selections with the Architect prior to order of material.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Inspect areas and conditions under which air outlets and inlets are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION/APPLICATION/ERECTION

- A. General: Install air outlets and inlets in accordance with the manufacturer's written instructions and in accordance with recognized industry practices to ensure that products serve the intended function.
- B. Coordinate with other work, including ductwork and duct accessories, as necessary to interface installation of air outlets and inlets with other work.
- C. Locate ceiling air diffusers, registers, and grilles, as indicated on general construction "Reflected Ceiling Plans". Locate units as shown on drawings.

3.03 ACCEPTABLE CRITERIA

- A. HVAC air inlets and outlets shall be clean, undamaged, with no visible rivet marks, scratches, or blemishes. Blades shall be rigid and not loose. No rattles shall be observed.
- B. Mountings shall be clean to adjacent construction with uniform edge to adjacent surfaces.

END OF SECTION 23 37 00

DIVISION 23 HEATING, VENTILATING AND AIR CONDITIONING

SECTION 23 62 00 – SPLIT SYSTEM AIR CONDITIONERS

PART 1 - GENERAL

1.01 SUMMARY

- A. The Contract Drawings and the General Provisions of the Contract, including the General Conditions of the Contract for Construction, Supplementary Conditions, Special Conditions and Division 1 Specification Sections apply to the work of this Section.
- B. The Work of Section 23 05 00 - HVAC Basic Materials and Methods applies to the Work of this Section.

1.02 WORK INCLUDED

- A. Furnish and install one (1) complete DX Cooling System, including evaporator unit, condenser unit, refrigerant piping, valves, and specialties.
- B. 6-year compressor warranty.
- C. Cooling performance shall be as scheduled.

1.03 SUBMITTALS

- A. Provide submittals for:
 - 1. DX cooling system.
 - 2. Refrigerants.

PART 2 - PRODUCTS

2.01 EVAPORATOR UNIT

- A. General:
 - 1. The indoor unit shall be wall or ceiling mounted as scheduled by means of a factory supplied mounting plate. Unit shall be formed from high strength molded plastic with front panel access.
 - 2. The evaporator unit shall be factory assembled, wired, and run tested. Contained within the unit shall be all factory wiring, internal piping, control circuit board and fan motor.
 - 3. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, an emergency operation function, and a test run switch.
 - 4. Indoor unit and refrigerant pipes shall be purged with nitrogen before shipment from the factory.
- B. Unit Cabinet:
 - 1. The casing shall have a white finish.
 - 2. Multi-directional drain and refrigerant piping offering four (4) directions for refrigerant piping and two (2) directions for draining shall be standard.
 - 3. There shall be a separate installation plate which secures the unit firmly to the wall.
- C. Fan:

1. The evaporator unit fan shall be an assembly with a DWDI, forward curve direct driven by a single motor.
2. The fan shall be statically and dynamically balanced and run on a motor with permanently lubricated bearings.
3. A manual adjustable vertical guide vane shall be provided with the ability to change the airflow from side to side (left to right).
4. An integral, motorized air sweep flow louver shall provide an automatic change in airflow by directing the air up and down to provide for uniform air distribution.
5. The indoor air unit fan motor shall operate in four (4) selectable speeds, Low, Medium 1, Medium 2, and High.

D. Filter:

1. Return air shall be filtered by an easily removable air filter and an anti-allergy enzyme filter - blue bellows type.

E. Coil:

1. The evaporator coil shall be of nonferrous construction with smooth, pre-coated aluminum fins on copper tubing.
2. Tubing shall have inner grooves for high efficiency heat exchange.
3. All tube joints shall be brazed.
4. The coil shall be pressure tested at the factory.
5. A sloped condensate pan and drain with extension hose shall be provided under the coil.

F. Electrical:

1. The electrical power of the unit, supplied from the condensing unit shall be as scheduled.
2. The unit shall be equipped with a microprocessor control system directing indoor and outdoor unit with coordinated operation by two polarity sensitive control wires.
3. The indoor unit shall not have any supplemental electrical heat elements.

G. Control:

1. The evaporator unit shall be connected to a wall-mounted wired controller to perform input functions necessary to operate the system. The wired controller shall have a large multi-language DOT liquid crystal display (LCD). The controller shall consist of an On/Off button, Increase/Decrease Set Temperature buttons, a Cool/Dry/Fan mode selector, a Timer Menu button, a Timer On/Off button, Set Time buttons, a Fan Speed selector, a Vane Position selector, a Louver Swing button, a Ventilation button, a Test Run button, and a Check Mode button. The controller shall have a built-in temperature sensor. Temperature shall be displayed in Fahrenheit (°F). Temperature changes shall be by increments of 1°F with a range of 67°F to 87°F.
2. The wired controller shall display operating conditions such as set temperature, room temperature, pipe temperatures (i.e., liquid, discharge, indoor and outdoor), compressor operating conditions (including running current, frequency, input voltage, On/Off status, and operating time), LEV opening pulses, sub cooling and discharge super heat.
3. Normal operation of the wired controller shall provide individual system control in which one wired controller and one indoor unit are installed in the same room.
4. The control voltage from the wired controller to the indoor unit shall be 12 volts, DC. The control signal between the indoor and outdoor unit shall be pulse signal 24 volts DC.

5. The control system shall control the continued operation of the air sweep louvers, as well as provide On/Off and mode switching. The controller shall have the capability to provide sequential starting with up to fifty seconds' delay.
6. The system shall provide automatic restart when power is restored after power interruption.

H. Refrigerant:

1. Refrigerant shall be R-410a.

2.02 CONDENSING UNIT

A. General:

1. The condensing unit shall be designed specifically for use with the evaporator unit. These units are equipped with a circuit board that interfaces to the evaporator. The condensing unit shall be completely factory assembled, internally piped, and wired. Each unit shall be run tested at the factory.

B. Unit Cabinet:

1. The casing shall be fabricated from zinc coated steel, bonderized with an electrostatically applied, thermally bonded, acrylic, or polyester powder coating for corrosion protection.
2. Case and mounting feet shall be as follows: Base shall be of aluminum-zinc-magnesium alloy coated steel, with welded mounting feet.

C. Fan:

1. The unit shall be furnished with a direct drive propeller type fan, statically and dynamically balanced for smooth and quiet operation.
2. The fan motor shall have inherent protection, be equipped with permanently lubricated bearings. The fan motor shall be mounted and isolated for quiet operation.
3. The fan shall be provided with a raised guard to prevent contact with moving parts.
4. The condensing unit shall have horizontal discharge airflow.

D. Coil:

1. The condensing coil shall be of nonferrous construction with pre-coated aluminum strake fins on copper tubing.
2. The coil shall be protected with an integral metal guard.
3. Refrigerant flow from the condenser shall be controlled by means of a metering orifice of the linear expansion valve (LEV) type.

E. Compressor:

1. The compressor shall be a DC rotary compressor with variable compressor speed inverter technology.
2. Compressor shall be mounted using rubber isolating bushings to avoid the transmission of vibration.
3. Compressor shall be protected by an automatic over current relay and a thermal overload switch.
4. Outdoor unit shall include an accumulator and high pressure safety switch.

F. Connections:

1. The condensing unit must have the ability to operate with a maximum height difference of 35 feet to the evaporator.
2. The unit shall have a maximum refrigerant tubing length of 100 feet to the evaporator without the need for line size changes, traps, or additional oil.
3. The unit shall be pre-charged for a maximum of 70 feet of refrigerant tubing.
4. Provide additional refrigerant as required for longer refrigerant line lengths.

G. Electrical:

1. The electrical power of the system shall be as scheduled.

2.03 MANUFACTURER & MODEL

- A. As scheduled on the Plans.

PART 3 - EXECUTION

3.01 GENERAL

- A. Install system in strict conformance with manufacturers printed installation instructions.
- B. Follow latest EDA guidelines regarding refrigerant recovery.

3.02 NEW REFRIGERANT LINE INSTALLATIONS

- A. Flow Nitrogen through lines prior to and during brazing.
- B. Soap test lines at 150 psig nitrogen pressure.
- C. A triple evacuation system. First and second evacuation to 500 microns, breaking vacuum with refrigerant each time. Final evacuation to be to 200 microns. If vacuum cannot be achieved, identify and correct source of leaks.
- D. Start refrigeration system, check system for proper refrigerant charge.
- E. Checkout controls and verify system is operating properly.

END OF SECTION 23 62 00

DIVISION 23 HEATING, VENTILATING AND AIR-CONDITIONING

SECTION 23 84 00 - FIRESTOPPING AND SMOKESTOPPING FOR HVAC SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Specification Section 07 84 13 - Firestop Penetration Systems applies to the work of this Section.

1.02 WORK INCLUDED

- A. Provide firestopping and smokestopping for HVAC Systems to comply with the New York State Building Code Section 714.
- B. Provide submittals and installation detail sheets.
- C. Coordinate products to be used with the General Contractor and other trades to provide one product that will be used by all trades on this project. Submit on this elected product only.

1.03 SUBMITTALS

- A. Provide a schedule of each type of penetration together with the proposed method of protecting that penetration type. Schedule shall include the following details:
 - 1. Penetrated items (e.g., wall, floor, roof).
 - 2. Construction of items (e.g., metal studwall with gypsum wallboard).
 - 3. Fire rating of item (e.g., 1 hour wall).
 - 4. Description of penetrating item (e.g., 1" to 3" Schedule 40 pipe).
 - 5. Identification of penetrating seal to be used in this case (e.g., Rectorseal Biostop pipe collar).
 - 6. UL or FM detail sheet (e.g., per attached example).
 - 7. UL or FM system number (e.g., WL1200).
- B. The submittal shall include complete details for each penetration covered by this Division.
- C. It is intended that the submittal include each detail in full for each system used, so that the installing Contractor has the correct reviewed information in the field.

1.04 QUALITY ASSURANCE

- A. Firestopping Materials: Provide penetration seal assemblies whose fire-resistance ratings have been determined by testing in the configurations required and which have fire-resistance ratings at least as high as that of the fire-rated assembly in which they are to be installed.
 - 1. Comply with all applicable codes including but not limited to:
 - a. American Society of Testing and Materials (ASTM.)
 - b. ASTM E 84 Test Method for Surface Burning Characteristics of Building Materials.

- i. ASTM E 119 Method of Fire Tests of Building Construction Materials.
 - ii. ASTM E 814 Test Method for Fire Tests of Through Penetration Firestops.
 - iii. ASTM C 665 (Corrosion & Microbial Resistance Portions) Standard Specification for Mineral-Fiber Thermal Insulation for Light Frame Construction and Manufactured Housing.
 - iv. ASTM E 90 Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.
2. Listed by Underwriters Laboratories (UL) and /or Factory Mutual Research Corporation for each specific intended application.
 - a. UL Building Materials Directory.
 - b. UL Fire Resistance Directory.
 - c. UL 2079 Test.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Firestopping and smokestopping materials shall allow normal expansion and contraction (intumescent) of the penetrating item without failure of the penetrations seal and shall be heat absorbing (endothermic). Products may not emit hazardous, combustible, or irritating by-products during installation or curing. Products shall not require special tools for installation.

2.02 MASONRY EXEMPTION

- A. The Contractor shall note New York State Building Code Section 714.3.1 Exemption, which states:
 1. Exception: Where the penetrating items are steel, ferrous or copper pipes, tubes or conduits, the annular space between the penetrating item and the fire-resistance-rated wall is permitted to be protected by either of the following measures:
 - a. In concrete or masonry walls where the penetrating item is a maximum 6-inch (152 mm) nominal diameter and the area of the opening through the wall does not exceed 144 square inches (0.0929 m²), concrete, grout or mortar is permitted where installed the full thickness of the wall or the thickness required to maintain the fire-resistance rating.
 - b. The material used to fill the annular space shall prevent the passage of flame and hot gases sufficient to ignite cotton waste when subjected to ASTM E119 or UL 263 time-temperature fire conditions under a minimum positive pressure differential of 0.01 inch (2.49 Pa) of water at the location of the penetration for the time period equivalent to the fire-resistance rating of the construction penetrated.

2.03 MANUFACTURERS

- A. Manufacturers: Provide products complying with requirements of the Contract Documents and made by one of the following:
 1. Rectorseal.
 2. Hilti, Inc.
 3. 3M Fire Protection Products.
 4. Specified Technologies Inc.

5. U.S. Gypsum Company.
6. Johns Manville.
7. BlazeMaster.

2.04 FIRESTOPPING PRODUCTS

A. Provide Firestopping Products which:

1. Provide firestopping systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain fire resistance rating of assembly.
 - a. F-rated systems in accordance with ASTM 814.
 - b. T-rated systems in accordance with ASTM 814.

B. Firestopping Flamespread Performance Requirements:

1. Provide products with flame-spread ratings of less than 25 and smoke-development rating of less than 50 as determined in accordance with ASTM E 84.

C. Firestopping UL Performance Requirements:

1. Provide products with UL ratings specified for assembly indicated as determined in accordance with UL listing.

D. FM approval in lieu of UL shall be accepted by the Owner.

E. Where a specific firestopping product is identified on the Drawings, either that product or a similar product which has been tested in the exact application shown on the drawings shall be employed, after review by the Engineer.

F. Firestop caulk shall be Johns Manville Firetemp CI, Rectorseal Biostop 500+, or approved equal, except where otherwise shown on the drawings.

2.05 SMOKESTOPPING PRODUCTS

A. Provide smokestopping products which:

1. Allow normal expansion and contraction movement of the penetrating item without the failure of the penetration seal.
2. Maintain at least the smoke resistance of the barrier penetrated.
3. Firestop caulk shall be Johns Manville Firetemp CI or approve equal.

PART 3 - EXECUTION

3.01 INSTALLATION AND QUALITY ASSURANCE

A. Install firestopping materials in exact accordance with the manufacturer's instructions and conditions of the testing; provide all accessory materials required.

- B. Provide the services of a factory representative of the fireproofing product to review the installation practices and conduct training of the applications.
- C. The installer shall be trained to perform work.
- D. Inspection: The Authority Having Jurisdiction (AHJ) shall have a final inspection review of all work performed. Contractor shall make modifications to completed and uncompleted work as directed by the AHJ at the Contractor's expense.
- E. Refer to the Certified Installation Instructions sheet on the following page for an example of an acceptable installation method.

3.02 FIRESTOPPING AND SMOKESTOPPING ITEMS

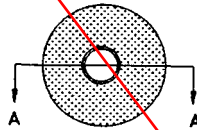
- A. Under Division 23, provide and pay for all firestopping materials, assemblies, and labor to provide complete firestopping and smokestopping.
- B. Provide firestopping of penetrations at each fire-rated floor, wall, or roof assembly of the following components:
 - 1. Ducts provided by Division 23.
 - 2. Insulated pipe provided by Division 23.
 - 3. Uninsulated pipe provided by Division 23.
 - 4. Conduits provided by Division 23.

3.03 FIRE DAMPERS, SMOKE DAMPERS AND COMBINATION FIRE/SMOKE DAMPERS

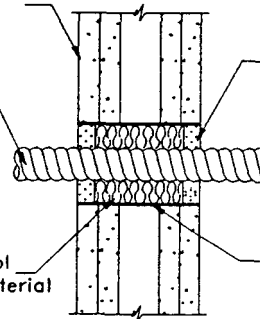
- A. Conform to manufacturer's details and details shown on the Drawings for fire dampers, smoke dampers and combination fire/smoke dampers. Typically, there is a gap of $\frac{1}{8}$ " per foot of damper height or width which is not to be caulked; however, a flange attached to the sleeve covers that opening.

Attachment(s): Example Detail Sheet

END OF SECTION 23 84 00

RECTORSEALSystem No.
WL1200**FIRESTOPS**500+GW-92
Wall Penetration
1, 2 Hr. Rating1 layer of 5/8"
UL Classified
Gypsum Wallboard
for 1 Hr. Rating
or
2 layers of 5/8"
for 2 Hr. RatingMax. 1" Corrugated
Stainless Steel Tubing
(PVC Coated)1/2" depth
Metacaulk® 1000

PLAN

Mineral Wool
Backing MaterialSteel Sleeve/
Wire Mesh

SECTION A-A

EXAMPLE**SYSTEM CONFIGURATION INFORMATION**

PRODUCT(S)			PENETRATING ITEM(S)			HOLE SIZE	ANNULAR SPACING			ADDITIONAL INSTALLATION MATERIALS AND AIDS			BACKING MATERIAL		ASTM E 814 RATING	
FILL MAT'L	MIN. THICK.	OTHER	TYPE	SIZE	INSULATION	MAX.	MIN.	MAX.		WIRE MESH	STEEL SLEEVE	OTHER	TYPE	DEPTH	T	F
500+	1/2" both sides	none	PVC Coated Corrugated Stainless Steel Tubing	up to 1"	none	3"	1/4"	1 1/2"		No. 8 steel wire mesh	min. 20 gauge	none	minimum 4.0 pcf mineral wool	N/A	0 0	2 1

INSTALLATION INSTRUCTIONS

These instructions are for the installation of through-penetration fire stop system 500+GW-92 in minimum 4 1/2 inch thick steel or wood stud fire rated gypsum wallboard partitions as listed by Underwriters Laboratories Inc. Refer to above drawings and System Configuration Information for component details.

Step Procedure

- 1 Cut hole in wall in required size to accommodate pipe penetrations and allowable annular spacing. Do not exceed maximum specified hole diameter.
- 2 Install - 1 inch PVC Coated Corrugated Stainless Steel Tubing. Support pipe rigidly on both sides of wall.
- 3 Install specified wire mesh or minimum 20 gauge steel sleeve cut to size, formed to hole shape centered inside wall around tubing and allowed to spring back snugly against periphery of hole.
- 4 Install backing material by tightly packing annular space in between and around tubes with specified mineral wool flush with wall. Recess mineral wool 1/2" on both sides of wall.
- 5 Apply a 1/2" depth of Biostop™ 500+ into annular space around tubing on both sides of wall. Tool surface to a smooth defect-free finish.

JOBNAME:

ARCHITECT:

CUSTOMER:

CUSTOMER ORDER NO:

CONTRACTOR:

REPRESENTATIVE:

REPRESENTATIVE ORDER NO:

RECTORSEAL

2601 SPENWICK HOUSTON, TEXAS 77055

REVISION NUMBER: 121499

SHEET NUMBER: OF

DIVISION 26 ELECTRICAL

SECTION 26 00 00 - ELECTRICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The Contract Documents and the General Provisions of the Contract, including the General Conditions of the Contract for Construction, Supplementary Conditions, Special Conditions and Division 1 Specification Sections apply to the Work of this Section.

1.02 SUMMARY

- A. This Section includes general administrative and procedural requirements for Division 26, Electrical work.

1.03 DIVISION 26 - DESCRIPTION

- A. The technical specifications of this Contract are arranged for the convenience of the Owner and Contractor into Divisions of work. The work of Division 26, Electrical, is further described in Specification Sections of the 26 00 00 Series and on Contract Drawings of the “E” series.
- B. The organization of this work into Divisions shall not relieve the Prime Contractor from providing all of the work shown on the complete set of Drawings or specified in the complete set of Specifications, whether or not the individual subcontractors correctly identify their respective responsibilities.

1.04 OTHER DIVISION SPECIFICATIONS APPLICABLE TO THIS WORK

- A. To the extent that the work of this Division or Contract includes the work of other trades, the Contractor for this Division shall adhere to the requirements of other specification sections. All General Construction work shall be performed in accordance with the provisions of the appropriate Division 1 through Division 14 Section. All mechanical work shall be performed in accordance with the appropriate Division 23 Sections.

1.05 WORK INCLUDED

The work of this Division shall include providing all materials, labor, services, permits and related work to furnish a complete, operating, tested, functioning, documented Electrical System including all work shown, specified, or required for proper system operation including but not limited to the following:

- A. Provide demolition and removal of existing circuits, devices, and fixtures, where shown, removal of all debris from site and proper disposal of same.
- B. Provide Basic Materials and Methods. (Section 26 05 00)
- C. Provide Temporary Construction Electrical Services. (Section 26 05 15)
- D. Provide Complete Grounding and Bonding System. (Section 26 05 26)
- E. Provide Electrical Equipment Identification. (Section 26 05 53)

- F. Provide Lighting Control Devices. (Section 26 09 23)
- G. Provide Motor Starters and Disconnects. (Section 26 29 13)
- H. Provide Lighting. (Section 26 50 00)
- I. Provide Firestopping and Smokestopping for Electrical System. (Section 26 84 00)
- J. Provide Submittals and Shop Drawings.
- K. Provide Equipment and Conductor Identification.
- L. Provide Testing of Equipment and Conductors.
- M. Provide Submittals, Shop Drawings and Coordination Drawings. Provide Shop Drawings, at a minimum, for the following:
 - 1. Lighting.
 - 2. Lighting Control Devices.
 - 3. Raceways/Conduit.
 - 4. Wiring Devices.
 - 5. Junction Boxes.
 - 6. Conductors.
 - 7. Fire Alarm and Detection Equipment.
 - 8. Others as required by individual specification sections.
- N. Provide Owner's Operation Instruction.
- O. Provide conduits, boxes, raceways, and pathways for telecommunications systems. (Division 27 - Section 27 00 01 to be included under Division 26 Contractor's scope)
- P. Provide Electronic Access Control System. (Division 28 to be included under Electrical Contractor's scope)
- Q. Provide fire alarm and detection system. (Division 28 to be included under Electrical Contractor's scope)
- R. Provide relocations of equipment and lighting fixtures where shown.
- S. Provide certificate of compliance and fees for permits and inspections.
- T. Provide openings in existing and new construction as required for the work of this Division.
- U. Provide sleeves and inserts.
- V. Provide maintenance of the system in good condition until final acceptance.
- W. Provide cooperation with Owner's telecommunication, audio-visual, and integrated automation vendors.
- X. Provide Operation and Maintenance Manuals in the form of a single composite electronic PDF file.
- Y. Provide warranty.

- Z. Provide “As-Built” Drawings.

1.06 RELATED WORK NOT INCLUDED

- A. The Owner’s telecommunication vendor shall install cabling and faceplates for telephone, computer, and television. Final terminations shall be performed by the Owner’s vendors.
- B. The Owner’s integrated automation vendor shall install raceways, cabling, and devices for temperature control. Final terminations shall be performed by the Owner’s vendors.
- C. Items of work listed for other divisions in the attached “Responsibility Matrix” are related to the work of Division 26 but not included in the work of Division 26.

1.07 OWNER / CM PROVIDED EQUIPMENT

- A. The Owner’s security vendor shall provide termination of security cables to security devices. The Contractor shall be responsible for pathways, pull strings, certain cable installations, and Division 8 - Electrified Door Hardware. Refer to attached “Responsibility Matrix”.

1.08 QUALITY OF WORK AND WORKMANSHIP

- A. The highest degree of quality of materials and professionalism of workmanship is required for the Electrical System.
- B. The Contractor shall initiate and maintain a worker instruction and quality monitoring campaign throughout the duration of the project directed at enlisting each worker in maintaining the highest quality of work and the maximum protection of the existing and proposed facilities from unintentional, neglectful, or intentional damage and providing the best possible electrical system for the building.

1.9 ALTERNATES/ALLOWANCES

- A. Refer to Division 1 for a description regarding alternates/allowances.

1.10 PERMITS AND INSPECTIONS

- A. Division 26 shall be responsible for applying, obtaining and meeting the requirements of all permits and inspections required by jurisdictions for the work of Division 26. Division 26 shall pay all fees associated with these permits and inspections.

1.11 PLANS AND SPECIFICATIONS

- A. It shall be the responsibility of the Contractor to thoroughly examine the complete project documents including Plans and Specifications prior to bid and to notify the Engineer of any uncertainties or apparent omission, conflicts, or discrepancies between the Plans and Specifications. In any case of a conflict between the Plans and Specifications or between two Specification sections, it shall be assumed that the larger capacity or quantity shall govern until a determination can be made by the Engineer.
- B. Plans and Specifications are of abbreviated form. Omitted words or phrases shall be inferred.
- C. Plans and Specifications are complementary. Provide all work which is either shown or specified or both.

1.12 LAWS AND REGULATIONS

- A. Division 26 shall conform with all Federal, State, County, and Municipal Laws, Ordinances and Regulations. Comply with the Occupational Safety and Health Act (OSHA).

PART 2 - PRODUCTS

2.01 GENERAL

- A. See Applicable Division 26 Sections.

PART 3 - EXECUTION

3.01 GENERAL

- A. See Applicable Division 26 Sections.

3.02 SUBMITTAL LIST

- A. Within ten (10) days of receipt of award of subcontract, submit to the Architect, Engineer and Owner through the Construction Manager, a complete listing of proposed submittals, compiled by this Division Contractor based on the requirements of the Specifications as well as the work shown and scheduled on the Drawings.

END OF SECTION 26 00 00

DIVISION 26 ELECTRICAL

SECTION 26 05 00 - ELECTRICAL BASIC MATERIALS & METHODS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The Contract Documents and the General Provisions of the Contract, including the General Conditions of the Contract for Construction, Supplementary Conditions, Special Conditions and Division 1 Specification Sections apply to the Work of this Section.

1.02 WORK INCLUDED

- A. Provide Basic Materials and Methods as follows:

1. Conduit.
2. Conduit Fittings.
3. Sleeves, Inserts and Openings.
4. Support Systems.
5. Surface Raceways.
6. Cable Trays.
7. Ladder Trays.
8. Wireways/Wire Troughs.
9. Outlet, Junction and Pull Boxes.
10. Conductors.
11. Conductor Splicing Materials.
12. Wiring Devices.
13. Conductor Pulling Lubricant.
14. Miscellaneous Painting.
15. Waterproofing, Caulking and Sealing.
16. Protection and Storage of Materials and the Work.

1.03 SUBMITTALS

- A. Provide submittals for the following:

1. Conductors.
2. Conductor splicing materials.
3. Conductor pulling lubricant.
4. Conduit.
5. Conduit fittings.
6. Conduit support systems.
7. Outlet, junction and pull boxes.
8. Electrical and telecommunications flush floor boxes.
9. Sleeves, inserts and openings.
10. Surface raceways.
11. Wireways, wire trough and cable tray.
12. Wiring devices.

PART 2 - PRODUCTS

2.01 CONDUCTORS

A. Conductors:

1. Conductors shall be annealed copper, 98 percent conductivity.
2. Panel feeders shall be copper conductors unless otherwise shown.
3. Aluminum conductors shall only be allowed where called for.
4. All conductors used on the Project shall be stranded.

B. Insulation:

1. Grounding conductors shall have green color coded insulation.
2. Signal circuits shall be color coded using solid colors with contrasting tracer color lines.
3. 600 volts rating for building feeders and branch circuits.
4. 300 volts rating for signal systems operating at 50 volts or less.
5. #12 through #8 AWG: dry locations, use type THWN/THHN.
6. #6 and larger in normally dry locations type THWN/THHN.
7. #12 AWG and larger: under buildings, slab on grade, steam tunnels, crawlspace, boiler rooms, pump house, kitchen, mechanical rooms, use type THWN/THHN.
8. Wiring to street lighting systems, snow melting systems, exterior signs, etc., use THWN or RHW in conduit.
9. For fire rated wiring systems, the circuit assembly shall comply with UL FHIT circuit integrity ratings.

B. Cables:

1. Power cables shall be allowed only as called out on Drawings.
2. All cables shall be either a UL-listed 600V MC or AC, provided with separate ground conductor.
3. All conductors shall comply with Part A and Part B of this Section.
4. Phase conductors within the cable shall be marked or colored for identification.
5. Cable shall be constructed with a galvanized steel interlocking armor.
6. Manufacturers: Southwire Duraclad or similar in Prysmian/General.

C. Make: Southwire, Republic Wire, American Wire, Okonite, Cerro, Houston, General Cable.

2.02 CONDUCTOR SPLICING MATERIALS

A. #10 AWG and Smaller (600V Class):

1. Pressure connectors shall be UL-listed for the wire combination being spliced.
2. Ideal 344 Red Yellow, 3M Performance Plus R/Y+.

B. #8 AWG and Larger (600V Class):

1. Pre-insulated multi-tap connectors. Burndy Uni-tap, ILSCO Cleartaps, or approved equal.
2. Non-reversible, crimped pressure connectors, taped. Burndy, Blackburn or approved equal.

C. Tape (600V Class):

1. U.L. listed for 600 volt minimum.

2. Scotch 33 or 88, or Plymouth.

2.03 CONDUCTOR PULLING LUBRICANT

A. The cable lubricant shall meet the following performance specifications:

1. When subjected to a 100 lbs./ft. Normal force, between (type) cable and (type) conduit, the lubricated cable system shall have a coefficient of kinetic friction less than 0.25 (pulling force greater than lbs./ft.)
2. The lubricant shall be U.L. (or CSA) listed.
3. When used on high voltage cable, the lubricant shall not affect the volume resistivity of any semi-conducting jacket or insulation shield present. The volume resistivity of the semi-conducting material shall at no time increase more than 100% when tested via the ICEA T-25-425 method, 90 degrees centigrade exposure, 7 day test, readings made at 23 degrees centigrade daily.
4. The lubricant shall not affect the tensile/elongation properties of the cable jacket more than existing ICEA/NEMA aging specifications allow.
5. The lubricant shall contain no waxes, greases, silicones, or polyalkylene glycol oils or waxes.

B. Manufacturer: American Polywater Corporation, Ideal.

2.04 CONDUIT

A. Aluminum Rigid Conduit:

1. Aluminum Rigid Conduit shall require silicone treated interior, with all aluminum accessories and approved aluminum lubricant for threaded connections.

B. Flexible Metal Conduit:

1. Steel interlock type, galvanized, with galvanized steel fittings.
2. Complies with NEC Article 348 and U.L. standards for flexible conduit.
3. Make: Galflex or approved equal.

C. Electrical Metallic Tubing (EMT):

1. EMT shall be low carbon steel, with set screw type, concrete tight fittings.
2. Exterior shall be galvanized by electrolytic process and extra coat provided by bright dip in zinc chromate solution.
3. The interior shall be coated with baked plating process.
4. Make: Cerro, Republic, Allied Tube, Youngstown, Wheatland or approved equal.

D. Liquidtight Flexible Metal Conduit (LFMC):

1. Heavy galvanized steel core type.
2. Oil resistant thermoplastic cover, grey color.
3. Integral ground wire, sizes $\frac{3}{8}$ " to $1\frac{1}{4}$ ".
4. For high/low temperature applications, use type H.C.
5. Use steel, gasketed, insulated throat, compression type liquidtight fittings.
6. Make: Anaconda seal-tite, Electri-Flex, Southwire or approved equal.

E. Rigid Non Metallic Conduit (PVC):

1. Heavy wall, 90°C temperature rated, polyvinyl chloride Schedule 40 conforming to NEMA Standards.
2. Approved standard manufacturer's fittings and supports as required.
3. Make: Carlon or approved equal.

F. Rigid Metallic Conduit (RGS):

1. Rigid galvanized steel, hot dipped threaded type.
2. Galvanized threaded malleable iron fittings.
3. Make: Cerro, Republic, Allied Tube, Youngstown, Wheatland or approved equal.

G. PVC Coated Rigid Metallic Conduit (PRGS):

1. Rigid galvanized steel, hot dipped, threaded with 40 mil min polyvinyl chloride exterior coating.
2. UL-listed, conforming to NEMA RN-1-1998.
3. Make: Korkap or approved equal.

H. Aluminum flexible conduit and cast or plotted metal conduit shall not be used.

2.05 CONDUIT FITTINGS

A. EMT:

1. All fittings shall be U.L. listed steel or malleable iron.
2. Branch circuit conduits larger than 1" diameter and conduits containing feeders serving panelboards shall have grounding type bushings.
3. Set screw type fittings, Concrete tight as manufactured by Neer, OZ Gedney, Bridgeport or equal.
4. Compression connectors, squeeze type Efcor or equal.

B. Flexible:

1. Fittings shall be UL listed steel or malleable iron.
2. Fittings for flexible steel conduits shall be squeeze type, as manufactured by Thomas and Betts, Steel City or Appleton.

C. Liquidtight:

1. Fittings shall be malleable iron, tapered hub threads, with safe-edged ground cone and double bevel sealing ring.
2. Fittings for liquid tight flexible conduits shall be screw-in type manufactured by Thomas and Betts Company or Pittsburgh Standard Conduit Company.

D. Rigid Metal Conduit:

1. Bushings for metal conduit terminations shall be the nylon insulated type throat, with grounding type locknut ahead of bushing.
2. Die cast zinc-alloy and pressure cast and indenter type fittings shall not be approved. Provide steel or malleable iron only.
3. Conduit hubs shall be manufactured by Myers Electric Products, Inc., Raco, T&B, General Electric Company or equal.

E. PVC Coated Rigid Metallic Conduit:

1. All ferrous fittings shall be PVC coated, UL-listed and approved by conduit manufacturer for use with the conduit.
2. A urethane coating shall be uniformly applied to the interior of all conduit fittings. All threads shall have a uniform urethane coating applied.

F. Die cast, pressure cast, potted metal or similar type fittings shall not be used.

2.06 CONDUIT SUPPORT SYSTEMS

A. Support System Strut:

1. Strut shall not be less than 1 $\frac{5}{8}$ " x 1 $\frac{5}{8}$ ", 12ga. in trapeze support applications.
2. Strut shall not be less than 1 $\frac{5}{8}$ " x 1 $\frac{5}{8}$ ", 14ga. in wall support applications.
3. Interior strut steel shall electro-galvanized with no less than 0.50 mils of zinc with a chromium finish.
4. Exterior strut steel shall hot dip galvanized.
5. All field cuts shall be cleaned and treated with a high zinc paint.
6. Make: Eaton B-Line, Atkore Unistrut, or equal in ABB Kindorf complete with all necessary bolts, screws, angles, anchors, connection plates, straps, etc., as required to perform the necessary functions.

B. Trapeze Type Hangers:

1. Steel horizontal members and threaded hanger rods.
2. Rods shall not be less than 1/2" diameter.

2.07 OUTLET, JUNCTION AND PULLBOXES

A. Type:

1. Unless otherwise noted on the Drawings, boxes shall be NEMA rated as follows:
 - a. Where installed indoors and intended primarily for protection against access to hazardous parts, boxes shall be NEMA 1 rated.
 - b. Where installed indoors or outdoors and intended for protection against access to hazardous parts, as well as protection against ingress of falling water (rain, sleet, snow), boxes shall be NEMA 3R rated.
 - c. Where installed indoors or outdoors and intended for protection against access to hazardous to hazardous parts, as well as protection against ingress of falling water and direct spray, boxes shall be NEMA 4 rated.
 - d. Where the requirements of Item d. are met, as well as protection against corrosion, boxes shall be NEMA 4X rated.

B. Construction:

1. Galvanized, stamped steel shall be provided when recessed in construction or exposed on walls and ceilings in dry areas.
2. Deep conduit style with hubs, or Myers hubs for exposed work in damp areas or wet location or for weatherproof type outlets.
3. Large pullboxes shall require 14 gauge galvanized steel, fold, and weld construction; with 14 gauge galvanized and gasketed steel cover secured in place by galvanized sheet metal screws on maximum 10 inches centers. All cut edges to be free of burrs.

4. Provide cast-iron, gasketed, watertight boxes installed in earth, surface mounted outdoors, where threaded connection is needed.
- C. Size: Provide as required for number and size of conduit and conductors. Coordinate depth to suit wall depth and construction. Use special forms and designs as required for outlet facilities.
- D. Covers: Provide design and style to suit outlet box and electric facility. Provide for all unused or non-designated boxes. NEMA 1, 12, 3R, rating for area environment and use watertight cover with gasket for exterior boxes.
- E. Elevator pits shall be equipped with while-in-use NEMA 3R receptacle covers where sprinklered.
- F. While-in-Use Covers:
 1. Provide size, design, and alignment to suit outlet box.
 2. Provide for all boxes designated on prints and all other required locations as per NEC 406.8 (B).
 3. Provide with clear-polycarbonate shield.
 4. Make: P&S WIUC10 for single gang and WIUC20 for double gang. Equivalent in Hubbell is acceptable.
- G. Junction boxes and pullboxes used for fire alarms shall be painted red. Covers shall be painted red.
- H. Fixture Studs: Use $\frac{3}{8}$ " studs and securely fastened to support fixtures.
- I. Make: Appleton, Crouse-Hinds, O.Z. Gedney, National, Steel City, Racor, Pyle-National.

2.08 SLEEVES, INSERTS AND OPENINGS

- A. "Link-seal" assembly as manufactured by Thunderline (see Execution for locations).
- B. Schedule 40 steel pipes, packed with fire barrier wool and caulk (see Execution for locations).
- C. Fire barrier wool and caulk. No sleeve necessary (see Execution for locations).
- D. Where a 3-hour fire rating is required, use split collar fire seal with sleeve.
- E. When penetrating through a floor, the sleeve shall be waterproof, as well as fireproof. Submit through floor sleeve system.

2.09 SURFACE RACEWAYS

- A. Surface Raceways:
 1. Provide enameled steel, code sized for quantity of wires indicated; use manufacturer's standard fittings.
 2. Where pre-wired plug-in strips are shown on Drawings, use assemblies with 20 amperes grounding type receptacle with outlet on 12 inch centers.
 3. Provide pre-punched snap on covers to suit outlet spacing.
 4. Combination assemblies for communication and power shall contain integral dividers.
 5. Telephone, computers, cable openings shall have bushed openings, with split stainless plates.
 6. Provide all couplings, device plates, blank end fittings, entrance and wall box connectors, elbows, breakers, wire clips, etc., to make a complete job.

7. Make: Wiremold “Plugmold 2000” Series for plug-in service. Wiremold 500, 700, 2000, 2400 or 4000 for raceway application.
8. Color: All wiremold products shall match the wall finish.
9. Raceways for telecommunications wiring shall have full radiused fittings to maintain capacity.

B. Pre-Wired Surface Raceway:

1. Raceway shall be a two piece design with a base and a snap-on over. The snap shall be configured so that conductor damage will not inadvertently occur during assembly. Pre-assembled wiring harness of #12 AWG copper shall be provided in single circuit and two circuit configurations as required. (See Plans) Receptacles shall be duplex type.
2. The system shall include all necessary fittings; various elbow types, adapter, end cap, tees, and splice cover. All shall be made of rigid PVC material to match the color of the raceway. The entire assembly shall be office white.
3. Manufactured by Wiremold Company, Plugmold 2000 series.

2.10 CABLE TRAY

- A. Cable trays shall be made of high quality, welded steel wire mesh, electroplated with zinc galvanize.
- B. The cable tray shall be supported by two (2) threaded rods connected to overhead structural members and forming a trapeze-style bar beneath the cable tray. Supports shall be a maximum of 6'-0" on center unless loading requires closer spacing.
- C. The inner radius on the cable tray turns shall not be less than 1.25 times the bending radius of the strictest occupying cable.
- D. Supply all clips, screws, brackets, and supports to provide a fully functional cable tray system.
- E. A cable tray shall be provided in new 10' lengths. Heights and widths shall be specified on Drawings.
- F. Provide wall sleeve by cable tray manufacturer as part of a complete system.
- G. Acceptable Manufacturers:
 1. Cablofil.
 2. Black Box.
 3. Cope Cat-Tray.
 4. Equal in pre-approved manufacturers.

2.11 LADDER TRAY

- A. The ladder tray shall be Aluminum construction with 1" rails, 9" on center.
- B. The ladder tray shall be supported by two (2) threaded rods connected to overhead structural members and forming a trapeze-style bar beneath the cable tray. Supports shall be a maximum of 6'-0" on center unless loading requires closer spacing.
- C. The inner radius on the ladder tray shall be 12".
- D. Supply all clips, screws, brackets, and supports to provide a fully functional ladder tray system.

- E. The ladder tray shall be provided in new 12' lengths. Heights and widths shall be specified on Drawings.
- F. Cable trays shall be made electrically continuous and grounded.
- G. Acceptable Manufacturers:
 - 1. Black Box.
 - 2. Cope (Tyco).
 - 3. Pass & Seymour Cablofil.

2.12 WIREWAYS AND WIRE TROUGH

- A. Use hinged cover type wire way with provisions for full lay-in along the entire length of run.
- B. The wireway shall be steel, enclosed with gray enamel finish.
- C. Use JK sectional NEMA dust resistant, oil tight type, where subjected to moisture, in pump rooms, mechanical, electric and fan rooms, exterior walls, shops, maintenance shops, and similar locations.
- D. Knockouts along runs.
- E. Provide all elbows, tees, pullboxes, fittings, hangers, reducers, supports, etc., to meet installation requirements.
- F. Size as shown on drawings or code size where not noted.
- G. Make: Square D "Square Duct" or equal by Hoffman, Meco, Wiremold.

2.13 WIRING DEVICES

- A. Receptacle, Surge Protection Device:
 - 1. Copper-alloy contacts, thermal protection in three modes (L-G, L-N, N-G) absorbing 340 joules per mode of energy absorption and 24,000 amp maximum surge capability, three thermal fuses and two overcurrent protection fuses, autoground clip.
 - 2. High impact resistant thermoplastic for all exposed molded parts, wrap around face-locking strap, epoxy compound encapsulating the internal components.
 - 3. UL-listed 1449 latest Edition, Type 3 SPD, 20 amp circuit rating.
 - 4. Visual LED surge status indicator to alert users to surge suppression circuit condition. Visual indicators will be illuminated (GREEN) when power is on, and surge suppression circuit is fully functional. Visual indicator will not be flashing red upon loss of surge suppression protection. Audible alarms will sound when there is a loss of surge suppression protection. Audible alarm able to be turned on/off.
 - 5. Extra heavy duty use surge protection device receptacle, NEMA 5-20R.
 - 6. Make: Pass & Seymour #PT 5362SP with plugtail connector PTR66STR.
- B. Receptacle, GFCI:
 - 1. Nickel-plated mounting strap and terminal screws.
 - 2. High impact resistant, thermoplastic construction for receptacle face and back body.
 - 3. UL-listed, 20 amp circuit rating, no feed through on plugtail.

4. Trip indicator light (red lamp) and “safelock protection” which denies power if there is a ground fault, if GFCI is miswired or if GFCI fails. Device to include self-test circuitry.
5. Specification grade receptacle, NEMA Type 5-20R.
6. Make: Pass & Seymour plugtail GFCI Receptacle PT2097 with plugtail connector PTR6STR.

C. Receptacle, Duplex:

1. Grounding type with brass integral ground system and auto ground clip, brass line contacts, brass mounting strap and brass plugtail contacts.
2. High strength nylon construction for receptacle face and back body.
3. UL-listed, 20 amp circuit rating, NEMA Type 5-20R.
4. Extra heavy-duty use specification grade receptacles with stranded right angle plugtail connector.
5. Make: Pass & Seymour Duplex Receptacle PT5362A with plugtail connector PTR6STR.

D. Wall Plates:

1. Provide thermoplastic wall plates molded of rugged, practically indestructible, self-extinguishing nylon. Wall plates shall be preferred for use in high-abuse applications.
2. Standard colors are available in ivory, white, brown, gray, black, red, and light almond. Color to be selected by Architect, except where specifically shown.
3. Nominal thickness, 0.070”.
4. Make: Pass & Seymour Trademaster Thermoplastic Wall Plates “TP” Series.

E. Ceiling Plates:

1. Round ceiling plate, white finish, steel, to cover existing cast-in-place ceiling boxes.
2. Mulberry Model 40430 or equal.

2.14 NEW PRODUCTS, SINGLE MANUFACTURER

- A. All equipment, materials and products furnished shall be new unless specifically shown to be reused. All materials shall be new and of the best quality of their respective kinds. The work when completed will be accepted in an undamaged and perfect condition only. Where equipment, materials and products are used for the same purpose, they shall be provided by the same manufacturer.

2.15 QUALITY ASSURANCE

- A. All equipment, materials and products shall conform to the applicable ANSI, ASA, NFPA, UL, AGA and/or ARI standard. All electrical equipment shall be UL or ETL Listed.

2.16 WARRANTY

- A. Provide one year manufacturer’s warranty on all equipment, materials, and products. Where shown or specified, provide the manufacturer’s extended warranty.

2.17 SUBSTITUTIONS FOR SPECIFIED EQUIPMENT, MATERIALS AND PRODUCTS

- A. Design Equipment - The design of this Project is based upon the use of the specified equipment, materials, and products. The Plans are prepared on the basis of the arrangement, size, capacity, and characteristics of the design equipment.

- B. Specified Alternate Equipment - In the event the Contractor elects to use equipment named as an alternate manufacturer herein, the Contractor shall verify that the equipment is of the same capacity, arrangement, size, and characteristics as the design equipment and shall make all incidental changes in his work and coordinate and pay for any changes in work made necessary by deviations from the design capacity, arrangement, size and characteristics of the alternate manufacturer's equipment.
- C. Substitutions of Unspecified Equipment, Products and Materials - Unspecified equipment, products and materials may be added to the List of Specified Alternate Equipment, Products and Materials at the request of any bidder by written application at least five (5) days prior to the bid date.
- D. Addition of an unspecified equipment product of material to the List of Alternate Manufacturers will occur at the determination of the Engineer if there is sufficient time to review the proposed substitution prior to bid date and to issue addenda to all Contractors. In no case will substitutions be approved to individual bidders. Substitution requests will not be acted upon within the last five (5) days prior to bid date.
- E. Addition of unspecified equipment, products and materials to the List of Alternate Manufacturers does not relieve the Contractor from his obligation described in subparagraph B to verify that the equipment is of the same arrangement, capacity, size, and characteristics and to pay for any modifications required in his and other Contractors' work made necessary by the use of this equipment.
- F. By submission of his bid for this Project, the Contractor acknowledges the authority and prerogative of the Engineer and Owner to evaluate proposed substitutions as to suitability for the Project and the Contractor agrees to abide by the Engineer's decision if unspecified equipment, products, and material are disallowed by the Engineer.

2.18 DELIVERY, STORAGE AND PROTECTION

- A. All materials shall be delivered to the site in their original, unopened labeled containers.
- B. All materials shall be stored in a clean, dry area as required by the Owner.
- C. All materials shall be properly protected from weather, damage, and theft. The Contractor shall be responsible for the proper care and protection of all materials, equipment, etc., on site.

PART 3 - EXECUTION

3.01 EQUIPMENT FOUNDATIONS

- A. Provide equipment foundations for all floor mounted equipment, transformers, panels, etc., and/or where called for on Plans. Submit detailed sketches giving size and height for approval, if requested. Use 3000 psi concrete. Chamfer edges, trowel smooth. Securely bond to floor by roughening and coating with cement grout. Set anchor bolts in sleeves before pouring. After anchoring, fill equipment bases with thin grout according to manufacturer's printed instructions. Carefully align shafts and set plumb before grouting. Re-align shafts after grout have been set.

3.02 MISCELLANEOUS PAINTING

- A. Paint all hangers and exposed or unpainted or ungalvanized iron work with two brush coats of black rust preventative paint. Touch up any damaged surfaces of factory painted equipment.

3.03 ADJUSTING AND INITIAL LUBRICATION

- A. Adjust each system to air quantities shown on drawings. Balance system according to the requirements contained herein. Adjust all automatic control systems for proper operation. Adjust all temperature controls for proper operation. Adjust all electrical systems. Adjust all motors for proper rotation. Adjust all dampers for tight closing. Adjust all electrical work free from grounds of phase or neutral conductors.
- B. As soon as installed, lubricate, and leave in good working order, all motors, bearings, etc., in accordance with manufacturer's instruction.
- C. Lubrication Chart - Provide 8½" x 11" lubrication chart, typed in capital letters, mounted in wood frame under clear plastic. Hang where directed. The Mechanical Contractor shall provide a chart listing all motors. Other Contractors supply information on motors furnished by them. List the following information:
 - 1. Name and location of equipment.
 - 2. Type of lubrication recommended by manufacturer.
 - 3. Lubrication period recommended by manufacturers.

3.04 CONDUITS

- A. General:
 - 1. Securely support conduit from building construction, separately from outlets and boxes which are secured to the building. Support shall be spaced at intervals of eight (8) feet maximum or as required by the NEC Code.
 - 2. Conduit runs shall be concealed unless otherwise specified. Do not expose conduits in finished rooms unless specifically permitted.
 - 3. Conduit runs shall be exposed in electrical, mechanical and fan rooms.
 - 4. Conduit runs shall be installed neatly and parallel to ceilings, walls, and floors.
 - 5. All conduits and fittings on exposed work shall be secured by means of metal clips on back plates.
 - 6. Avoid installation adjacent to hot surfaces. Raceways shall be spaced from heat sources as follows:
 - a. Steam: no conduit within 12" of outside surface of insulation.
 - b. Hot water piping: 6" minimum from outside surface of insulation.
 - 7. Provide one pull box or junction box per three 90° bends in any one conduit run.
 - 8. Plug openings until wire is installed and ream conduit joints and ends before installation. Wires shall not be pulled until the conduit system is completed in all details.
 - 9. Conduits feeding panelboards; pull boxes:
 - a. Terminations at each pullbox, panelboard and switchboard shall have double locknut (one inside and one outside).
 - b. Provide a minimum of two (2) 1" conduit stubs from each flush mounted panelboard to an accessible ceiling space above the panel, in an adjacent area or at the ceiling line.
 - 10. Conduit terminating in gasketed enclosures shall be terminated with conduit hubs or Myers hubs.

11. Avoid installing conduits in water or where excessive moisture exists. For conduits terminating to boxes in wet areas, use Myers hub fittings.

B. Aluminum Conduit:

1. Use in dry locations for concealed or exposed work.
2. Do not install in direct contact with concrete or earth.
3. Provide expansion joints in runs at maximum 120' intervals in the run.

C. EMT:

1. Use in dry locations for concealed or exposed work.

D. Liquidtight Conduit:

1. Use for terminating connection for motors, compressors, air conditioners, sound equipment and dry type transformers.
2. Provide proper fittings with insulated throats. Provide green wire ground.
3. Use Liquidtight conduit and fittings in outdoor locations and in pump rooms, garages, elevator pits and other locations subjected to moisture.
4. Use for all motor transformer terminations and other equipment where vibration is present.

E. Flexible Metal Conduit:

1. Install terminating connections for motors, compressors, air conditioners, sound equipment and dry type transformers in dry areas as shown or scheduled.
2. Install green wire ground in all flexible conduit.

F. RGS:

1. Use in dry locations for concealed or exposed work where shown.
2. Use in or under concrete pours.
3. Use where exposed to weather.
4. Where run in earth and below slab on grade, encase conduit in 1½" concrete envelope unless otherwise noted.
5. Use where noted on Drawings.

G. PVC/PRGS:

1. Use for underground ductbank systems, street lighting, and where direct burial in earth (concrete encased) is noted unless modified elsewhere in these specifications.
2. Schedule 40 PVC conduit shall be permitted below slab of building under conditions of Engineer inspection of backfill materials and with RGS sweeps where rising out of slab.

3.05 CABLE TRAY/LADDER TRAY

- A. The cable tray shall be securely supported from the building construction. Supports shall be spaced at intervals of six (6) feet or less as specified by the cable tray manufacturer.
- B. Any edges created by field cutting shall be filed free of any burrs or sharp edges.

- C. Wires, cables, and conductors shall not be installed until the complete cable tray system has been completed and accepted by the Engineer.
- D. Provide neoprene hanger vibration isolators on all threaded rods connected to structural members within noise-sensitive areas.
- E. Provide mineral wool insulation loosely packed into wall sleeves into noise sensitive areas and between rooms within sound sensitive areas.
- F. Ground cable tray.

3.06 CABLE LUBRICATION AND LUBRICANT

- A. The cable jacket and/or conduit walls shall be completely lubricated when cable is pulled into conduit. The lubricant shall be applied immediately before or during the pull.
- B. Minimum quantities of lubricant are as follows:
 - 1. 1 quart of lubricant per 100 feet of 1 inch conduit.
 - 2. 2 quarts of lubricant per 100 feet of 2 inch conduit.
 - 3. 3 quarts of lubricant per 100 feet of 3 inch conduit.
 - 4. 1 gallon of lubricant per 100 feet of 4 inch conduit.
- C. This quantity shall be increased as needed for difficult pulling situations (high temperatures, multiple bends, poorly placed conduit, etc.).
- D. Cable attachments for pulling shall be patent cable grips, or other devices subject to the Owner's approval. In using woven basket type grips on covered cable, care shall be taken to avoid damage to the cable and seal, which shall be marked up and maintained during cable installation. Difficult pulling is not anticipated; if unduly difficult pulling occurs, the Contractor shall check pull required and suspend further pulling until further procedure has been approved by the Owner. Maximum pull tension shall not exceed recommended value for the cable when measured by tension dynamometer.
- E. Cable pulling during low temperatures is subject to review by the Owner and shall be discontinued when, in the Owner's and Engineers opinion, the cable may be damaged.
- F. The Contractor shall keep records of all cables pulled, meggered and terminated. Exact lengths of cables installed shall be supplied to the Owner.

3.07 CONDUIT FITTINGS

- A. EMT:
 - 1. Provide EMT connector and nylon bushing at all EMT plain end terminations for power, CATV, communications and computer.
 - 2. Use set screw type, concrete tight indoors, dry locations.
 - 3. Use compression connectors, squeeze type in wet locations.
- B. RGS:
 - 1. Provide galvanized steel locknuts at each termination unless hubs are used.
 - 2. Use sealing locknuts for all wet/damp areas.

3. Use grounding type locknuts for rigid terminations not equipped with grounding bushings.

3.08 CONDUIT HANGERS

A. General:

1. Investigate thoroughly, Architectural and Shop Drawings related to work, to determine how equipment, fixtures, piping, ductwork, etc., are to be supported, mounted, or suspended. Provide extra steel, bolts, inserts, pipe stand brackets, or any other items required for proper support. Provide supporting accessories where required, whether or not shown on the drawings. Where directed, furnish drawings showing supports, etc., for approval.
2. Conduit hanger rods in areas where hot dipped galvanized conduit is installed shall be galvanized steel, sprayed with one coat of Rustoleum paint.
3. Size support member within load rating of member section, and without visible deflection.
4. Mount conduit on top of support member unless space considerations prevent installation; use conduit clamps.
5. Provide channels for racking up conduit, trapeze, suspensions, cable racks, panel racks, etc., as shown and as required and provide poured-in-place inserts for supporting channels.

B. Conduit Clamps:

1. Single conduits shall be supported by means of one-hole pipe clamps in combination with one-screw back plates to raise conduits from the surface.

C. Trapeze Hangers:

1. Multiple runs of conduits shall be supported by means of trapeze hangers, keeping conduits as high as possible with minimal beads and offsets in height.

3.09 ACCESS DOORS

- A. Provide where indicated and where required for access to all equipment. Size 16" x 24" unless otherwise noted. It is to be noted that various types of frames are required for specific wall and ceiling finishes. Any door having an area exceeding 324 square inches shall have two (2) camlocks. Employ and pay General Contractors for installation.

3.10 SURFACE RACEWAYS

A. Surface Raceways:

1. Blank cover raceways shall be provided where shown, or as approved in advance by the Engineer.
2. Secure to structure per installation instructions.
3. All surface boxes to be independently secured to structure.
4. Provide separate green grounding wire within each surface raceway and extend back to ground of serving panelboard.
5. Paint all raceways to match adjacent walls.

3.11 WIREWAYS AND WIRE TROUGHS

- A. Install so all covers can be easily removed.

- B. Install straight and level.
- C. Use only hangers designed for equipment, support to meet NEC.
- D. Punch openings where knockouts are not present.
- E. Do not exceed code fill, increase conductor size as required by NEC.
- F. Do not use for large conductor or primary voltage pull of splice boxes.

3.12 CONDUCTOR SPLICING MATERIALS

- A. Splices and connections for lighting and receptacles shall be made in accessible outlets, pullboxes or junction boxes.
- B. Insulate all splices, taps and connections for lighting and receptacles with U.L. labeled gauge plastic tape or molded composition caps.
- C. Splices shall not be made except where called for by the drawings, or where specifically permitted by the Owner. Where splices are permitted, they shall be made in a neat, workmanlike and approved manner by those specialized in this class of work, close attention being paid to all splices with particular attention to splices on higher voltages. Splices shall be made by the Contractor for each type of wire or cable in accordance with instruction issued by Cable Manufacturers and the Owner. Before splicing, insulated cables shall have conductor insulation stepped and bound or penciled for recommended distances back from splices to provide a long leakage path. After splicing, insulation equal to that on the spliced conductors shall be applied at each splice. In baring conductors for splices, care shall be taken to avoid nicking strands.

3.13 CONDUCTORS

- A. All wire and cables shall be installed in an approved raceway.
- B. Provide wire and cable in conduit for all feeders, motor circuits, lighting circuits, receptacle circuits, equipment circuits, etc., as shown on Drawings.
- C. Coil slack wire at outlets, inside the outlet boxes and seal the outlet opening with cardboard or fiber plug to prevent entrance of concrete plaster or paint. Provide separate neutrals for all single phase circuits.
- D. Tag all feeders, subfeeders, special system wiring and control wiring in each pullbox and gutter space, denoting points of origin and termination of wires.
- E. Install a maximum of three (3) phase and one (1) neutral conductor in any one (1) feeder or branch circuit conduit unless otherwise directed by Engineer.
- F. Provide support for conductors in vertical raceways in accordance with NEC, Article 300.19.
- G. Flexible conduit used as connection to any equipment shall contain separate green grounding wire run back to ground bus of serving panelboard.
- H. Provide #12 AWG minimum size for branch circuits and emergency system wiring, #14 AWG minimum size for signal circuits.

- I. Provide #10 minimum size for branch circuit run which exceeds 100 feet; unless otherwise directed.
- J. Panel feeders and Branch circuits for 3 phase motors and equipment rated for 3 phase, 120/208 volts, shall have color coded insulation; black-phase “A”, red-phase “B”, blue-phase “C” with white neutral conductor. Colored tape at each terminal of all power feeders (black insulation) will be accepted in lieu of colored insulation as described above.
- K. Panel feeders and Branch circuits for 3 phase motors and equipment rated for 3 phase 277/480 volts shall have color coded insulation; brown - phase “A”, orange - phase “B”, yellow - phase “C”, with gray neutral conductor. Colored tape at each terminal of all power feeders (black insulation) will be accepted in lieu of colored insulation as described above.
- L. The neutral wire shall be identified throughout the system. Feeders shall be identified at the source and at all boxes with panel make and phase (A, B, C).
- M. Included in the work covered under this section is the cutting or drilling of entrance holes into enclosures, equipment terminal boxes and outlet boxes for entrance of cable not in conduit, as well as the work of cutting and drilling of holes in miscellaneous plates located in the path of cable runs. Entrance holes for cable shall be installed around cable, as part of the work of installing cable, sealing bushings, Crouse-Hinds type: “CGB” or Owner approved equal, or conduit bushings where these alone are permissible. The work shall also include the work of packing or sealing at conduit bushings after cables are pulled, using uncoiled Oakum and JM Dux-seal or Owner approved equal.
- N. Cables shall be formed to avoid sharp bends or edges of conduit bushings upon entering or leaving conduit terminations, and insulated wiring to approximately six inch intervals between conduit and terminals. Where outlet box, cabinet, cubicle, switchgear, or other terminal points for cable are equipped with cable or wiring trays, troughs, or gutters. The Contractor shall pull sufficient length of each cable to permit neat arrangement of all entering cables, with leads formed and cabled or clamped as each conductor is brought to its terminal connection. No tangle box work will be accepted.
- O. Where reasonably practicable, the minimum radius to which an insulated conductor is bent, whether permanently or temporarily during installation, shall be ten times the diameter over the outer covering.
- P. Making terminal connections shall be included as part of the work, except as specifically noted. At points where the conductor and cable insulation will be terminated, terminations shall be made in a neat, workmanlike and approved manner by men specialized in this class of work, particular attention being given to higher voltage terminations, shielded conductor terminations and coaxial cable terminations. Terminations shall be made by the Contractor for each type of wire or cable in accordance with instructions issued by the Owner. Spare cables shall be trimmed, taped, and bundled neatly within the cabinet so their presence will not interfere with connected terminations. They shall be trimmed to a length such that they can be made up and connected to the farthest terminal block within the cabinet.
- Q. Before any cable terminal connections are made, conductors shall be rung out. Connections shall be made according to wiring diagrams. Polarity or phasing shall be checked before final connections are made, and corrections of polarity, phasing or rotation shall be made without additional cost to the Owner.
- R. Control cable terminations shall be made in accordance with wiring diagrams, using wire numbers established by the Owner for the various control circuits. It is the intent that the Contractor shall terminate the cables which he installs, except as specifically noted.

- S. When control cables are to be fanned out and cabled together with cord, Contractor shall make connections to terminal blocks, and test equipment for proper operation before cables are corded together. If there is any question as to proper connection, the Contractor shall make temporary connection with sufficient length of cable so that cable can be switched to another terminal, without splicing cable.
- T. After pulling and splicing but before making cable terminal connections, the Contractor shall expose ends, clear each conductor, and make the required Megger test on all circuits except lighting circuits. Contractor shall test cables for motors, power, and control, with a Megger insulation testing instrument (Associated Research, Inc., Megohmmeter) before equipment is energized. In the event insulation is deficient, repeat Megger testing shall be accomplished after corrective measures have been applied. Extreme care shall be exercised in meggering so as not to put excessive voltage on instrumentation and electronic equipment and thereby damage such devices.
- U. The Contractor shall megger all power feed cables for 10 to 15 sec., at 4000 volts on apparatus rated 2500 volts, 1000 volts on apparatus rated 550 volts to 2500 volts and 500 volts on apparatus rated less than 500 volts. The cable shall be meggered first on the reel before pulling and then again on a cable-by-cable basis after being cut and pulled.
- V. A check shall be made of all external and internal wiring for loose connections, cable sizing and proper terminations per the elementary and connection drawings listed and attached with specification.
- W. All wiring systems shall be thoroughly checked before placing the system in service, for grounds, short circuits, and conformity to wiring diagrams.

3.14 CONDUCTOR CIRCUITING

A. Lighting, receptacles, and special circuits:

- 1. Lighting circuits: Provide lighting arrangement as shown or 15 amperes maximum per circuit where not otherwise shown.
- 2. Receptacle circuits: Provide five (5) convenience outlets maximum per circuit unless otherwise shown or specified.
- 3. Special receptacle circuits: Provide as indicated on Drawings and as specified under special items of equipment and provide separate green conductor for grounding receptacles to panel ground bus.
- 4. Exits and emergency lighting circuits: Install in separate conduit system and circuit to emergency panel, as shown on Drawings.
- 5. Fire alarm and detection circuits: Install in separate conduit system.

B. Communications:

- 1. Provide all conduits, wireway, wire terminations, etc., necessary to provide for the functions specified:
 - a. All wiring shall be installed in conduit unless specified otherwise.
 - b. The cross-sectional area of all telephone and television cabling installed in a conduit shall not exceed the percentage of the cross-sectional area of the conduit as scheduled.
 - c. The cross-sectional area of all computer cabling installed in a conduit shall not exceed 20% of the cross-sectional area of the conduit.
 - d. Provide a separate circuit power supply for each system.
 - e. Refer to Division 27 for additional requirements.

C. Power and Control Circuits:

1. General Requirements:

- a. Provide all power wiring. Install in conduit and make all connections to disconnect switches, motor controllers, motor and other items of electrical equipment shown on Drawing details and schedules.
- b. Provide control wiring only as shown on electric equipment schedule and plan details. Install in conduit and make connections to motors, motor controllers, control devices, etc., including the mounting of all control devices furnished by others.
- c. Verify exact location and rating of all motors, controllers, control devices, etc., with other contractors before roughing.
- d. Power and control wiring may be combined in common conduit by increasing conductor or conduit sizes as required by code.
- e. Provide minimum working clearances as required by NEC Article 110.26 and as shown on the Drawings.

2. Wiring Diagrams:

- a. Any wiring diagrams shown on drawings for hookup of equipment furnished by others, are approximate and are for bidding purposes only.
- b. Obtain wiring diagrams, certified correct for the job, from respective Contractor for all equipment and systems furnished by them.
- c. Install all work in accordance with certified wiring diagrams.

3. Control Devices:

- a. Do not accept control devices from other Contractors unless they are properly tagged and furnished with circuiting information.

3.15 LIGHTING CIRCUIT CONTROL DEVICES AND RECEPTACLES

- A. All devices shall be mounted within a steel box.
- B. All receptacles shall be mounted with a box aligned in a vertical direction with a ground slot at bottom of receptacle. In those areas where vertical space is not available such as under fin radiation, cabinets and above backsplash, mount horizontally with ground slot at right.

3.16 WALL PLATES

- A. Submit samples as requested by Architect/Engineer.
- B. Provide special plates fabricated for devices shown ganged together at one location and provide special engraving for switch plates covering special utility switches as shown on Drawings.
- C. Special finish plates will be required where so noted on drawings or included in specifications. The sample of finishes will be furnished to the Architect/Engineer for approval when requested.
- D. Provide blank matching cover plates for outlets not used.
- E. Cover plates for telephones, dimmer controls, etc., shall match device plates in each area.

3.17 OUTLET, JUNCTION AND PULLBOXES

- A. Flush recessed wherever possible and securely supported from building construction.
- B. Where outlet boxes are installed in exposed block walls, locate them at corner of block. Locate conduit as required to meet block conditions. Coordinate with other Divisions.
- C. Identify junction boxes for particular services such as power, lighting, fire alarm, etc. Label with suitable tags or use stencil lettering.
- D. Locate where shown or required for outlet facilities and where shown or required for installing wire or cable. Make accessible after completion of construction; Electric Contractor shall be responsible for coordination with other divisions. Junction and pullboxes shall not be located in the finished room unless specifically permitted.
- E. Mounting heights of boxes shall be as scheduled.

3.18 PREVENTION OF CORROSION

- A. Protect all metallic materials against corrosion.
- B. Aluminum shall not be used in contact with earth nor embedded in concrete. Where connected to dissimilar metal, protected by approved fittings and treatment.
- C. Hot dip galvanize all ferrous metal materials such as bolts, braces, boxes, bodies, clamps, fittings, guards, nuts, pins, rods, shims, washers, and miscellaneous parts which are not made of corrosion-resistant steel. Use stainless steel fasteners in wet locations and out of doors.
- D. Galvanized in accordance with ASTM A-123 or A-153.

3.19 PAINTING

A. General Requirements:

- 1. Painting shall be provided as outlined hereafter.
- 2. Clean all surfaces of moisture, rust, plaster, dirt, dust, and foreign matter before painting.
- 3. Apply full even coats as required to provide an acceptable finish.
- 4. Apply finish coat just before final acceptance.
- 5. Protect all other surfaces with drop cloths, masking tape, etc.
- 6. Protect equipment and internal parts with masking tape.
- 7. Factory enamel-finished equipment not to be painted, EXCEPT when rusted or otherwise damaged; then paint as directed or if specifically called for hereinafter.
- 8. Appearance to be approved; repaint if required.

B. Paint all work of this division in the following areas:

- 1. Boiler Room, Mechanical Equipment Rooms, Electrical Equipment Rooms, Penthouses, Fan Rooms, all work of this contract exposed to the weather and where specifically called for.
 - a. Bare pipes, conduit, supports, all supports, mounting boards/panels, metal jackets, etc., also paint equipment not supplied with factory finished surface.

- i. First Coat: Pratt and Lambert “Effecto” primer unless equipment supplied with factory prime coat.
- ii. Second Coat: Pratt and Lambert “Effecto” enamel.
- iii. Color as selected by Engineer/Architect.
- iv. Additional coats as required.

3.20 WATERPROOFING, CAULKING AND SEALING

A. Opening Through Roofs:

1. Provide with nonferrous flashing pieces, skirts, hoods, and collars as required to make all ducts, pipes, and conduit watertight, and installed as approved by Architect/Engineer.
2. Where curbs are required as part of this Division for rectangular openings in new roofs, flashing will be done by others unless specifically indicated otherwise.
3. For existing roofs, provide all flashing for roof curbs, and all other roof openings.
4. Caulked and waterproofed, with additional material as required, seal airtight.

B. Opening Through Fire/Smoke Walls and Floors:

1. Install work per NFPA.
2. Provide sleeves for ducts and pipe anchor duct sleeves with angle iron.

3.21 TESTS

A. General:

1. Perform all operations required for the complete testing of all systems, equipment and related work as shown on drawings or specified herein and in accordance with all applicable requirements of the specifications.
2. Before final acceptance, all specified tests shall be completed to the satisfaction of the Engineer or his representative, who shall be the sole judge of the acceptability of such tests and who may direct the performance of any such additional tests as he deems necessary in order to determine the acceptability of the systems, equipment, material, and workmanship. Any additional tests required by the Engineer will be made at no additional costs to the Owner.
3. All protective equipment shall be actuated in a manner that clearly demonstrates their work ability and operation.
4. Demonstrate the ability of each and every piece of equipment to meet the design and operating requirements indicated on the Drawings.
5. The inspection and test by the Owner or Engineer of any articles or lots thereof, or failure to inspect and accept or reject any article or lots thereof, shall not relieve the Contractor from any responsibility regarding defects or other failure to meet the Specification requirements which may be discovered prior to final acceptance. Except as otherwise provided in the specification, final acceptance shall be conclusive except as regards any latent defects, fraud, or such gross mistakes as amount to fraud.
6. Acceptance of the material and/or equipment and the waiving of test thereof shall in no way relieve the Contractor of the responsibility for furnishing material and/or equipment meeting the requirements of these specifications.

B. Test Reports:

1. Written test reports shall be signed by an authorized representative of the equipment manufacturer and shall be submitted to the Engineer prior to final payment. Provide test reports for the following:
 - a. Fire alarm system. Refer to Section 28 31 00.
 - b. Feeder conductor. Load test (phase balance). Refer to Section 26 24 00, Part 3.4.
 - c. Load test (phase balance).
2. Perform any and all other tests that may be required by local municipality, utility or other governing body, board or agency having jurisdiction.

3.22 QUALITY OF WORK

- A. All work shall be executed in accord with recognized standards of workmanship. All work shall be installed in a neat and orderly manner. If, in the judgment of the Engineer, the workmanship is not acceptable, the work in question is to be removed and reinstalled in a manner satisfactory to the Engineer.
- B. Furnish at site during construction a competent and experienced foreman. They shall have complete charge of all field work of this Contract. They shall be authorized to act for the Contractor in their absence, and to represent the Contractor with the Engineer or Owner. The Project foreman shall not be changed during the Project except for single day occurrences for personal needs. It is essential that the same foreman be provided for the duration of the Project to maintain continuity on the job site. Cornell University shall view any departure from this requirement by the Contractor as an indication of the Contractor's unwillingness to meet the needs of Cornell University.
- C. The project foreman shall be present at site whenever any Contractor or subcontractor employees are working at the site. In the event of absence by the project foreman, the Prime Contractor shall designate an Assistant Foreman and advise the Owner and Engineer of the designated individual's name. The Assistant Foreman shall have been working on the site for a minimum of five (5) working days prior to being designated acting foreman and shall be designated at least two (2) working days prior to becoming acting foreman.
- D. All personnel employed by or subcontracted by the Contractor shall at all times be suitably clothed and shall conduct themselves in a professional manner. Shirts shall be worn at all times. Any employee found to have been making gestures or harassing remarks to the staff, students or general public shall be disciplined by the Contractor and removed from the site.
- E. No radios or other portable sound equipment shall be played on the site.

3.23 PROTECTION

- A. The Contractor shall provide adequate protection to the work, his workmen, the General Public, and private property.
- B. The Contractor shall use all means and precautions necessary to ensure on-site safety during construction. All OSHA construction requirements covering a project of this type shall be required of the Contractor.
- C. All fencing and security measures must be implemented before work starts.
- D. The Contractor shall use all means and precautions to ensure the safety of the occupants of the buildings during construction. Occupied portions of the buildings shall have a minimum of two (2) exits available at all times.

3.24 BARRIERS

- A. The Contractor shall furnish, erect, and maintain barricades, fences, railings, enclosures, guard lights, danger signals, warnings, cribbing, shoring, and other such precautions necessary to protect all installations and structures in the area of the work to ensure the safety of the public and to avoid damage or injury to any and all persons and property. Warning lights shall be of blinker type, battery or electrically operated.
 - 1. The Contractor shall be solely and without exception, responsible for safety on the project site.
 - 2. All barricade and security measures shall be implemented before work starts.

3.25 SAFETY & HEALTH REGULATIONS FOR CONSTRUCTION

- A. The Contractor shall be solely responsible for compliance with all applicable safety and health regulations including, but not limited to, U.S. Department of Labor Safety and Health Regulations for Construction. Construction employees are required to comply with the most stringent rule or standard in the event of dual or concurrent State and Federal jurisdiction. Detailed information on this subject may be obtained from the Office of Information Services, Occupational Safety and Health Administration, U.S. Department of Labor, Washington, D.C. 20210.
- B. No obstructions are to be placed on or around fire hydrants or fire department connections that could make them inaccessible or inoperative for firefighting purposes.
- C. All temporary construction sheds, trailers, and flammable liquid storage areas belonging to Contractors shall be placed on the construction site to minimize any danger to Owner's property and the public. Construction trailers and sheds shall require the pre-approval of the Owner.
- D. The conduct of the work shall be such that pestilence does not occur. To prevent influx of rats, vermin and other pestilence, the Contractor shall retain an approved exterminating firm until such time that the danger of pestilence has passed as approved by the Engineer. Contractors shall remove all garbage and trash from the site daily.

3.26 FIRE SAFETY

- A. Fire Watch: Provide a fire watch wherever welding, brazing, cutting, or other processes involving an open flame or potential for generating sparks is used. A fire watch shall consist of a person with a 10 pound carbon dioxide fire extinguisher. While on fire watch, the person assigned shall have no other duties or assignments.
- B. Fire Blanket: In addition to providing a fire watch, have available an approved fire blanket to cover any combustible materials in the immediate area.

3.27 INSPECTIONS

- A. The Engineer or Owner may visit the site at intervals appropriate to the stage of construction according to the General Conditions. The periodic observation or inspection of the general project progress shall not be construed as supervision of actual construction, nor make the Engineer or Owner be responsible for providing a safe place for performance of work by the Contractors or Contractor's employees or those of suppliers of Contractors or for access, visits, use, work, travel, or occupancy by any person.

3.28 LAYING OUT OF WORK

- A. The Plans are in part diagrammatic. The Contractor shall verify rough-in dimensions with Shop Drawings and with the Plans. Conform to dimensions shown on the Plans in preference to scaling from the drawings. Provide all fittings and appurtenances required for proper system operation.
- B. Before commencing work, the Contractor shall carefully examine the Contract Drawings. If any discrepancies occur between the drawings and the specifications, he shall report such discrepancies to the Engineer in writing and obtain written instructions as to the manner in which to proceed. No departures from the Contract Drawings shall be made without prior written approval of the Engineer.

3.29 SUBMITTALS/SHOP DRAWINGS

- A. Submission for Engineer Review: The Owner and Engineer will accept only electronic copies of submittals.
 - 1. Electronic Submittals:
 - a. The Prime Contractor shall submit one (1) electronic copy of each submittal to the Engineer for review.
 - b. The Engineer shall review and return the submittal in an electronic format to the Prime Contractor. All markups by the Engineer shall be in red print.
 - c. The Prime Contractor shall be responsible for distributing the returned submittal to subcontractors, suppliers, vendors, etc.
 - d. The Prime Contractor shall furnish color printouts of all electronic submittals for inclusion in the Operation and Maintenance Manuals.
 - B. Post copies of all submittals at temporary field office.
 - C. Quality and Legibility:
 - 1. Electronic Submittals:
 - a. Electronic submittals shall be digitally produced directly from the manufacturer. Scans of catalogs, faxes, etc. will not be accepted.
 - b. Contractor markings to electronic submittals must be made electronically.
 - c. Contractor cover sheets may be scanned and must meet the legibility requirements of hard copy submissions.
 - d. No exceptions shall be permitted.
 - D. Submittals shall contain:
 - 1. The date of the submission and the dates of any previous submission.
 - 2. The project title and number.
 - 3. Contract identification.
 - 4. The names of:
 - a. Contractor.
 - b. Supplier.
 - c. Manufacturer.

5. Identification of the product, with the specification section number.
 6. Field dimensions clearly identified as such.
 7. Relation to adjacent or critical features of the work or materials.
 8. Applicable standard, such as ASTM or Federal Specification numbers.
 9. Safety Data Sheets (SDS).
 10. Identification of deviations from Contract Documents.
 11. Identification of revisions on resubmittals.
 12. A 5" x 3" blank space for Contractor and Engineer stamps.
- E. Shop Drawings - Provide Shop Drawings for each product to be utilized on the project. Shop Drawings for equipment shall include detailed and dimensional literature and catalog data showing detailed compliance with the Contract Documents. Shop Drawings shall include a copy of the manufacturer's printed installation instructions for the equipment proposed. Shop Drawings for electrically energized equipment shall show all electrical characteristics and interconnection requirements.
- F. Engineer's Action:
1. The Engineer shall return copies of the Shop Drawings marked as follows:
 - a. "Reviewed for General Compliance Only - No Exception Taken" - Drawings bearing this comment have been found to be generally in conformance with the intent of the Plans and Specifications.
 - b. "Reviewed for General Compliance Only - Make Noted Corrections" - Drawings bearing this comment have been found to be generally in conformance with the intent of the Plans and Specifications, with the exception of the noted items. A resubmittal to the Engineer is not required and it is understood the Contractor will make the noted corrections.
 - c. "Reviewed for General Compliance Only - Revise and Resubmit" - Drawings bearing this comment have been found to contain a substantial departure from the Plans and Specifications. The Contractor must make a new corrected submittal.
 - d. "Reviewed for General Compliance Only - Rejected" - Drawings bearing this comment depict materials, equipment or supplies which are not judged by the Engineer to meet the requirements of the Plans and Specifications. The Contractor shall provide a new submittal on alternative equipment.
 - e. "Reviewed for General Compliance Only - Not Reviewed; Returned" - Submittals bearing this comment have not been reviewed and are returned to the Contractor.
 - f. "Reviewed for General Compliance Only - Additional Submittal Required" - Submittals bearing this comment have been found to be generally in conformance with the intent of the Plans and Specifications; however, more information is required, and a resubmittal is required.
- G. Samples:
1. The Contractor shall, when required, submit to the Engineer for review typical samples of materials equipment and products. The Samples shall be properly identified by tag and shall be submitted sufficiently in advance of the time when they are to be incorporated into the work so that rejection thereof will not cause delay.

3.30 EXAMINATION OF ACTUAL CONDITIONS

- A. Before ordering any material or doing any work, the Contractor shall verify all measurements at the site and shall be responsible for the contingencies which may be encountered. No extra compensation will be allowed on account of the difference between actual dimensions and measurements at the site and those indicated on the drawings. Any difference which may be found should be submitted to the Engineer for consideration before proceeding with the work.
- B. The Contractor shall work accurately to benchmarks and to proper elevations and dimensions established by the Contractor. The Contractor shall check the conditions and details of the work in relation to the progress of the work.
- C. The Contractor shall lay out the work, establishing heights and grades for all piping work included in these specifications in strict accordance with the intent of the drawings, the physical conditions of the Project and the finished site grades. The Contractor shall be responsible for the accuracy of the work and ensuring that the work meets all physical conditions of the Project and the requirements of these specifications.
- D. Prefabrication of piping, conduit, etc. may be performed only at the risk of the Contractor. Changes to the prefabricated piping required by actual site conditions shall be made by the Contractor without extra compensation from Cornell University.
- E. Due to the scale of drawings, it is not possible to indicate all offsets, fittings, changes in elevation, etc. which may be required. Make all such changes in piping, location of equipment, etc., to accommodate work to obstacles encountered, at no increase in compensation. If requested, submit at least five (5) copies of drawings detailing all major deviations or changes. All changes must be approved before installation.
- F. Plans show general arrangements of piping and connections. Install work substantially as indicated. Verify exact locations and elevations on job.
- G. Thoroughly coordinate work with that of other Contractors.
- H. Should either Engineer's details, field conditions, a change in equipment or Shop Drawing information necessitate an important rearrangement, report same to Engineers and obtain approval before proceeding.
- I. No compensation shall be awarded for extra work because the above precautions have not been followed. In the event of conflicts, the Engineer's decision is final. The Contractor shall be fully responsible for unauthorized changes.

3.31 MANUFACTURER'S DIRECTIONS

- A. In the case where any manufactured article, material, or equipment is specified, then the Contractor must install, apply, connect, erect, use, clean and condition it in strict accordance with the manufacturer's directions.

3.32 SLEEVES, INSERTS AND OPENINGS

- A. Provide sleeves for all piping systems. Set all sleeves and inserts in place ahead of new construction. Cooperate with other trades. The Contractor shall correct all omitted or improperly located sleeves without additional compensation.

3.33 SUPPORTS AND HANGERS

- A. Supports: Investigate thoroughly, Plans and Shop Drawings related to work, to determine how equipment and piping are to be supported, mounted, or suspended. Provide extra steel, bolts, inserts, pipe stand brackets, or any other items required for proper support. Provide supporting accessories where required, whether or not shown on the drawings. Where directed, furnish drawings showing supports, etc., for approval.

3.34 EQUIPMENT INSTALLATION

- A. It is required of each equipment manufacturer, through the Contractor, to carefully check Plans and Specifications as they affect their particular equipment. Report to Engineers, any discrepancies or contradictions as applied to their particular equipment which prevents proper functioning, servicing, etc. before or at the time when Shop Drawings are submitted. Furnish manufacturer's printed installation instructions for each piece of equipment. Thoroughly instruct contractors' personnel on the job, exactly how their equipment shall be installed, connected, lubricated, started up, operated, etc., so that all factory instructions are rigidly followed. If required by Engineer, Contractor shall submit satisfactory evidence that systems have been installed strictly in accordance with manufacturer's recommendations and have been properly aligned.

3.35 NOISE AND VIBRATION

- A. Install all equipment to be free of transmission of noise and vibration to occupied spaces. Arrange isolated equipment so that it does not contact members of the building structure, ceiling grids, piping, conduits, or ductwork.
- B. Provide replacement at no cost to the Owner of any pump, motor, motor starter, or lighting fixture, transformer, UPS system, other equipment which in the opinion of the Engineers produces excessive vibration or noise.

3.36 EQUIPMENT CHECKOUT AND TESTING

- A. Notify Engineer when installation(s) is/are ready for testing, as specified with ample time in advance. Provide all metered and unmetered services, tools, equipment, and manpower necessary to perform tests.
- B. Perform all equipment testing as specified and as recommended by the manufacturer and directed by the Engineer. Demonstrate that all operating and safety devices are in proper working order.

3.37 AS-BUILT DRAWINGS

- A. The Contractor shall be required to prepare and submit a set of Division 26 "As-Built" Drawings as the portions of work are completed and prior to application for final payment.
- B. The As-Built Drawings shall include a full set of the 'as bid' or 'conformed' Contract Drawings for Division 26, and Divisions assigned to Division 26 such as Divisions 27 and 28, plus all drawings prepared by the Contractor, subcontractors, suppliers, and vendors for those Divisions.
- C. The submitted drawings shall be in the form of full size as-bid drawings first plus additional drawings and attachments following. The drawings shall be clean, original paper copies of the Contract Drawings, marked up in red pencil or pen with the Contractor's markups. For floor plans drawn at less than 1/4" scale, the field drawings should be expanded to 1/4" scale to provide room for markups.

- D. The Contractor shall maintain a dedicated set of Construction Drawings at a protected location at the job site for the continuous documentation for these as-builts. The Contractor shall record the actual installed locations of devices, major conduit runs, wireway runs, cable tray and wire basket runs, junction boxes, equipment, panels, lighting, fire alarm devices, fire alarm panels, booster panels, fire alarm EOL resistors, fire alarm control relays and monitor modules. Record any and all variations from the original Construction Drawings in neat, legible, hand drawn lines and text. Attach copies of Contractor's field sketches and note where they pertain.
- E. Confirm that all information provided to the Contractor in the form of Request for Information (RFI) responses, accepted Requests for Proposal (RFPs), Change Orders and Supplemental Instructions (SIs) is properly conveyed on the drawings. Show the actual changes are made, do not just paste a copy of the RFI, RFP, ASI, CO unless that document includes a full scale drawing which accurately represents the work actually installed.
- F. Confirm that the room names and numbers shown on the as-built's are the actual room numbers and names posted on the rooms at the time of turnover.
- G. Confirm that the panel directories shown match the actual panel directories installed in the panels in the field, and that those panel directories actually depict the correct circuit connections installed. Confirm that the room numbers shown in the panel directories match the room numbers on the rooms, and on the As-Built Drawings.
- H. Confirm that the electrical equipment circuiting schedule accurately depicts any changes made during construction.
- I. For work which becomes concealed as part of the project, keep an accurate record, and show on As-Built Drawings the actual installed location of any concealed work such as underground services, piping and ductwork, junction boxes, etc. Provide location on Record Drawings for outside services by indicating actual dimensions from fixed reference points which will be available after completion of construction. "Tie two (2) dimensions from different reference points to confirm locations of concealed work.
- J. For projects extending more than three months, provide the original "As-Built" to the Engineer as the work is completed on sections of the project and obtain a receipt from the Engineer. The Contractor shall be responsible to the safe keeping and maintenance of the As-Built Drawings throughout construction, and for maintenance of one (1) photocopy at the Contractor's office for a period of not less than three (3) years following final acceptance.
- K. Provide the original copies of the As-Built Drawings to the Architect or Engineer in accordance with the provisions of the General Conditions and Division 1. Unless reproducible As-Built Drawings are required under the General Condition and Division 1, provide the original paper copy of As-Built Drawings to the Engineer.

3.38 OPERATION AND MAINTENANCE INFORMATION

- A. Submit Operation and Maintenance Manuals per Section 01 33 00 "Submittal Procedures". Submit reviewed manual content formatted and organized as required by this Section.
 - 1. The Architect/Engineer will comment on whether content of Operation and Maintenance submittals is acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

- B. Initial Manual Submittal: Submit a draft copy of each manual at least 30 days before commencing demonstration and training. Architect/Engineer will comment on whether the general scope and content of the manual are acceptable.
- C. Final Manual Submittal: Submit each manual in the final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. The Architect will return a copy with comments.
 - 1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.
- D. Comply with Section 01 77 00 "Closeout Procedures" for schedule for submitting Operation and Maintenance documentation.
- E. Format of Operation and Maintenance Manuals: Submit manuals in the form of a single composite electronic PDF file.
 - 1. Electronic Files: Use electronic files prepared by the manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size. "Recognize Text" shall be run on all scanned documents to provide a text searchable PDF.
- F. Organization and Requirements for Operation and Maintenance Manuals: Unless otherwise indicated, organize each manual into the format as described below, and as indicated in Figure 1: O&M Manual Diagram, in Section 01 78 23.
 - 1. Title Page: Indicate Building Name, Project Title, and Project Number.
 - 2. Table of Contents: Hyperlinked bookmarked information with links to each CSI Master Format specification section contained in manual.
 - 3. Contact List: Indicating name and contact information for the following:
 - a. Construction Manager or General Contractor.
 - b. Subcontractor.
 - c. Architect.
 - d. Architect's Subconsultants.
 - 4. Project Warranties: Include the overall project warranty and hyperlinks to any special warranties included in equipment's specification sections.
 - 5. Operations and Maintenance Information: Operations and Maintenance information for every CSI specification section included in project. Each section shall contain the final submittal that has been updated to include any architectural remarks, any special Contractor or manufacturer warranty associated with the equipment or system, the installation, Operations and Maintenance manuals for each piece of equipment, including any accessory components, all test reports for systems and equipment and parts list for each piece of equipment.
 - 6. Include a typed guarantee from the Contractor with a one (1) year guarantee stated as commencing on the date of final acceptance.
 - 7. The Contractor shall include a complete copy of the O&M Manual checklist which follows this section as the last page of the O&M Manual.

3.39 INSTRUCTION OF OWNER’S DESIGNATED REPRESENTATIVE

- A. After submission and acceptance of the Operating and Maintenance information and prior to final acceptance of the Project, provide a scheduled instruction period for the Owner’s designated representative. The instruction period shall be sufficient to cover the contents of the Operating and Maintenance portfolio, a walk-through of the Project and a review of all systems.
- B. At the conclusion of the instruction period, provide approved copies of the accepted Operation and Maintenance Manual to the Owner’s representative and obtain a signed receipt.

3.40 GUARANTEE

- A. Prior to application for final payment, the Contractor shall provide a written guarantee covering all portions of the work of this Division. The guarantee shall include all work and materials for a period of one (1) year from the date of final acceptance. The guarantee shall provide for the repair or replacement of any defective equipment, materials, products, or work at no cost to the Owner.
- B. Items or work which are repaired or replaced under this guarantee shall be covered under an extended guarantee by the Contractor so that the replaced products or work shall have performed satisfactorily without repair or replacement for a period of one (1) year.
- C. The failure of any manufacturer to provide a one (1) year warranty, or the failure of any manufacturer or vendor to honor a warranty shall not relieve the Contractor from his obligation to provide a complete parts and labor guarantee on all work provided under his Contract for a period of one (1) year.
- D. Supplemental Guarantees - Supplemental Guarantees and extended warranties may be included under this Contract as part of specific specification sections.

3.41 GUARANTEE PERIOD

- A. During the guarantee periods, the Owner may respond to emergency situations. Emergency situations for the purposes of this section are those situations determined to be potentially harmful to the surrounding personnel, equipment, or environment. In cases where work is performed by the Owner’s employees, the Contractor will be charged for all labor and material needed to complete emergency repairs, if the repairs are determined to be the result of faulty material or workmanship. The performance of these repairs by the Owner shall not void any Contractor guarantee.
- B. The act of the Owner in responding to any emergency situation shall not relieve the Contractor from the obligation to respond to the emergency and from correcting any problems as part of the original Project cost.
- C. The Owner shall begin preventive maintenance programs immediately following final inspections. Preventive maintenance activities will not relieve Contractor from any equipment warranties.

O&M Manual Checklist

Date _____

(Include a completed copy of this Checklist in O&M Manual when submitted)

Project _____

Trade _____

Project Name _____

Submitted as an electronic file per Section 01 78 23

YES / NO

Composite electronic PDF file

YES / NO

Minimum readable text size

YES / NO

Title page “Recognize Text” turned on for all scanned documents

YES / NO.....
O&M Manual:

Cover Sheet listing:

Building Name

O&M Manual Table of Contents: Hyperlinked book-marked information with links to each CSI Master Format
Specification Section in manual YES / NO

O&M Manual Contact List:

ContractorContractor Name _____
Contractor's Address _____
Contact person _____
Tel. & Fax #'s _____Each Major SubcontractorContractor Name _____
Contractor's Address _____
Contact person _____
Tel. & Fax #'s _____Project Manager

Name

EngineerName _____
Company Name _____
Contact person _____ArchitectName _____
Company Name _____
Contact person _____

.....

O&M Manual - Remaining Pages:

Checklist Page 2

O&M Manual Project Guarantee & Warranties:

Typed guarantee from Contractor with 1 year guarantee stated as commencing on the date of final acceptance by the University. Date must be identified _____

Hyperlinks to any special warranties included in Equipment Specifications YES / NO

1.	Organized by CSI Specification Section number.	<u>YES / NO</u>
2.	Each CSI Specification Section included.	<u>YES / NO</u>
3.	Includes final submittal, updated to contain A/E remarks.	<u>YES / NO</u>
4.	Includes any special Contractor or manufacturer warranty.	<u>YES / NO</u>
5.	Includes the Installation, Operation and Maintenance (IOM) manuals for each piece of equipment, up to date for the version of equipment supplied.	<u>YES / NO</u>
6.	Includes IOM data for accessory data.	<u>YES / NO</u>
7.	Includes test reports for each piece of equipment.	<u>YES / NO</u>

Scan of spare parts list.

Scan of all test reports (i.e., fire alarm).

Scan of all inspections (i.e., plumbing, electrical).

Scan of all certification data.

Scan of facility lubrication chart.

Scan of facility valve chart.

Scan copy of complete temperature control and operating instructions.

Completed copy of checklist last page of O&M Manual.

END OF SECTION 26 05 00

DIVISION 26 ELECTRICAL

SECTION 26 05 15 - TEMPORARY CONSTRUCTION ELECTRICAL SERVICES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The Contract Drawings and the General Provisions of the Contract, including the General Conditions of the Contract for Construction, Supplementary Conditions, Special Conditions and Division 1 Specification Sections apply to the work of this Section.
- B. The Work of Section 26 05 00 - Electrical Basic Materials and Methods applies to the Work of this Section.
- C. The Work of Section 28 31 00 - Fire Alarm System Improvements applies to the Work of this Section.

1.02 WORK INCLUDED

- A. Electrical outages for panel and feeder replacements.
- B. Temporary elevator feeder.

1.03 RELATED WORK NOT INCLUDED

- A. Other Division 26, 27 or 28 requirements may be requested by the General Contractor and are not covered by this Section.

1.04 SUBMITTALS

- A. Provide detailed Plan for:
 - 1. Electrical outages.
 - 2. Temporary elevator feeder.

PART 2 - PRODUCTS

2.01 ELECTRICAL SERVICE

- A. Provide products conforming to Specification Section 26 05 00.

2.02 FIRE ALARM

- A. Provide products conforming to Specification Section 28 31 00.

PART 3 - EXECUTION

3.01 TEMPORARY ELECTRICAL SERVICE

- A. Conform installation to all requirements of the NEC.

3.02 TEMPORARY FIRE ALARM

- A. During all hours, the building fire alarm system shall be fully operable outside of project work areas. The system will be in trouble or supervisory only when fire alarm or sprinkler work is occurring. At the end of each workday, the system will be 100% operational and no trouble showing.

END OF SECTION 26 05 15

DIVISION 26 ELECTRICAL

SECTION 26 05 26 – GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The Contract Documents and the General Provisions of the Contract, including the General Conditions of the Contract for Construction, Supplementary Conditions, Special Conditions and Division 1 Specification Sections apply to the Work of this Section.
- B. The Work of Section 26 05 00 - Electrical Basic Materials and Methods applies to the Work of this Section.

1.02 WORK INCLUDED

- A. Provide a complete, operating, tested, functioning, documented grounding system including all work shown, specified, or required for proper system operation.
- B. All grounding and bonding circuitry shall equal or exceed the requirements of NEC, latest issue, Article 250.
- C. The raceway system which includes all metal conduit, wireways, pullboxes, junction boxes, bus ducts, built-up enclosures, 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 non-load current carrying parts of the electrical system.
- D. In addition to the raceway system ground, an additional green wire ground shall be run in each raceway, sized for the largest circuit in the raceway.
- E. Provide additional grounding and bonding as required in the Div 27 – Telecommunications requirements.

1.03 DEFINITIONS

- A. Earth: Interpreted as referential ground, the point in which all grounding is connected to.
- B. Ground: Interpreted as made conducting connection to earth by employing such devices as a driven metal rod, a buried metal plate, a metallic water pipe, etc., or any multiple or combination of these devices, and the conductors which may interconnect any of the foregoing.
- C. System ground: Interpreted as a low impedance made conducting ground plane or system, with a conducting connection to ground, established for the benefit of a particular electrical system or related systems.
- D. Bonded: Connected to establish electrical continuity and conductivity.

PART 2 - PRODUCTS

2.01 CONDUCTORS

- A. All exposed grounding conductors such as bars, straps, cables, flexible jumpers, braids, shunts, etc., shall be bare copper unless specifically noted or approved otherwise.
- B. Cable size shall be as required by NEC Code, Section 250, stranded, soft drawn or soft annealed, unless otherwise shown on plans or specified.
- C. Cable insulation type and color shall be as shown or as specified.
- D. Manufacturer to be same as specified in Section 26 05 00 - Basic Materials and Methods.

2.02 GROUND RODS

- A. Rods shall be solid cylindrical, sectionalized as required and $\frac{5}{8}$ " minimum diameter, minimum 10 feet long.
- B. Material shall be solid copper or copperclad steel approved for use intended.
- C. Copperweld or approved equal.

2.03 CONNECTORS, CLAMPS, TERMINALS

- A. Mechanical connectors and clamps shall be silicon bronze.
- B. Solderless compression terminals shall be copper, long-barrel, two-bolt.
- C. Make: Anderson, Burndy, Penn-Union, T&B, approved for use intended.

2.04 SOLDER

- A. Solder shall be prohibited for connections, except for high voltage cable metallic tape shields.

2.05 MOLDED FUSION WELDS

- A. Provide mold based system for thermite exothermic welding of approved metals.
- B. Approved systems include Erico's Cadweld, Burndy's Burndyweld, and ABB's Furseweld.

2.06 HARDWARE

- A. All hardware shall be silicon bronze alloy.
 - 1. Make: "Durium" or "Everdur".

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Bare copper bars, cables, fittings, etc., shall not be installed in cinder fill nor shall be covered with soil containing cinders or other corrosive material.
- B. Cables shall be installed with enough slack to prevent breaking stresses.
- C. All grounding conductors subject to mechanical damage shall be protected by rigid steel conduit or other suitable steel guards and in all cases where so protected shall be permanently and effectively grounded to said enclosure at each end of its length.
- D. Where grounding conductors pass through floor slabs, walls, etc., and are not encased in metal conduit, they shall be sleeved in fiber, or approved non-metallic conduit.
- E. The length, number, spacing, and location of ground rods shall be as shown on the Drawings and as specified hereinafter.
- F. The depth to which ground rods are driven shall be as shown on the Drawings, or as specified, or to refusal.
- G. Connections to water pipes, including water meter or other similar device bypass connections, shall be made only after the surface of the pipe at the point of connection has been thoroughly cleaned and brightened and immediately prior to actually making the connection the contact surfaces are to be coated with an anti-oxidation compound such as Ideal Noalox.
- H. All equipment ground bus, ground pads, frames, enclosures, etc., shall have surfaces at point of connection thoroughly cleaned and brightened just prior to actually making the connection. Touch-up damaged painted surfaces.
- I. Splices in wire or cable grounding conductors are prohibited.
- J. Where connections between ground rods and conductors are intended to be buried, the connection between shall be a molded exothermic fusion weld.

3.02 INSTALLATION, RACEWAY SYSTEMS

- A. All metal supports, cable trays, messenger cables, frames, brackets, races, etc., for any part of 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, the size of the bonding conductor in accordance with NEC Table 250.66.
- B. 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 where required by NEC.
- C. Conduit which runs to or from all 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 sized in accordance with NEC Table 250.122 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.

- D. Conduit expansion joints and telescoping sections of metal raceways shall be provided with bonding jumpers sized in accordance with NEC Table 250.122.
- E. Where flexible metallic conduit or liquid tight conduit is used, a bonding jumper shall be provided, sized in accordance with NEC Table 250.122.
- F. All non-metallic runs of conduit or raceway shall be provided with a system ground conductor sized according to Table 250.122.
- G. Where conduit enters or leaves any electrical enclosure with removable cover plates, provide conduit grounding bushings and bonding jumpers sized in accordance with NEC Table 250.122 between the grounding bushings and the enclosure rigid frame or ground bus.
- H. The ground conductors contained in the interstices of interlocked armor cable shall be connected to ground at every splice and termination point.

3.03 INSTALLATION, ATTACHMENT TO STRUCTURAL STEEL

- A. The location of attachment bonds of ground conductors shall be at points not subject to mechanical damage, but, if possible, where accessible for inspection.
- B. Attach preferably by molded fusion welding process.
- C. Where welding is prohibited, attach by bolting, 7/16" hole in steel, 3/8" silicon bronze bolt, bolt end peened, steel surface bright and flat prior to bolting, just prior to bolting contact surfaces lightly coated with an anti-oxidation compound such as Ideal Noalox.

3.04 GROUND ROD CONNECTION

- A. Unless otherwise shown on drawings or specified, all below grade connections shall be by molded fusion welding process, all molds shall be new and unused at start of work and shall be replaced when worn or broken, and the use of crossover molds is prohibited.

3.05 INSTALLATION, SECONDARY ELECTRICAL SYSTEMS

- A. The neutral conductor of each and every low voltage, single or polyphase, system or distribution system, except special isolated double insulated systems, shall be solidly connected at one point only; at the main secondary switchgear; to system ground and shall be sized for current carrying capacity, not to be less than the following, which are listed in preferential order:
 - 1. As shown or specified.
 - 2. As required by NEC, latest issue, Table 250.122.
 - 3. Not less than 25 percent of the transformer full load current or main protective device rating, whichever is greater, based on NEMA standard bus size.
- B. Provide equipment grounding conductor, green colored insulation, with phase conductors, to primary side of all transformers rated 600 volts or less circuited to case and secondary neutral bushing, to motors, to motor control equipment, to Kitchen equipment, to heating equipment, and to all convenience outlets, insulation shall be same type as phase conductors.

- C. Transformer secondary neutral bushings shall also to be circuited to nearest metallic water pipe, building steel or ground rod.

END OF SECTION 26 05 26

DIVISION 26 ELECTRICAL

SECTION 26 05 53 - ELECTRICAL EQUIPMENT IDENTIFICATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The Contract Documents and the General Provisions of the Contract, including the General Conditions of the Contract for Construction, Supplementary Conditions, Special Conditions and Division 1 Specification Sections apply to the Work of this Section.
- B. The Work of Section 26 05 00 - Electrical Basic Materials and Methods applies to the Work of this Section.

1.02 WORK INCLUDED

- A. Provide a complete, operating, tested, functioning, documented Electrical Equipment Identification System including all work shown, specified, or required for proper system operation.
- B. Under this Section provide equipment and circuit identification as follows:
 - 1. Typewritten panel directories with duplicates on As-Built Drawings.
 - 2. Panelboard nameplates.
 - 3. Panelboard breaker identification tags.
 - 4. Wiring color code.
 - 5. Wiring labeling.
 - 6. Junction box marking.
 - 7. Fire alarm detection junction box color coding.
 - 8. Motor starter/disconnect/VFD nameplates.
 - 9. Conduit marking.
 - 10. Panelboard voltage marking.
 - 11. Receptacle marking.
 - 12. Fire alarm device labeling.
 - 13. Arc flash equipment marking.
 - 14. Ground bar conductors.

1.03 SUBMITTALS

- A. Provide submittals, shop drawings and coordination drawings. Provide for the following:
 - 1. Panel.
 - 2. Switchgear.
 - 3. Motor starters.
 - 4. Disconnect.
 - 5. VFD nameplates.
 - 6. Arc flash labeling.

1.04 RELATED WORK SPECIFIED ELSEWHERE

- A. The factory produced panelboard nameplates included in Specification Section 26 24 00.

- B. Color code for conductors provided in Specification Section 26 05 00.

PART 2 - PRODUCTS

2.01 IDENTIFICATION MATERIALS

A. Legend Plates:

1. Two ply, 1/16" thick flexible plastic legend plates, front etched with minimum 3/16" Sans Serif letters. Provide adhesive backing and a minimum of two 5/32" diameter screw holes. Plate size shall be minimum 1" x 3". Multi-layer, non-conductive material, machine-engraved with proper designation.
2. Stick on computer printed labels shall not be accepted.

B. Stencils:

1. Die cut, capital letters.
2. Letters 3/8" minimum height.

C. Wire Markers:

1. Adhesive backed mylar or fabric material with printed markings.
2. Brady or equivalent.

D. Voltage Markers:

1. Voltage markers shall be bright orange with black letters. Brady Style B (1" by 4½") or equal.
Examples:

Three Phase	Single Phase	Three Phase
208 volts	240 volts	480 volts
120 volts	120 volts	277 volts

E. Receptacle Source Marker:

1. 12 point black text on white or clear background, computer printed stick-on labels.

2.02 ARC FLASH LABELING

- A. Provide labels on all Contractor-provided electrical equipment. Provide sample label submittal for review.

2.03 PANEL SCHEDULE

- A. All panel schedules shall be typewritten. Handwriting in any form will not be accepted.
- B. Panel schedules shall identify voltage of operation, rating of buss or MCB and upstream overcurrent protection devices.
- C. Breakers shall be identified by their pole space, current rating and load serviced.
- D. The Contractor shall provide their company name and date of substantial completion on the schedule.

2.04 FIRE ALARM DEVICE ADDRESS LABELING

- A. Provide computer-printed adhesive labels for each fire alarm device. Label shall indicate the device address number for initiating devices and the loop/zone number for notification devices.

PART 3 - EXECUTION

3.01 IDENTIFICATION, GENERAL

- A. Equipment name and number as shown on drawings to be used for equipment identification.
- B. Disconnect switches, starters, control, etc., serving utilized equipment shall be labeled on front cover.
- C. Step-down transformers shall be labeled with primary/secondary voltages.
- D. Utilized equipment which does not have a service voltage clearly indicated shall also be labeled by the Contractor.
- E. Starters or control panels with interlocks shall be provided with a warning sign to indicate separate control voltage and may be energized. A warning sign shall be mounted inside the enclosure.

3.02 IDENTIFICATION MARKERS

- A. Securely fastened to equipment to be identified with adhesive material and plated screws.
- B. Locate on front of equipment to be identified in neat manner, plumb and true.
- C. All power supply equipment; i.e., branch circuit breakers, equipment disconnect switches, motor starters, etc. to be labeled to identify function and/or load served.

3.03 GROUND BAR CONDUCTOR LABELING

- A. Ground bars that are separate from electrical equipment, e.g., telecom grounding bars, shall have each conductor leaving the ground bar labeled with a plastic engraved plate.
- B. Ground bars inside of electrical service equipment shall have their connections to grounding electrodes labeled with a plastic engraved plate.

3.04 STENCILED LABELS

- A. To be used only on equipment in unfinished areas.
- B. Obtain Engineer's approval.
- C. Locate on front of equipment to be identified in neat manner, plumb and true.

3.05 WIRE MARKERS

- A. Install approximately 2" from wire ends.
- B. All wiring to be identified via labeling at all ends, in junction and pull boxes, in panelboards, at equipment terminations, at terminal boards and/or cabinets. Wiring to be identified for continuity.

3.06 PANEL DIRECTORIES

- A. Install in a manner to be legible but protected from physical damage under conditions of normal use.
- B. Room names and numbers to be referenced in the directory along with load supplied.

3.07 MATERIALS TO BE LABELED

- A. Directories: Update existing panelboards to include new load served.

3.08 CONDUIT IDENTIFICATION

- A. Neat ½" high black handwritten with permanent marker, block letters at 6" from entrance to panelboards, junction boxes, starters, and equipment.
- B. Use a consistent numbering scheme, separate from circuit, or load numbers, start with A1 and continue through Z99, omitting the Letters D, I, L and O. Conduits shall be marked in all spaces where exposed or accessible. Mark conduit numbers inside junction boxes where the conduit is not exposed or accessible.
- C. Identify conduit layout and conduit numbers on As-Built Drawings.

3.09 FIRE ALARM/DETECTION

- A. Paint junction box covers red and mark zone and function in permanent black marker on outside of junction box cover.
- B. Omit red paint on junction box covers in finished areas. Mark zone and function on inside of junction box in finished areas.

3.10 RECEPTACLE IDENTIFICATION

- A. Each receptacle shall be marked with source panel and breaker number.

3.11 ARC FLASH LABELS

- A. Labels shall be customized, and type written for each piece of equipment.
- B. Labels shall only be installed after all the painting has been completed.

END OF SECTION 26 05 53

DIVISION 26 ELECTRICAL

SECTION 26 09 23 – LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Provide a complete, operating, tested, functioning, and documented Lighting Control System including all work shown, specified, or required for proper system operation.
- B. Contractor's work to include all labor, materials, tools, appliances, control hardware, sensor, wire, junction boxes and equipment necessary for and incidental to the delivery, installation and furnishing of a completely operational lighting control system, as described herein.
- C. The Contractor/Supplier shall examine all general specification provisions and drawings for related electrical work required as work under Division 26.

1.02 SUMMARY

- A. This Section includes switches and occupancy sensors.
- B. Related sections include the following:
 - 1. Division 26 Section 26 05 00 - Electrical Basic Materials and Methods.

1.03 SUBMITTALS

- A. Product Data: Include dimensions and data on features, components, and ratings for lighting control devices.
 - 1. Switches.
 - 2. Occupancy sensors.
- B. Samples: Occupancy sensors for color selection and evaluation of technical features.
- C. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.
- D. Maintenance Data: For lighting control devices to be included in maintenance manuals.

1.04 QUALITY ASSURANCE

- A. Source Limitations: Obtain lighting control devices from a single source with total responsibility for compatibility of lighting control system components specified in this Section and throughout Division 26.
- B. Electrical Components, Devices and Accessories: Listed and labeled as defined in NFPA 70, Article 100, for their indicated use and installation conditions by a testing agency acceptable to authorities having jurisdiction.
- C. Comply with 47 CFR 15, Subparts A and B for Class 'A' digital devices.
- D. Comply with NFPA 70.

1.05 COORDINATION

- A. Coordinate features of devices specified in this Section with systems and components specified in other Sections to form an integrated system of compatible components. Match components and interconnections for optimum performance of specified functions. Include coordination with the following:
 - 1. Division 26 Section “Basic Materials and Methods”.
 - 2. Division 26 Section “Panelboards”.
- B. Where a light control device is selected as part of a system, all components of the system must be from the same manufacturer.

PART 2 - PRODUCTS

2.01 GENERAL LIGHTING CONTROL DEVICE REQUIREMENTS

- A. Line-Voltage Surge Protection Device: Include in all 120- and 277-V solid-state equipment. Comply with UL 1449, 3rd Edition and with ANSI C62.41 for Category ‘A’ locations.

2.02 OCCUPANCY/ VACANCY SENSORS

- A. Ceiling-Mounting Units: Unit receives 24 V dc control power from a separately mounted auxiliary power and control unit and operates power switching contacts in that unit.
- B. Switch-Box-Mounting Units: Unit receives power directly from switch leg of the 120- or 277- V ac circuit it controls and operates integral power switching contacts rated 800 W at 120-V ac, and 1000 W at 277-V ac, minimum. Units shall be capable of either auto-on or manual-on operation, vacancy.
- C. Operation: Turns lights on when the room or covered area is occupied and off when unoccupied, unless otherwise indicated.
 - 1. Time Delay for Turning Lights Off: Adjustable over a range from 5 seconds to 30 minutes, minimum.
 - 2. Manual Override Switch: Turns lights off manually regardless of elapsed time delay.
 - 3. Ambient-Light-Level Control: Adjustable for setting a level of ambient illumination above which sensor will not turn lights on when occupancy is sensed.
 - 4. Isolated Relay Contact: Operates on detection of occupancy or vacancy, as indicated, to activate an independent function.
- D. Auxiliary Power and Control Units: As follows:
 - 1. Relays rated for a minimum of 20-A normal ballast load or 13-A tungsten filament or high-inrush ballast load.
 - 2. Sensor Power Supply: Rated to supply the number of connected sensors.
- E. Where part of a system, the occupancy sensor shall be selected based upon compatibility with the system. See system specifications for alternate sensors.

- F. Dual-Technology Type: Uses a combination of passive-infrared and ultrasonic detection methods to distinguish between occupied and unoccupied conditions for area covered. Particular technology or combination of technologies that controls each function (on or off) is selectable in the field by operating controls on units. All sensors shall be of the dual-technology type.
- G. Description: Dual technology (ultrasonic and passive infrared) sensors, ceiling-mounted shall be used, unless otherwise noted.
- H. Manufacturers:
 - 1. Greengate Lighting Controls.
 - 2. Leviton.
 - 3. Wattstopper, Inc. (Legrand).
 - 4. Sensor Switch, Inc. (Acuity).
 - 5. Lutron.
 - 6. NX (Current).

2.03 TOGGLE SWITCHES

- A. Switches, Local:
 - 1. Toggle operated A.C. type.
 - 2. Color selected by Architect.
 - 3. Specification grade, slow make, slow break.
 - 4. 20 amperes at 120V rating.
 - 5. Make: P&S PT20AC1 single pole, PT20AC3 three way.
 - 6. Provide with plugtail connector PTS6STR3&4.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install equipment level and plumb and according to the manufacturer's written instructions.
- B. Mount lighting control devices according to the manufacturer's written instructions and requirements in Division 26 Section 26 05 00 - Electrical Basic Materials and Methods.
- C. Mounting heights indicated are to bottom of unit for suspended devices and to center of unit for wall-mounting devices.

3.02 CONTROL WIRING INSTALLATION

- A. Install wiring between sensing and control devices according to the manufacturer's written instructions and as specified in Division 26.
- B. Wiring Method: Install all wiring in raceway as specified in Section 26 05 00 - Electrical Basic Materials and Methods.
- C. Bundle, train, and support wiring in enclosures.
- D. Ground equipment.

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

3.03 IDENTIFICATION

- A. Identify components and power and control wiring according to Division 26.

3.04 FIELD QUALITY CONTROL

- A. Schedule visual and mechanical inspections and electrical tests with at least seven (7) working days advance notice.
- B. Inspect control components for defects and physical damage, the testing laboratory labeling, and nameplate compliance with the Contract Documents.
- C. Check the tightness of electrical connections with torque wrench calibrated within the previous six months. Use the manufacturer's recommended torque values.
- D. Verify settings of photoelectric devices with photometers calibrated within the previous six months.
- E. Electrical Tests: Use particular caution when testing devices containing solid-state components. Perform the following according to the manufacturer's written instructions:
 - 1. Continuity tests of circuits.
 - 2. Operational Tests: Set and operate devices to demonstrate their functions and capabilities in a methodical sequence that cues and reproduces actual operating functions.
 - a. Include testing of devices under conditions that simulate actual operational conditions. Record control settings, operations, cues, and functional observations.
- F. Correct deficiencies, make necessary adjustments and retest. Verify that specified requirements are met.
- G. Test Labeling: After satisfactory completion of tests and inspections, apply a label to tested components indicating test results, date, and responsible agency and representative.
- H. Reports: Written reports of tests and observations. Record defective materials and workmanship and unsatisfactory test results. Record repairs and adjustments.

3.05 CLEANING

- A. Cleaning: Clean equipment and devices internally and externally using methods and materials recommended by manufacturers and repair damaged finishes.

3.06 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel as specified below:
 - 1. Train Owner's maintenance personnel on troubleshooting, servicing, adjusting, and preventative maintenance. Provide a minimum of three hours' training.
 - 2. Training Aid: Use the approved final version of maintenance manuals as a training aid.

3. Schedule training with Owner, through Architect, with at least seven (7) days advance notice.

3.07 ON-SITE ASSISTANCE

- A. Occupancy Adjustments: Within one year of the date of Substantial Completion, provide up to three (3) project site visits, when requested, to adjust light levels, make program changes and adjust sensors and controls to suit actual conditions.

END OF SECTION 26 09 23

DIVISION 26 ELECTRICAL

SECTION 26 29 13 - MOTOR STARTERS & DISCONNECTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The Contract Documents and the General Provisions of the Contract, including the General Conditions of the Contract for Construction, Supplementary Conditions, Special Conditions and Division 1 Specification Sections apply to the Work of this Section.
- B. The Work of Section 26 05 00 - Electrical Basic Materials and Methods applies to the Work of this Section.

1.02 WORK INCLUDED

- A. Provide motor starters and disconnects, including all work shown, specified, or required for proper system operation.

1.03 REFERENCE STANDARDS

- A. The combination starters and protection devices in this specification shall be designed and manufactured according to the latest revision of the following standards (unless otherwise noted):
 - 1. ANSI/NFPA 70 - National Electrical Code - Latest issue.
 - 2. CSA C22.2 No. 14 - Industrial Control Equipment - Latest issue.
 - 3. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors and Overload Relays, Rated Not More than 2000 Volts AC or 750 Volts DC - Latest issue.
 - 4. UL 508 - Industrial Control Equipment - Latest issue.

1.04 SUBMITTALS

- A. Provide submittals on all products covered under this division. Submittals shall include:
 - 1. Dimensions.
 - 2. Fuses.
 - 3. Accessories.
 - 4. All ratings.
 - 5. Auxiliary contacts.
 - 6. Overloads.
 - 7. Magnetic contactor specifications.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. All products in this section shall be by ABB / General Electric Company, Schneider Electric/Square D, Eaton Cutler-Hammer, or the Siemens Company. These manufacturers are the Owner Standard; no other manufacturers shall be accepted.

2.02 CLASSIFICATION/ASSEMBLY

- A. All products to be heavy duty grade classification, NEMA type as scheduled on drawings. General duty products are not accepted.
- B. All products shall be factory assembled and wired and shall be UL approved. Assemblies fabricated by Contractor shall not be accepted.
- C. Units shall be horsepower rated for load served, current rating and poles as shown on Plans.

2.03 DISCONNECT SWITCHES (NON-FUSIBLE)

- A. Visible blade with dual color, red/black position indicator. Unit shall be padlockable in “off” position.
- B. Unit shall be the heavy-duty version.
- C. Where shown provide auxiliary interlock kits. Auxiliary interlocks are required on all disconnect switches serving VFD equipment.
- D. Rating: 600 Volts for all loads served.
- E. Make: Eaton Cutler Hammer DH Series or equal.

2.04 DISCONNECT SWITCHES (FUSIBLE)

- A. Visible blade with dual color, red/black position indicator. Unit shall be padlockable in “off” position.
- B. Unit shall be the heavy-duty version.
- C. Provide motor overload elements and fuse clips for Class ‘R’ fuses.
- D. Where shown provide auxiliary interlock. Auxiliary interlocks are required on all disconnect switches serving VFD equipment.
- E. Rating:
 - 1. 240 Volts for 208 and 240 Volt loads.
 - 2. 600 Volts for loads above 240 Volts.
- F. Make: Eaton Cutler Hammer DH Series or equal.

2.05 MANUAL MOTOR STARTERS

- A. Motor control switch and motor overload element in single enclosure.
- B. Make: Eaton Cutler Hammer DH Series or equal.

2.06 COMBINATION MAGNETIC MOTOR STATER/FUSIBLE DISCONNECT SWITCH

- A. Provide motor overload elements and fuse clips for Class ‘R’ fuses.
- B. Visible blade with dual color, red/black position indicator. Unit shall be padlockable in “off” position.

- C. Parts subject to wear or arcing shall be removable and replaceable.
- D. Where shown provide auxiliary interlock kits. Auxiliary interlocks are required on all disconnect switches serving VFD equipment.
- E. Provide 24 or 120 volt control transformers as shown and 24 or 120 volt contactor coil, provide fuses for transformers.
- F. Provide cover mounted HOA switch.
- G. Make: Eaton Cutler-Hammer ECN Series or equal.

2.07 FUSES

- A. Dual Element, time delay.
- B. Type and size as required.
- C. Make: Buss Fustron, Shawmut Gould, or Brush Reliance.

2.08 ENCLOSED CIRCUIT BREAKERS

- A. Enclosure: NEMA 12, cover interlocked with handle, capable of being padlocked in the “off” position.
- B. Breaker: Molded case circuit breaker, LSI electronic trip with fully adjustable long-time, short-time, and instantaneous pickup and delay settings, ampacity, poles, and accessories as shown or scheduled.
- C. Make: Eaton Cutler-Hammer PD2/PD3 with PXR 20 trip unit or equal.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Mount manual motor starters, magnetic motor starters and disconnects on substantial mount frames provided by the Electrical Contractor, with clearances according to the NEC.
- B. Circuit according to the NEC.
- C. For variable speed application, provide auxiliary interlock wiring for disconnects to disable variable frequency drive unit which feeds the disconnect.

END OF SECTION 26 29 13

DIVISION 26 ELECTRICAL

SECTION 26 50 00 - LIGHTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The Contract Drawings and the General Provisions of the Contract, including the General Conditions of the Contract for Construction, Supplementary Conditions, Special Conditions and Division 1 Specification Sections apply to the Work of this Division.
- B. The applicable provisions of Sections 23 05 00 - HVAC Basic Materials and Methods and 26 05 00 - Electrical Basic Materials and Methods apply to the Work of this Section.

1.02 WORK INCLUDED

- A. Provide lighting fixtures, lenses, globes, hangers, supports, LED light engines and lamps and appurtenances to provide a complete lighting system.
- B. Provide means of disconnect at ballasted luminaires for the purpose of servicing.
- C. Provide spare lamps and ballasts as identified in Part 3.

1.03 SUBMITTALS

- A. Submit shop drawings as described in Section 26 05 00. Luminaire shop drawings shall include photometric data for each luminaire utilizing the specified lens/louver type, lamp(s) and ballast(s). All luminaire types for the project shall be submitted in a single complete package which shall be in the form of a soft cover binder with each luminaire separated by an identified index tab. Information on each luminaire shall include:
 - 1. Manufacturer and Catalog Number.
 - 2. Dimensioned Construction Drawing(s).
 - 3. Complete Catalog "Cut" Sheet.
 - 4. Photometrics (space to mounting height ratio, coefficient of utilization complete values, IES distribution hard and electronic copy, candlepower distribution by angle and luminaire efficiency).
 - 5. Lens/Louver Type.
 - 6. Reflector information (type, material, reflectance, etc.).
 - 7. LED driver or fluorescent ballast with each type of luminaire as applicable (type, sound rating, overload protection, voltage, input/fixture wattage, ballast factor, power factor, etc.).
 - 8. Materials for all components.
 - 9. Socket Type (as applicable).
 - 10. Lamp or LED light engine (L70 lumen maintenance calculations, initial delivered lumen output, color temperature in degrees kelvin, LED chip binning accuracy, color rendering index, dimensions, wattage, and mercury content [for fluorescent lamps]).
 - 11. Certification of IES LM-79 and IES LM-80 testing for LED luminaires.
 - 12. IES TM-21 life cycle testing results for LED luminaires.
 - 13. Proof that the lamps and ballasts to be provided are on the Consortium for Energy Efficiency's (CEE) list of approved equipment.
 - 14. Means of service disconnect.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Luminaires and equipment shall be delivered with NRTL and the manufacturer's labels intact and legible. Broken, cracked and damaged materials and equipment shall be removed from the site immediately and be replaced with new materials and equipment. Luminaires and accessories shall be stored in protected dry locations in their original unbroken package or container. Luminaires shall be protected from dust and dampness both before and after installation. Luminaires shall be protected from painting and cleaning solvents during all phases of construction.

PART 2 - PRODUCT

2.01 GENERAL

- A. All fixtures of the same type shall be by the same manufacturer.
- B. All lamps of the same type shall be by the same manufacturer. Lamps shall be appropriate for the actual ballast furnished and shall be tested and certified for operation by the ballast manufacturer.

2.02 FIXTURES

- A. Schedule (See Drawings). Schedule can be provided to the Contractor in electronic spreadsheet format upon request.

2.03 LED LUMINAIRES

- A. LED luminaires shall be identical in construction features, options and appearance to the luminaires specified in the Luminaire Schedule. LED luminaires include white and RGB systems respectively.
 - 1. LED luminaires shall be provided with all cables, controllers, power supplies, connectors, terminators, and accessories required for a complete installation. LED systems shall utilize pulse width modulation, non-linear scaling techniques and reverse polarity protection for high-resolution output.
 - 2. RGB LED systems shall be capable of at least 8-bit control of red, green, and blue modules. RGB LED systems shall be capable of setting each module with a unique and individual address. Each address shall be controlled independently by DMX or alternate method protocol. All RGB LED fixtures shall undergo a minimum of eight-hour burn-in testing during manufacturing.
 - 3. LED luminaires shall be of high brightness and binned for forward voltage, luminous flux, and wavelength.
 - 4. LED luminaires shall be tested in accordance with IESNA LM-79 (luminous output, power input, luminaire efficacy (lumens/watt), color temperature and color rendering index) and IESNA LM-80 (output luminous maintenance, 6,000 hour minimum test). Luminaire output efficacy shall be a minimum of 89 lumens/watt. Rated life as calculated according to IES Standard TM-21 shall be a minimum of 50,000 hours at 90% output. Testing shall be performed by a US Department of Energy (DOE) accredited laboratory.
 - 5. The luminaire (including LED lamps, LED chips, LED boards and LED drivers) shall have a full five (5) year minimum warranty for replacement and labor of any failed component or diode.
 - a. Acceptable LED Diode Manufacturers:
 - i. Philips.
 - ii. Osram.

- iii. Cree.
- iv. Nichea.
- v. Lumiled.

2.04 LED POWER SUPPLIES & DRIVERS

- A. Power supplies shall meet or exceed the technical and performance standard all power supplies shall meet or exceed the following basis:

1. The LED power supply shall accept an input voltage range of 120-277VAC $\pm 10\%$.
2. The LED power supply shall have a power factor of 0.9 or higher.
3. The LED power supply shall have a maximum THD of 20% at full load (@ 120V or 277V).
4. The minimum efficiency of the LED power supply shall be 85% at full load.
5. Control Input:
 - a. Power supplies with dimmable outputs shall indicate whether the output is Pulse Width Modulated (PWM), Constant Current Reduction (CCR), or a combination. For PWM dimming, the frequency shall be $>1000\text{hz}$ to minimize risks of strobe effect.
 - b. Phase Control:
 - i. Dimming of the input power source down to 1% of the power supply output. It shall be the responsibility of the installation contractor to coordinate phase control dimming technology with the lighting control devices.
6. Phase-controlled power supply shall indicate the preferred method of phase-controlled input (forward or reverse):
 - a. 4-Wire (0-10V DC Voltage Controlled) Dimming Drivers:
 - i. Compatible with Passive or solid state current sink devices down to 1% of the power supply output.
 - ii. The 0-10VDC dimming circuit shall not exceed 15V DC in an unloaded or loaded condition.
 - iii. Must meet IEC 60929 Annex E for General White Lighting LED drivers.
 - iv. Connect to devices compatible with 0 to 10V Analog Control Protocol, Class 2, capable of sinking 0.6 mA per driver at a low end of 0.3V. Limit the number of drivers on each 0-10V control output based on voltage drop and control capacity.
 - v. Must meet ESTA E1.3 for RGBW LED drivers.
 - vi. Interface with 0-10 dimming driver shall be completely isolated from AC power to prevent AC voltage on the 0-10V wires.
 - vii. The available sink current from each driver on the 0-10V interface shall not exceed 1 mA.
 - b. Digital (DALI Low Voltage Controlled) Dimming Drivers:
 - i. Must meet IEC 62386.
 - c. Digital Multiplex (DMX Low Voltage Controlled) Dimming Drivers:

- i. Must meet DMX / RDM: USITT DMX512A and ANSI E1.20 (Explore & Address).
 - ii. Capable of signal interpolation and smoothing of color and intensity transitions.
7. The LED power supply shall comply with FCC Part 15 (Class A or Class B).
8. The LED power supply shall have a Class A sound rating.
9. The LED power supply shall have two cycle inrush current when power is applied that does not exceed 20 times steady state current per power supply.
10. Total Harmonic Distortion is less than 20% percent and meet ANSI C82.11 maximum allowable THD requirements at full output. THD shall at no point in the dimming curve allow imbalance current to exceed full output THD.
11. The LED power supply shall have transient protection – ANSI C62.41 Category A.
12. The LED power supply shall be UL 8750 Class 2 Recognized or Listed; Damp rated.
13. The LED power supply output voltage should not exceed 60V (Complies with Class 2 for US).
14. The driver should be UL Recognized under the component program and shall be modular for simple field replacement. Drivers that are not UL Recognized or not suited for field replacement will not be considered.
15. The LED Power supply shall have a minimum of 50,000 hours of a rated lifetime at maximum operating conditions.
16. The LED Power supply shall have a minimum of 5-year warranty Tc of 75°C or higher point.

2.05 LUMINAIRES DISCONNECT

- A. All ballasted lighting fixtures shall be provided with luminaire disconnect to allow for the simultaneous disconnect of hot and neutral conductors to the ballast.
- B. Make: Ideal “PowerPlug” luminaire disconnect or equal.

2.06 EMERGENCY LED DRIVERS

- A. All emergency drivers shall be inverter type with the following minimum requirements:
 1. Shall operate the indicated lamps at nearly full illumination for a minimum of 90 minutes.
 2. Upon loss of normal power, luminaire shall automatically switch to inverter ballast / driver with battery.
 3. Upon restoration of normal, luminaire shall return to normal power and ballast /driver shall return to charging mode.
 4. Battery shall be maintenance free, nickel-cadmium type, and be an integral part of ballast assembly. Life expectancy of battery shall be a minimum of seven years.
 5. Assembly shall be UL listed and approved under UL924 - “Emergency Lighting and Power Equipment”.
 6. Shall include an emergency test switch with LED indicator mounted in a common utility/mechanical room.
 7. Manufacturer: Bodine or approved equal.

2.07 REFLECTORS

- A. Reflectors and reflecting cones or baffles shall be as follows:
 1. Absolutely free of any tooling marks including spinning lines, indentations caused by riveting or other assembly techniques.
 2. No rivets, springs, or other hardware visible after installation.

3. First quality polished, buffed, and anodized finish, “Alzak” or approved equal.
4. Specular finish color as selected by the Architect or as specified in the fixture schedule.

B. Other aluminum reflectors shall be as follows:

1. Formed and finished as noted on the Drawings and elsewhere in the Specification.
2. Reflectors are free from blemishes, scratches, or indentations which would distort their reflective function.
3. Finished by means of the “Alzak” process or approved equal unless otherwise noted.

C. Reflectors and housing shall completely enclose the fixture’s fluorescent lamp in downlights in a plenum ceiling and provide the full rated output of the lamp. Fixtures that vent through the downlight reflector into the plenum are not acceptable.

2.08 LENSES

- A. All lenses are secured by positive means with neoprene or silicone gasketing, or washers as required to hold the lens tight within a frame or attach to housing.
- B. All glass lenses shall be heat treated (tempered) or sealed with a clear acrylic laminate layer to provide a “safety glass” rating. All lenses which require removal for relamping or normal maintenance shall be attached to the fixture housing by a minimal length of safety chain to prohibit the lens from falling and striking surrounding surfaces.
- C. Acrylic lenses shall be 100 percent virgin acrylic polymer and colorless. For lenses with patterns of pyramids or cones, specified minimum thickness refers to distance from flat surface to base of pyramids (cones), or thickness of undisturbed material. All lenses shall be a minimum 0.156” thick.
- D. The quality of the raw acrylic material must exceed IES, SPI, and NEMA Specifications by at least 100 percent which, as a minimum standard, shall not exceed yellowness factor of 3 after 2,000 hours of exposure in the Fade-o-meter or as tested by an independent test laboratory. Acrylic plastic lenses and diffusers shall be properly cast, molded, or extruded as specified, and shall remain free of any dimensional instability, discoloration, embrittlement, or loss of light transmittance for at least 15 years.

2.09 LOUVERS

- A. All louvers shall be fabricated of the specified material.
- B. All fluorescent light fixture louvers shall be parabolic and shall be rated at 90 percent or over on the VCP index.
- C. Louver finishes shall be provided as specified.
- D. All plastic parabolic louvers shall be destaticized before and after fabrication to insure minimum maintenance.
- E. All metal louvers shall be coated with anti-rust material and electrostatically painted.
- F. All louvers shall be heat tested to withstand lamp operating temperatures with no deformation of shape, paint blistering or discoloration.

2.10 FIXTURE TRIMS

- A. Fixtures shall have finish trim designed for the following types of ceiling systems: Ceiling Type Trim Type:
 - 1. Recessed Fixtures:
 - a. Plaster - Overlap Trim.
 - b. Concrete - Overlap Trim.
 - c. Tile - Overlap Trim.
 - d. Gypsum - Overlap Trim.
 - e. Metal Pan, Concealed M - Modular, Fit-in Support.
 - f. Lay-in - Modular, Tile with Flush Fit-in.
- B. Provide trim details as shown on the Drawings or as specified, which are indicative of appearance and dimensional requirements. The trim finish and dimensions are subject to the approval of the Architect.
- C. Trimless fixtures shall be installed per manufacture's guidelines and shall be installed and coordinated with other trades as required.
- D. Mitered corners shall be continuously welded and smoothed before shop finish is applied. No lapping of trim metal for all flush mounted ceiling trims for rectangular or square recessed fixtures.
- E. Provide a mounting frame or ring with lock recessed or semi-recessed light fixture to secure the mounting frame to the ceiling and support any reflectors, trims, or lenses. Ring shall be compatible with the ceiling and of sufficient strength to rigidly support the fixture and any stress applied in relamping.
- F. Catalog numbers are included in the Lighting Fixture Schedule for reference. Provide all accessories and design features described herein regardless of whether such features are included in catalog reference including, mounting hardware, louvers, lenses, filters, transformers, etc.

2.11 WIRING

- A. Wiring within lighting fixture for connection to branch circuit shall be:
 - 1. NEC Type AF for 120 volt, minimum No. 18 AWG.
 - 2. NEC Type SF-2 for 277 volt, minimum No. 18 AWG.
- B. Stranded wire within lighting fixtures shall be lead dipped.

2.12 EXIT LUMINAIRES

- A. Electrical characteristics:
 - 1. LED type for 120/277 volt supply.
 - 2. Use two LED strips for indirect illumination of the face. Meet or exceed illumination requirements of NFPA 101, and all of the requirements of UL924.
 - 3. Maximum input power of 5 watts per illuminated face.
 - 4. Provide fully automatic internal emergency power pack including a premium grade battery, three-stage charger (constant current, equalize and float charge), relay, low voltage battery disconnects, and brownout protection circuits. Battery shall provide sufficient capacity to operate the lamps for 1½ hours to an end voltage of 87½% of nominal battery voltage.

5. Provide self-diagnostic circuitry to warn of malfunction of battery, charger, transfer circuit or emergency lamps by means of separate LED indicator lights. Also provide automatic programming which will include five minute discharge/diagnostic cycling every $28 \pm$ days to exercise the unit's battery and check emergency operation.

2.13 EMERGENCY BATTERY PACK LUMINAIRES

- A. Completely self-contained in compact, low profile injection molded UL 94V-0 flame rated thermoplastic housing with universal mounting plate.
- B. Premium grade, pure lead maintenance free battery. Two with sufficient capacity to operate the lamps for $1\frac{1}{2}$ hours to an end voltage of $87\frac{1}{2}\%$ of nominal battery voltage. Three stage chargers (constant current, equalize and float charge), relay, low voltage battery disconnect and brownout protection circuits.
- C. Two fully adjustable glare-free LED type lighting heads. Test switch and charge rate indicator.
- D. Universal 120/277 volt supply.
- E. Provide self-diagnostic circuitry to warn malfunction of battery, charger, transfer circuit of emergency lamps by means of separate LED indicator lights. Also provide automatic programming which will include five minute discharge/diagnostic cycling every $28 \pm$ days to exercise the unit's battery and check emergency operation.

PART 3 - EXECUTION

3.01 FIXTURES

- A. Securely support all fixtures in accordance with manufacturer's installation instructions and U.L. or ETL listing information.
- B. Location:
 1. Evenly proportioned in room, except adjusted to conform with ceiling pattern as described below and except where otherwise shown or dimensioned.
 2. The edges of the fixtures are parallel with walls.
- C. Plaster Frames:
 1. Provide for all recessed fixtures in wet type ceilings.
 2. Install in cooperation with other trades.
- D. Mounting:
 1. All fixtures must hang true to vertical, free from finger marks, flaws, scratches, dents, or other imperfections.
 2. Take care when hanging fixtures not to deface in any way, ceilings, or walls.
 3. Install continuous rows of fixtures in straight line; all fixtures at same level. Fixtures must not be rotated about longitudinal axis with respect to one another.
 4. Mount surface fixtures tight to surface without distorting it.
 5. Provide proper mounting equipment and trim for recessed fixtures to adapt them to the ceiling or wall construction and to prevent light leaks around trim.

6. Provide special means for supporting fixtures as hereinafter specified, as shown on plans, or as required.
7. All stem mounted fixtures shall be hung level from self-aligning hangers in canopies; all stems shall be constructed of formed and stamped sheet metal, no cast or “pot metal” parts shall be accepted.
8. Securely support all ceiling fixtures, hangers, and outlet boxes from structural members, not from ceiling members. In addition, the fixtures must be securely fastened to framing members of the ceiling in order to meet NEC, Article 410.36. Lock clip, wirelashing or leveling supports shall be acceptable means.
9. Plastic inserts are not permitted.
10. Outlet boxes shall not be supported by conduit.
11. Supports for each fixture shall be capable of supporting four (4) times the fixture weight. Use ¼” threaded rod, fender washer and double nuts.
12. Exterior fixtures shall be installed with non-ferrous metal screws finished to match the fixture.
13. Fixtures shall be supported from building structure and using supports as follows (minimum requirements):
 - a. Ceiling Surface Mounted:
 - i. 1’x 4’ - two supports.
 - ii. All boxes (canopies) supported from structure.
14. Provide special extra wide toggle bolt support, 10” wide toggle, Paine Company #400, mounted above existing plaster ceilings where approved by Engineer and noted on Plans.

E. Surface Ceiling Mounting:

1. Mount surface luminaires tight to surface in a manner such that mounting surface does not distort fixture.
2. Luminaires installed in continuous rows may be fed by a single outlet if fixtures are UL approved and suitable for through wiring in luminaire raceway.
3. Luminaire fasteners or hangers shall be capable of supporting four times luminaire weight.
4. Luminaires shall be supported independently from the ceiling system or other building services.

F. Recessed Mounting:

1. The Electrical Contractor shall verify ceiling type, construction, and material prior to placing an order for recessed luminaires.
2. The Electrical Contractor shall furnish fixtures with an IC rating for all recessed incandescent fixtures installed in direct contact with insulation.
3. The Electrical Contractor shall furnish and install plaster frames for plaster ceilings and flanged frames for drywall ceilings.
4. The Electrical Contractor shall furnish and install all required mounting hardware and accessories to adapt fixtures to ceiling construction.
5. Lay-in type luminaires shall be supported independent of the ceiling system at each end of the luminaire with galvanized support wire.
6. Provide and install seismic hold-down clips for all lay-in type lighting fixtures.

G. Pendant Mounting:

1. Mount pendant mounted luminaires from ¼” threaded rods of required length.

2. Sleeve threaded rods with ½" EMT painted with color as directed by Architect/Engineer.
3. Luminaires installed in continuous rows may be fed by a single outlet if they are UL approved and suitable for through wiring in luminaire raceway.

H. Remote LED Drivers:

1. Remote LED drivers shall be mounted in an approved NEMA 1 enclosure. Remote drivers shall be located in areas easily accessible to maintenance personnel.
2. Wiring from luminaire to remote LED drivers shall not exceed the manufacturer's recommendations for distance.
3. Remote LED drivers shall be clearly labeled indicating fixture served, voltage, panelboard and circuit number served from.

I. Aircraft Cable Suspension:

1. Cables shall be 1/16" aircraft cable with end safety fittings. Cable shall be provided with 2" diameter mini-canopy and threaded coupler for attachment to a ¼" 20 threaded stud extending ¾" below ceiling.
2. Cable assembly shall include a spring-loaded adjustment device mounted in the fixture.
3. The Contractor shall be responsible for providing required support for cable attachment.
4. For cord feed to the luminaire provide continuous cord clip of matching color to attach the cord to the cable.
5. Support per manufacturer's recommendations.

J. Cove Lighting:

1. Fluorescent cove lighting shall be installed so as to produce a continuous and unbroken band of light with no shadows or light gaps.
2. A combination of 2 ft., 3 ft. and 4 ft. lamp fixtures may be required to accomplish a continuous band of light.

K. Mechanical Coordination:

1. Coordinate the location of all hangers in rooms without ceilings with ductwork, plumbing piping, sprinkler piping, etc.
2. Make all necessary offsets and extensions so that stems and fixtures avoid beams, pipes, ducts, etc.
3. Where fixtures are located below heating, ventilation and air conditioning units, or ductwork and piping, provide trapeze hangers around obstruction and suspend fixture from trapeze hanger. Do not suspend from duct.

L. Architectural Coordination:

1. Locate all hangers at intersections of joints or at center of blocks in rooms with acoustic tile or other patterned types of ceiling materials.
2. Space continuous row fixtures to conform to corresponding joint intersections.
3. Coordinate all ceiling layouts and obtain Engineer's approval before proceeding.
4. Heights of fixtures not scheduled will be furnished on application to Engineer.
5. The Contractor is specifically required to verify ceiling construction and report in writing any discrepancies between the ceiling type and the fixture type before releasing fixtures for manufacture.
6. Coordinate all under cabinet lights with the Engineer before rough-in.

M. Care of Fixtures:

1. Remove and replace with new, all broken glassware, plastic or fixtures damaged before final acceptance at no additional expense to Owner.
2. No allowance made for breakage or theft before final acceptance.
3. Immediately prior to occupancy, damp-clean all diffusers, glassware, fixture trims, reflectors, lamps and replace burned-out lamps.

N. Wiring:

1. Fixture shall not be used as a raceway except as allowed in NEC, Article 410.64.
2. The wiring to fixture shall be 90°C minimum.
3. Provide servicing luminaire disconnect at fixture prior to the ballast.

3.02 GROUNDING

- A. Ground all non-current carrying parts of all lighting fixtures.
- B. All grounding shall be accomplished with NRTL tested grounding connectors suitable for this purpose.

3.03 RETROFITTING EXISTING LUMINAIRES

- A. Retrofit existing luminaires where called for. Perform the following work for each retrofit luminaire:
 1. Replace lamps.
 2. Replace ballast(s).
 3. Replace sockets.
 4. Replace any cracked, discolored, or otherwise damaged lenses. Replacement lenses shall match existing ones.
 5. Clean the lens and reflector surface with detergent solution and rinse with clear water. Assure no streaks remain on surfaces.

3.04 LAMPS

- A. All new lamps for new fixtures shall be installed. Provide spare lamps as required to allow replacement of flickering or bad lamps. Provide labor and material to replace any failed lamp during the one (1) year warranty period. In the event that more than 10% of the lamps in a particular room or lot fail within twelve (12) months of Project completion or earlier, the Contractor shall replace all lamps which were provided for that room or lot. The Contractor shall provide all labor and materials for this work at no cost to the Owner and shall compensate the Owner for his personnel who provide access for the Contractor.
- B. Clean all fixtures and lamps prior to requesting a punch list.
- C. Supply in O&M Manuals a list of lamps installed in light fixtures. Include manufacturer model number, lamp voltage and color temperature for each fixture type supplied.

3.05 SPARE LAMPS

- A. Provide the following spare lamps:
 1. The greater of two percent or two (2) lamps of each size and manufacturer furnished.

3.06 SPARE LED BOARDS & LED DRIVERS

- A. Provide the following spare LED boards or LED light engines:
 - 1. The greater of 2% or two LED boards or LED light engines for each type of fixture.
- B. Provide the following spare LED drivers:
 - 1. The greater of 2% or two LED drivers for each type of driver employed on the project.
- C. Spare parts are to be provided with first fixture shipment to allow for field replacement of any failed components during construction in a timely manner.
- D. Turn over all spare parts to the Owner as attic stock at completion of Project. Provide careful labeling and inventory control of each type of part with information on where it was installed, what fixture type, manufacturer, date, and other related information. If any spare parts are utilized during construction to replace any failed components, such parts shall be replenished prior to turn over.
- E. If any single component (LED board, LED light engine or LED driver) demonstrates a failure rate across the entire project in excess of 2% of the quantity provided within the first year, quantity of spare parts for that particular component to be turned over to the Owner, shall be increased from 2% to 5%, as identified in Parts A. and B. above.

3.07 QUALITY CONTROL

- A. To ensure uniformity of products installed, provide the following steps to remediate recognizable variations in light color and intensity:
 - 1. Replace bulbs.
 - 2. Replace ballasts.
 - 3. Replace fixture.

3.08 FINAL CLEANING

- A. Immediately prior to acceptance, damp clean diffusers, glassware, luminaire trim, reflectors, lamps, louvers, lens, and similar objects of all luminaires. Remove all dirt, corrosion, foreign material, finger marks, and blemishes. Replace all burned out lamps and failed components.

3.09 REMOVAL OF BALLASTS IN EXISTING LUMINAIRES

- A. Assume ballasts contain PCB material unless labeled otherwise or test samples show materials are not PCB; submit a test report. Remove all ballasts from existing luminaires indicated on contract documents. Dispose of all ballasts which do not have non PCB labels in PCB containers and turn over to Owner for disposal.

3.10 REMOVAL OF LAMPS IN EXISTING LUMINAIRES

- A. The Contractor shall provide containers and labels for the disposal of all fluorescent and HID lamps. Turn containers over to Owner for disposal.

3.11 AIMING AND ADJUSTMENT

- A. All adjustable lighting units shall be aimed, focused, locked, etc., by the Contractor under observation of the Architect, Engineer and/or Lighting Designer. It is the responsibility of the Contractor that all fixtures scheduled for aiming shall be operational prior to the aim work session. All aiming and adjusting shall be carried out after the entire installation is complete. All ladders, scaffolds, etc., required shall be furnished by the Contractor. When aiming and adjusting is completed, locking setscrews and bolts and nuts shall be tightened securely. The aiming and adjustment of luminaires must take place after the project's amenities have been completely installed. These amenities shall include but are not limited to plantings, furniture, artwork, graphics, and signage.
- B. Where possible, units shall be focused during the normal working day. However, where daylight interferes with seeing, aiming shall be accomplished at night.

END OF SECTION 26 50 00

DIVISION 26 ELECTRICAL

SECTION 26 84 00 - FIRESTOPPING AND SMOKESTOPPING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Provide firestopping and smokestopping for Electrical Systems to comply with The Building Code of New York State Section 714 Penetrations.
- B. Provide submittals and installation detail sheets.
- C. Coordinate products to be used with the General Contractor and other trades so as to provide one product that will be used by all trades on this project. Submit on this elected product only.

1.02 SUBMITTALS

- A. Provide a schedule of each type of penetration together with the proposed method of protecting that penetration type. Schedule shall include the following details:
 - 1. Penetrated items (e.g., wall, floor, roof).
 - 2. Construction of items (e.g., metal studwall with gypsum wallboard).
 - 3. Fire rating of items (e.g., 1 hour wall).
 - 4. Description of penetrating items (e.g., 1" to 3" Schedule 40 pipe).
 - 5. Identification of penetrating seal to be used in this case (e.g., Rectorseal Biostop pipe collar).
 - 6. UL or FM detail sheet (e.g., per attached example).
 - 7. UL or FM system number (e.g., WL1200).
- B. The submittal shall include complete details for each penetration covered by this Division.
- C. It is intended that the submittal includes each detail in full for each system used, so that it is clear that the installing Contractor has the correct reviewed information in the field.

1.03 QUALITY ASSURANCE

- A. Firestopping Materials: Provide penetration seal assemblies whose fire-resistance ratings have been determined by testing in the configurations required and which have fire-resistance ratings at least as high as that of the fire-rated assembly in which they are to be installed.
 - 1. Comply with all applicable codes including but not limited to:
 - a. American Society of Testing and Materials (ASTM).
 - b. ASTM E 84 Test Method for Surface Burning Characteristics of Building Materials.
 - i. ASTM E 119 Method of Fire Tests of Building Construction Materials.
 - ii. ASTM E 814 Test Method for Fire Tests of Through Penetration Firestops.

- iii. ASTM C 665 (Corrosion & Microbial Resistance Portions) Standard Specification for Mineral-Fiber Thermal Insulation for Light Frame Construction and Manufactured Housing.
 - iv. ASTM E 90 Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.
2. Listed by Underwriters Laboratories (UL) and/or Factory Mutual Research Corporation for each specific intended application:
- a. UL Building Materials Directory.
 - b. UL Fire Resistance Directory.
 - c. UL 2079 Test.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Firestopping and smokestopping materials shall allow normal expansion and contraction (intumescent) of the penetrating item without failure of the penetrations seal and shall be heat absorbing (endothermic). Products may not emit hazardous, combustible, or irritating by-products during installation or curing. Products shall not require special tools for installation.

2.02 MASONRY EXEMPTION

- A. The Contractor shall note BCNYS 714.4.1 Exemption, which states:
- 1. Exception: Where the penetrating items are steel, ferrous, or copper pipes, tubes or conduits, the annular space between the penetrating item and the fire-resistance-rated wall is permitted to be protected by either of the following measures:
 - a. In concrete or masonry walls where the penetrating item is a maximum 6-inch (152 mm) nominal diameter and the area of the opening through the wall does not exceed 144 square inches (0.0929 m²), concrete, grout or mortar is permitted where installed the full thickness of the wall or the thickness required to maintain the fire-resistance rating.
 - b. The material used to fill the annular space shall prevent the passage of flame and hot gases sufficient to ignite cotton waste when subjected to ASTM E119 or UL 263 time-temperature fire conditions under a minimum positive pressure differential of 0.01 inch (2.49 Pa) of water at the location of the penetration for the time period equivalent to the fire-resistance rating of the construction penetrated.

2.03 MANUFACTURERS

- A. Manufacturers: Provide products complying with requirements of the contract documents and made by one of the following:
- 1. Rectorseal.
 - 2. Hilti, Inc.
 - 3. 3M Fire Protection Products.
 - 4. Specified Technologies Inc.
 - 5. U.S. Gypsum Company.
 - 6. Johns Manville.

7. BlazeMaster.

2.04 FIRESTOPPING PRODUCTS

A. Provide firestopping products which:

1. Provide firestopping systems that are produced and installed to resist the spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain fire resistance rating of assembly.
 - a. F-rated systems in accordance with ASTM 814.
 - b. T-rated systems in accordance with ASTM 814.

B. Firestopping Flame Spread Performance Requirements:

1. Provide products with flame-spread ratings of less than 25 and smoke-development rating of less than 50 as determined in accordance with ASTM E 84.

C. Firestopping UL Performance Requirements:

1. Provide products with UL ratings specified for assembly indicated as determined in accordance with UL listing.

D. FM approval in lieu of UL shall be accepted by the Owner.

E. Where a specific firestopping product is identified on the Drawings, either that product or a similar product which has been tested in the exact application shown on the drawings shall be employed, after review by the Engineer.

F. Firestop caulk shall be Johns Manville Firetemp CI, Rectorseal Biostop 500+, or approved equal, except where otherwise shown on the drawings.

2.05 SMOKESTOPPING PRODUCTS

A. Provide smokestopping products which:

1. Allow normal expansion and contraction movement of the penetrating item without the failure of the penetration seal.
2. Maintain at least the smoke resistance of the barrier penetrated.
3. Firestop caulk shall be Johns Manville Firetemp CI or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION AND QUALITY ASSURANCE

- A. Install firestopping materials in exact accordance with the manufacturer's instructions and conditions of the testing; provide all accessory materials required.
- B. Provide the services of a factory representative of the fireproofing product to review the installation practices and conduct training of the applications.

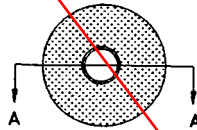
- C. The installer shall be trained to perform the work.
- D. Inspection: The Authority Having Jurisdiction shall have a final inspection review of all work performed. Contractor shall make modifications to completed and uncompleted work as directed by the AHJ at the Contractor's expense.
- E. Refer to the Certified Installation Instructions sheet on the following page for an example of an acceptable installation method.

3.02 FIRESTOPPING AND SMOKE STOPPING ITEMS

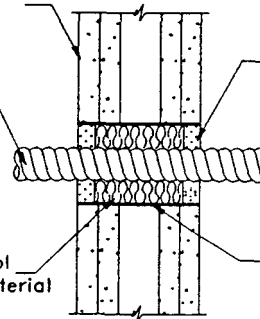
- A. Under Division 26, provide and pay for all firestopping materials, assemblies, and labor to provide complete firestopping and smokestopping.
- B. Provide firestopping of penetrations at each fire-rated floor, wall, or roof assembly of the following components:
 - 1. Conduits and raceways provided by Division 26.
 - 2. Other equipment or work provided by Division 26 which penetrates rated walls.

Attachment(s): Example Detail Sheet

END OF SECTION 26 84 00

RECTORSEALSystem No.
WL1200**FIRESTOPS**500+GW-92
Wall Penetration
1, 2 Hr. Rating1 layer of 5/8"
UL Classified
Gypsum Wallboard
for 1 Hr. Rating
or
2 layers of 5/8"
for 2 Hr. RatingMax. 1" Corrugated
Stainless Steel Tubing
(PVC Coated)1/2" depth
Metacaulk® 1000

PLAN

Mineral Wool
Backing MaterialSteel Sleeve/
Wire Mesh

SECTION A-A

EXAMPLE**SYSTEM CONFIGURATION INFORMATION**

PRODUCT(S)			PENETRATING ITEM(S)			HOLE SIZE	ANNULAR SPACING			ADDITIONAL INSTALLATION MATERIALS AND AIDS			BACKING MATERIAL		ASTM E 814 RATING	
FILL MAT'L	MIN. THICK.	OTHER	TYPE	SIZE	INSULATION	MAX.	MIN.	MAX.		WIRE MESH	STEEL SLEEVE	OTHER	TYPE	DEPTH	T	F
500+	1/2" both sides	none	PVC Coated Corrugated Stainless Steel Tubing	up to 1"	none	3"	1/4"	1 1/2"		No. 8 steel wire mesh	min. 20 gauge	none	minimum 4.0 pcf mineral wool	N/A	0 0	2 1

INSTALLATION INSTRUCTIONS

These instructions are for the installation of through-penetration fire stop system 500+GW-92 in minimum 4 1/2 inch thick steel or wood stud fire rated gypsum wallboard partitions as listed by Underwriters Laboratories Inc. Refer to above drawings and System Configuration Information for component details.

Step Procedure

- 1 Cut hole in wall in required size to accommodate pipe penetrations and allowable annular spacing. Do not exceed maximum specified hole diameter.
- 2 Install - 1 inch PVC Coated Corrugated Stainless Steel Tubing. Support pipe rigidly on both sides of wall.
- 3 Install specified wire mesh or minimum 20 gauge steel sleeve cut to size, formed to hole shape centered inside wall around tubing and allowed to spring back snugly against periphery of hole.
- 4 Install backing material by tightly packing annular space in between and around tubes with specified mineral wool flush with wall. Recess mineral wool 1/2" on both sides of wall.
- 5 Apply a 1/2" depth of Biostop™ 500+ into annular space around tubing on both sides of wall. Tool surface to a smooth defect-free finish.

JOBNAME:

ARCHITECT:

CUSTOMER:

CUSTOMER ORDER NO:

CONTRACTOR:

REPRESENTATIVE:

REPRESENTATIVE ORDER NO:

RECTORSEAL

2601 SPENWICK HOUSTON, TEXAS 77055

REVISION NUMBER: 121499

SHEET NUMBER: OF

DIVISION 27 COMMUNICATIONS

SECTION 27 00 01 - AUDIO-VISUAL AND COMMUNICATIONS RACEWAY SYSTEM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The Contract Documents and the General Provisions of the Contract, including the General Conditions of the Contract for Construction, Supplementary Conditions, Special Conditions and Division 1 Specification Sections apply to the Work of this Section.
- B. The Work of Section 26 05 00 - Electrical Basic Materials and Methods applies to the Work of this Section.

1.02 WORK INCLUDED

- A. Provide a complete, operating, tested, functioning, documented communication system including all work shown, specified, or required for proper system operation.
- B. Provide raceways, boxes, and pull strings for telephone, computer, cable TV and audio-visual systems.
- C. Provide blank covers to match the building standard for all unused boxes.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Provide products for raceways, boxes and pull strings for telephone, computer, and cable TV as detailed on Plans and Section 26 05 00 - Electrical Basic Materials and Methods.
- B. Conduit sizing shall be coordinated with the telecommunications cabling/conduit fill schedule on Plans.

PART 3 - EXECUTION

3.01 RACEWAYS

- A. Provide raceways, boxes and fittings for telephone, computer, cable TV and audio-visual systems as shown.
- B. Terminate open ended conduits or raceways with throat type nylon bushing.

3.02 PULL STRINGS

- A. Provide pull strings in each raceway.

END OF SECTION 27 00 01

DIVISION 28 ELECTRONIC SAFETY AND SECURITY

SECTION 28 05 28 - FIRE ALARM RACEWAY SYSTEMS AND CONDUCTORS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The Contract Documents and the General Provisions of the Contract, including the General Conditions of the Contract for Construction, Supplementary Conditions, Special Conditions and Division 1 Specification Sections, apply to the Work of this Section.
- B. The applicable provisions of Section 23 05 00 - HVAC Basic Materials and Methods and Work of Section 26 05 00 - Electrical Basic Materials and Methods apply to the Work of this Section.

1.02 WORK INCLUDED

- A. Provide raceways and conductors to support the modifications to the fire alarm and detection system.
- B. The work of fire alarm raceways and conductors shall be performed by a single Contractor who shall also be responsible to provide the remainder of the Division 28 work.

PART 2 - PRODUCTS

2.01 PRODUCTS

- A. Provide materials in conformance with Section 26 05 00.

PART 3 - EXECUTION

3.01 GENERAL

- A. Provide raceway systems and conductors to support Division 28.
- B. All raceways shall conform to the provisions of Section 26 05 00.

3.02 RACEWAY METHODS

- A. All Fire Alarm work shall be placed in raceway of one of the following types:
 - 1. Electrical Metallic Tubing: Above ceiling as well as in concealed spaces and in mechanical and unfinished back of house spaces, and dry crawlspaces.
 - 2. Rigid Galvanized Steel Conduit: Outdoors and in wet crawlspaces.
 - 3. Wiremold 700 Series or 2000 Series Raceway: Where specifically approved by the Engineer for use on existing masonry walls.
 - 4. Type MC listed Fire Alarm Cable: Where fished into existing walls (walls not constructed as part of this Project) or existing non-accessible ceilings.
 - 5. "Greenfield" Flexible Metallic Conduit: Where fished into newly installed or existing walls.
 - 6. Free Air Wire: Only for lengths not more than 18" where jumping from raceway to wire basket.
 - 7. In wire basket or wire trough together with other low voltage communications, security, and fire alarm conductors.

3.03 BOXES

- A. Provide boxes at all wiring, terminations, and devices.

3.04 CONDUCTORS

- A. Conductors shall be as scheduled on the Drawings. Contractors shall provide all stranded conductors only. The contractor shall provide shielded conductors if required by the fire alarm equipment manufacturer.

3.05 WIRE MARKINGS

- A. Permanent conductor wire markings for all conductors; coordinated and recorded on As-Built.

3.06 COLOR CODE

- A. Construction wire color code utilized throughout the project submitted for review by the Engineer.

END OF SECTION 28 05 28

DIVISION 28 ELECTRONIC SAFETY AND SECURITY

SECTION 28 08 08 - FIRE ALARM SYSTEM STARTUP & WITNESSED TESTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The Contract Documents and the General Provisions of the Contract, including the General Conditions of the Contract for Construction, Supplementary Conditions, Special Conditions and Division 1 Specification Sections apply to the Work of this Section.
- B. The Work of Section 26 05 00 - Electrical Basic Materials and Methods applies to the Work of this Section.

1.02 DEFINITIONS

- A. Pre-operational Acceptance Test:
 - 1. 100% of the initiating devices impacted or provided by the Project shall be functionally tested.
 - 2. 100% of notification devices impacted or provided by the Project, shall be witnessed fully functional in response to alarm initiation by the tester.
 - 3. 50% of testing shall be performed on battery power.
 - 4. Outputs from the fire alarm control panel to campus safety shall be 100% tested.
 - 5. Provide 100% testing of all safety functions and supplementary functions including elevator recall and shunt trip, etc., impacted or provided by the Project.
 - 6. Any changes made to the site specific software shall require a 100% retest of all functions directly affected and a 10% retest of system initiating devices not directly affected.
 - 7. Provide documentation in the form of the fire alarm inspection and testing form and the record of completion form.
- B. Operational Acceptance Test:
 - 1. Provide all requirements of the pre-operational acceptance test in the scheduled presence of the AHJ.
 - 2. Provide copies of the inspection and testing form and the record of completion form to the AHJ.
- C. Re-Acceptance Testing:
 - 1. Upon any changes to the system, post-operational acceptance testing shall apply as follows:
 - a. 100% of all safety functions known to have been modified shall be tested.
 - b. 100% of all revised devices shall be tested.
 - c. 10% of each type of initiating device shall be tested.
 - d. A revised Record of Completion shall be prepared noting these changes.

1.03 WORK INCLUDED

- A. On existing systems to be modified, provide baseline printout of fire alarm program.
- B. Provide system startup.

- C. Provide pre-operational acceptance test.
- D. Provide system troubleshooting.
- E. Provide operational acceptance testing.
- F. Provide completion of NFPA 72 Fire Alarm Inspection and Testing Form.
- G. Provide completion of NFPA 72 Fire Alarm Record of Completion Form.
- H. Provide submittals.
- I. Provide testing methods per NFPA 72, 2016 - Section 14.4.3 Testing Methods.

1.04 SUBMITTALS

- A. Provide a cut sheet of instruments to be used during testing including test gases and testing apparatus.
- B. Provide printout of existing system programming prior to any changes by the project.
- C. Provide testing technicians NICET Level II Certification or better.

1.05 SPECIFIC APPLICABLE CODES AND STANDARDS

- A. The fire alarm system shall comply with the applicable provisions of the following referenced codes and standards:
 - 1. NFPA 13, 2022.
 - 2. BCNYS, 2025 Edition.
 - 3. FCNYS, 2025 Edition.
 - 4. MCNYS, 2025 Edition.
 - 5. ASME A17.1-2022.
 - 6. NFPA 72, 2022.
 - 7. NFPA 720, 2015.

PART 2 - PRODUCTS

2.01 TESTING

- A. Sensitivity Testing Smoke Detector Apparatus:
 - 1. SDi Trutest, calibrated.
 - 2. Approved comparable apparatus.
- B. Heat Detector Tester:
 - 1. Solo 461.
 - 2. Approved comparable tester.
- C. Functional Smoke Detector Tester:
 - 1. Solo 330.

2. Approved comparable tester.

D. Test Gases:

1. Smoke aerosol: Solo A4.
2. Carbon monoxide: Solo C3.

PART 3 - EXECUTION

3.01 COORDINATION OF TESTING

- A. The Contractor shall be responsible for coordinating tests between the Owner's representative and the fire alarm manufacturers.
- B. The Contractor shall be responsible for coordinating the operational acceptance test with the Authority Having Jurisdiction (AHJ).

END OF SECTION 28 08 00

DIVISION 28 ELECTRONIC SAFETY AND SECURITY

SECTION 28 13 16 - ELECTRONIC SAFETY AND SECURITY SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Policy 8.1 – Physical Security.
- B. Division of Public Safety Access Control Program Procedures for adherence to Policy 8.1:
 - 1. Access Control Procedures.
 - 2. Video Surveillance Procedures.
 - 3. Intrusion Alarm Procedures.
- C. IT Policies 5.4.1 Security of IT Resources, 5.7 Network Registry, 5.8 Authentication to Information Technology Resources and 5.10 Information Security.
- D. Crime Prevention Through Environmental Design Guidelines (CPTED).
- E. Mercury Hardware Manuals.
- F. NFPA 730: Guide for Premises Security.
- G. NFPA 731: Standard for the Installation of Electronic Premises Security Systems.
- H. Other Design and Construction Standards and Standard Details. The following standards are mandatory and must be used when evaluating a holistic approach to security design:
 - 1. CU DIV 26 Standards – Electrical (Secondary Low voltage, fire alarm, etc.).
 - 2. CU Standard 330100 – Utility Interruptions and Connections.
 - 3. CU Standard 330526 – Utility Identification: Direct Buried Nonconductive.
 - 4. CU Standard 337500 – Medium Voltage Distribution.
 - 5. CU Standard 337800 – Pole Mounted Exterior Lighting.
 - 6. CU Standard 087100 – Door Hardware.
 - 7. CU Standard 270000 – Communications.
 - 8. CU Standard Detail 5.1.1 – Single Door Access Control.
 - 9. CU Standard Detail 5.1.2 – Entry with Vestibule Access Control.
 - 10. CU Standard Detail 5.1.3 – Single Door Access Control Wiring Diagram.
 - 11. CU Standard Detail 5.1.4 – Entry with Vestibule Access Control Wiring Diagram.

1.02 ACRONYMS IN THIS STANDARD

- A. ACC - ACCESS CONTROL COORDINATOR.
- B. ACP - ACCESS CONTROL PROGRAM.
- C. CAS - CARD ACCESS SYSTEM.
- D. CCA - COPPER CLAD ALUMINUM.

- E. CPW - CAMPUS POLICE WORKSTATION.
- F. CW - CLIENT WORKSTATIONS.
- G. DPS - DIVISION OF PUBLIC SAFETY.
- H. DPSC - DIVISION OF PUBLIC SAFETY COMMUNICATIONS.
- I. DRI - DUAL READER INTERFACE MODULE.
- J. EMF - ELECTROMAGNETIC FIELD.
- K. HDS - HEAD-END DATABASE SERVER.
- L. IDS - INTRUSION DETECTION SYSTEM.
- M. NVSSO - NETWORK VIDEO SURVEILLANCE SYSTEM OPERATOR.
- N. PIM - PANEL INTERFACE MODULE.
- O. POE - POWER OVER ETHERNET.
- P. RIM - READER INTERFACE MODULE.
- Q. SCP - SYSTEM CONTROL PROCESSORS.
- R. SRI - SINGLE READER INTERFACE MODULE.
- S. TCP/IP - TRANSMISSION CONTROL PROTOCOL/INTERNET PROTOCOL.
- T. TTL - TIME TO LIVE.
- U. VMS - VIDEO MANAGEMENT SYSTEM.

1.03 INTRODUCTION

- A. The electronic security devices/systems encompass head-end computers, network connections (including wireless), data transmissions, communication devices, multiple points of monitoring, interfacing controls, sensors, and actuators. Some functions are supported locally as well as University-supported.
- B. This standard applies to all installations subject to University Policy 8.1.
- C. For the purposes of this standard, electronic security systems or devices include:
 - 1. Access control (wired and wireless).
 - 2. Networked video surveillance.
 - 3. Intrusion detection.
- D. Per University Policy 8.1, security and access control systems shall be integrated with the University central systems unless an exemption has been granted through ACP.

- E. Electronic security systems/devices are to be installed as an independent system and not to be connected by hardware, integrated by software, or otherwise interfaced with any other control systems (ex. Building Automation Control System) or life safety systems except where specifically required by code or approved by appropriate system owner and DPS Access Control.

1.04 QUALITY ASSURANCE

- A. The integrated security and/or access system including all equipment, components, and accessories shall be UL listed for this purpose.
- B. The Contractor providing the security and/or access system must be certified by the equipment manufacturer and software vendor to install the approved equipment and licensed/registered by the New York State Department of State.
- C. The contractor installing video surveillance equipment must be an AXIS Certified Installer.

1.05 SYSTEM DESIGN

- A. The following elements shall be part of Basis of Design Construction Documents:
 - 1. List of applicable Codes and Standards used in the system design including applicable versions of Building Code, Fire Code, NFPA 70, NFPA 72, NFPA 730 and NFPA 731. Identify Building Occupancy Type.
 - 2. All electronic access control, video surveillance and intrusion system plans and details shall be in a distinct sub-section of the general electric documents and contain “Security Systems” in the drawing title block.
 - 3. Type of security system (card access, video surveillance, and/or intrusion).
 - 4. Sequence of operation on all electrified devices (especially when fire or intrusion alarm and access control systems are interconnected).
 - 5. Wiring type shall be per manufacturer of the access control devices specifications.
 - 6. Main equipment shall be installed in a locked enclosure located in a secured area approved by DPS Access Control and the Door and Hardware Center Electrical Foreperson. Installation location of an intrusion panel also requires the FM Operations Fire/Alarms & Security Technician in the case of intrusion panel.
 - a. New Construction and Major Renovations shall have Access Control Equipment installed in dedicated rooms no smaller than 6 feet by 8 feet on every other floor of the building and shall be capable of accommodating all hardware for assigned locksets and equipment for a 50% addition of hardware in the future, as well as for a technician to be able to enter, secure with card access, and work within the space on all equipment while standing on the floor. Room must contain at least one AC outlet for technician equipment.

1.06 SUBMITTALS

- A. Drawings and Specifications shall include all requirements for Submittals and for As-Built information. Submittals shall contain the following information:
 - 1. Product information for all installed components.
 - 2. Door riser diagram with typical equipment and device connection and labeling (A detailed connection diagram is not required until project completion).

3. System/Building riser diagram with reader module and intelligent system controller connections detailed and labeled.
 4. Wire and raceway(conduit/wireway) schedule.
 5. Battery stand-by and system load calculations.
 6. Special system requirements (interlocks with other systems, for example).
 7. System labeling materials and methods.
 8. Something to ensure the controller, etc. is on the secure side. Ability to see the location confirmation with regards to doors, height, fire strobes – like making sure this info is on the contractor coordination drawing requirements.
- B. To ensure compliance with the intent of this standard, all associated contract submittals shall be reviewed by Facilities Engineering, CIT, Door and Hardware Center forepersons, and DPS Access Control prior to releasing final approved submittals to the contractor.
1. Any device that generates an alarm to the Cornell Police or the DPS Communications Center must be pre-approved by the Chief of Police and DPS Communications Center Director prior to releasing an approved submittal to the contractor.

PART 2 - MATERIALS AND EQUIPMENT

2.01 SYSTEM DESCRIPTIONS

A. Card Access Systems:

1. Wired: Card Access Systems (CAS), at the User End, are comprised of card reader, door position sensing, electric hinge or power transfer (wired systems), door strike, latch, reader interface module, interconnecting power and communication wiring, head-end System Control Processor. All systems, unless exempted from University policy, are centrally monitored transmitting data to and received by DPS Access Control.
2. Wireless: Schlage AD400 – is comprised of an AD400 lockset (licensed for current CAS software), PIM400-1501 RSI wireless access point, Mercury 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 the currently employed secure credential. Cornell IT policies must be adhered to when attaching devices to the University network.

B. Video Surveillance Systems (NVSS):

1. Comprised of IP-enabled cameras, interconnecting power and communication wiring via POE (power over Ethernet). Cameras must be connected to a POE-enabled switch with ports enabled on the appropriate security VLAN except where approved by DPS Access Control. All systems, unless exempted from University policy, are capable of being centrally monitored and transmitting data to the central VMS. Some systems are also locally monitored within a specific unit.
2. Minimum Camera Requirements:
 - a. Every Camera installation must first have an assessment completed by DPS Access Control during design to determine the appropriate device and installation location suitable for the requirements.
 - b. 8 frames per second.
 - c. Support for 64GB SD card.

C. Intrusion Detection Systems (IDS):

1. Comprised of panic push pad, motion detectors, door contacts, interconnecting communication wiring and head end intrusion dialer panel. Installation of panic push pad systems require prior consent and approval from the Chief of Police and DPS Communications Center Director during design phase.
2. A phone circuit must be available/provided for communication to the University receiver. All systems transmit data to and are received by DPS Communications Center. Reporting format will be Contact ID protocol.
3. Intrusion Detection System designs must be reviewed by the FM Operations Fire/Alarms & Security Technician for the appropriate hardware to be specified in the construction documents.

D. DPS Access Control & Video Management Systems:

1. The Division of Public Safety's Access Control Program maintains centralized campus solutions for Access Control and Video Management. Any device deployed must be connected to these systems via IP connections on an approved secure VLAN.

E. Modifications and connections to existing intrusion hardware installations:

1. Ties into the DPS Communications Center central station is manufactured by Bosch. These existing systems report to the DPS Communications Center Central Station over dedicated copper communication pairs in the respective building. A digital dialer located in or at the building's security, access system transmits the information. The Station security output is gathered and transmitted over a TCP/IP connection to the current access control solution to ensure integrity of alarms and trouble conditions. Digital dialers must be approved by FM Operations Fire/Alarms & Security Technician.

F. Card Access, Video and Intrusion Division of Public Safety Communications (DPSC) Workstation:

1. A Campus Police Workstation (CPW) supporting the campus security systems resides at each DPSC installation location. These terminals support the Access Control Software System. Cornell IT policies must be adhered to when attaching devices to the University network. See Part 1.01 Related Documents.
2. All new, and existing installations of Card Access hardware, and Video Surveillance must be connected via IP networks via approved secure VLANs. All new and existing Intrusion Alarm devices must be connected to the central receiver via telephone lines, and the receiver must be connected via IP and secure VLAN to ACP central systems.

G. Campus User Workstations:

1. Client Workstations shall have access to the current Access Control Software through remote desktop protocols and the current VMS through a web browser while connected to the University network.

2.02 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.
10. Activation of off-premise signals that are sent to the ACP systems via the Bosch Central Station Existing intrusion hardware installations or Ethernet (Access Control supported systems).

B. 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 SCP(s).
2. Transmission of the selected alarm or trouble signal to the ACP Central System.
3. Indication of the alarm or trouble condition at the computer monitor display at the CW, and DPSC, shall include the alarm or trouble description, time/date, building controller, device, input/output, priority code.

C. Activation of any card access device shall cause, but not be limited to:

1. Transmission of the data signal to the Building SCP(s) and ACP Central System.
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.

D. Items C. and D. above define normal operations. In the event of a communication failure between an SCP and the ACP Central System, these signals will be stored and forwarded to the ACP Central System when the communication is restored.

2.03 POWER REQUIREMENTS

A. Provide 120VAC power to the system power supply locations. Where available, provide a dedicated emergency power circuit.

1. 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).

1. 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 the University's Door and Hardware Center Electrical Foreperson.

D. Power supply 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 in series with other locksets, and never directly to the power supply output.

2.04 BATTERY BACK-UP POWER SUPPLY

A. Battery Back-Up Power Supply – Access Control Systems:

1. Batteries shall be of the sealed, lead-acid type.
2. Batteries shall be capable of providing operating power to operate the system for a minimum of 24 hours, and at the end of that period, shall be capable of operating all alarm sounding devices for 15 minutes, where required.
3. Batteries shall be mounted in the control panel or a separate enclosure of similar type to the main control panel.

B. Uninterrupted Power Supply – Video Surveillance Systems:

1. Capable of providing 30 minutes for all connected devices, or enough time to transition from shore power to emergency power when present.

2.05 CABLE AND RACEWAY SYSTEMS

- A. Cables shall be routed in conduit or an enclosed wireway with screw-on cover. Hinged wireway is not acceptable. Plenum cable installed in open air is not acceptable. CAT6 cables for video surveillance may be run with IT cabling if inside conduit or an enclosed raceway.
- B. Raceway systems shall concealed in finished spaces. Surface raceway systems are permitted where ceilings are inaccessible and existing walls cannot be fished.
- C. Cabling shall be run in such a fashion 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.
- D. Cornell University Facilities Engineering (FE) must approve any deviations in wire, raceway systems, or raceway hardware.
- E. Raceways shall be run from the field device to the head-end termination point in a professional manner, utilizing conduit, beam clamps, 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 workman-like manner, with raceways mounted so as not to interfere with the servicing of other building infrastructure systems in the future.
- F. Specifications for Ethernet cabling:
 1. All cable should comply with CIT cabling standards, be full copper and a minimum rating of CAT6.
 - a. CCA (Copper Clad Aluminum) cabling shall not be used.
 2. All cabling should adhere to current NFPA and NEC requirements for power over Ethernet. (Code requirements vs standard)

- G. 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.
- H. Adequate conductors shall be provided to allow for all functions the equipment is capable of providing regardless of use at the time of installation.
- I. 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.
- J. Card reader conductors shall be a minimum of 18 AWG./6-conductor, shielded, between card reader and reader interface. Belden model #9942 or equivalent.
- K. Egress device conductors shall be a minimum of 22 AWG./2-conductor between egress device and reader interface module. Belden model #8442 or equivalent.
- L. Door position switch conductors shall be a minimum of 22 AWG./2-conductor between egress device and reader interface module. Belden model #8442 or equivalent.
- M. Electric locking hardware conductors shall be a minimum of 18 AWG./2-conductor, between head-end power supplies and each downstream device. Belden model #8461 or equivalent.
- N. Security and Card Access wiring shall be installed in a separate conduit system independent of other system circuits. This excludes Ethernet cable that can be run in existing data conduit.
- O. 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.).
- P. Junction and splice boxes containing card access system wiring, circuits, and conductors shall have blue covers.
- Q. End-of-line resistors shall be installed at the location of the door contact or other sensor, not at the SCP.

2.06 DOOR HARDWARE

- A. Refer to 087100 Door Hardware for electronic locking hardware requirements.

2.07 SYSTEM CONTROL PROCESSORS (SCP)

A. General:

- 1. Use of existing or single System Control Processor (SCP) is preferred. Multiple SCPs are acceptable when specifically requested by the customer or approved in design by the DPS Access Control Project Management team.
- 2. 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. Door and Hardware Center Electrical Foreperson must approve panel locations.
 - a. 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. System Control Processor 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 Weigand Format.
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 12 time intervals.
4. Alarm Masking, Individual shunt times, available 6-digit pin code.
5. Two dedicated inputs for tamper and power failure status.
6. RS2/AccessIT Licensed Mercury Hardware: LP1501 for Schlage AD400 and PIM485 only; LP1502, LP2500.

2.08 INPUT CONTROL MODULES

A. General:

1. Locate its respective power source as close as physically possible, while maintaining proper service clearances.
2. Two inputs are available for cabinet tamper and power fault monitoring. Normally, the contacts are closed. Power fault monitoring shall always be in place.
3. Alarm inputs shall be supervised with end-of-line resistors that are 1000-ohm, 1% tolerance.
4. The Input Control Modules are intended for low voltage, class 2 circuits only.

B. Cabinet:

1. Refer to SCP requirements for Input Control Module cabinet requirements.

C. Input Control Module:

1. Line supervision, with 12VDC power supply.
2. RS-485, 4-wire communications.
3. Sixteen programmable supervised input contacts (use end-of-line resistors).
4. Two form-C 5A, 30VDC contacts for load switching with contact protection.
5. Two dedicated inputs for tamper and power failure status.
6. RS2/AccessIT Licensed Mercury Hardware: MR16IN.

2.09 OUTPUT CONTROL MODULES

A. General:

1. Locate its respective power source as close as physically possible, while maintaining proper service clearances.
2. Two inputs are for cabinet tamper and power fault monitoring.
3. Contact protection shall be used to minimize premature failure of the contacts and to increase system reliability.
4. The Output Control Modules are intended for low voltage, class two circuits only.

B. Cabinet:

1. Refer to SCP requirements for Input Control Module cabinet requirements.

C. Output Control Module:

1. Line supervision with 12VDC power supply.
2. RS-485, 4-wire communications.
3. Sixteen form-C 5A, 30VDC contacts for load switching that support “on”, “off”, and “pulse” control.
4. Two dedicated inputs for tamper and power failure status.
5. RS2/AccessIT Licensed Mercury Hardware: MR16OUT.

2.10 SINGLE READER INTERFACES (SRIs)

A. General:

1. Dual Reader Interfaces (DRI) are preferred whenever possible due to greater functionality and expansion potential. See section 2.13 below.
2. Locate its respective power source as close as physically possible, while maintaining proper service clearances.
3. Two supervised inputs are for exit request (normally open) and door contact (normally closed) monitoring.
4. Alarm inputs shall be supervised with end-of-line resistors that are 1000 ohm, 1% tolerance.
5. Two output relays support fail-safe and fail-secure operation. One relay shall be used for the strike (locking device) and is capable of 5A; the other relay may be used for auxiliary functions and is capable of 1A.
6. Provide end-of-line termination at the end of the communications line. If the Single Reader Interface is at the end of the RS-485 line, the J4 termination jumper must be set.

B. Power:

1. Provide a 12VDC, 125mA power input.
2. 80mA is available from Single Interface Reader for reader TTL power.
3. Circuit with 18AWG (minimum) twisted pair cable.

C. Upstream Communication:

1. Port 1, using 2-wire RS-485 interface, is used to communicate with the Intelligent System Controller.
2. RS-485 interface cable shall be a minimum 24 AWG twisted shielded pair.
3. Cable drops to devices from the Single Interface Reader should be kept to a minimum.

D. RS2/AccessIT Licensed Mercury Hardware: MR50.

2.11 DUAL READER INTERFACE MODULES (DRIs)

A. General:

1. Locate its respective power source as close as physically possible, while maintaining proper service clearances.
2. Eight supervised inputs, four per door. Inputs per door are for exit request (normally open), door contact (normally closed), and two auxiliary monitoring points (selectable through the software).
3. Alarm inputs shall be each supervised with two end-of-line resistors that are 1000 ohm, 1% tolerance for a total of 2000 ohms.
4. Six output relays support fail-safe and fail-secure operation. All six relays are capable of 5A apiece. Relays per door are for the strike and two auxiliary relays.
5. Provide end-of-line termination at the end of the communications line. If the Dual Reader Interface is at the end of the RS-485 line, the J5 and J6 termination jumpers must be set.

B. Power:

1. Provide a 12VDC, 450mA power input.
2. 80mA is available from Dual Interface Reader for reader TTL power.
3. Circuit with 18AWG (minimum) twisted pair cable.

C. Upstream Communication:

1. Port 1, use 2-wire RS-485 interface, used to communicate with the Intelligent System Controller.
2. RS-485 interface cable shall be a minimum 24 AWG (minimum) twisted shielded pair.
3. Cable drops to devices from the Dual-Interface Reader should be kept to a minimum.

D. RS2/AccessIT Licensed Mercury Hardware: MR52.

2.12 CARD READERS

- A. The card readers shall be installed on the unsecured side of the door. It can be mounted adjacent to the door, on the door, or pedestal mounted. The reader shall be mounted in accordance with current ADA Compliance guidelines.
- B. For double door installations, the inactive door must be monitored with door position sensor.
- C. All doors with electrified locking hardware must have the request to exit (REX) built into the hardware and a door position sensor.
- D. If a door operator is in use, the reader must be mounted adjacent to operator push pad.
 1. Operators shall be wired in accordance with the electrical drawings in Appendix A of this document.
- E. All doors must have key override that is only distributed to Facility managers, The Card Access door hardware shops staff, and emergency responders who may need access during a system failure.
- F. Hard wired integrated locksets are approved for both interior and exterior doors not requiring door operators.

- G. Multi-technology readers must be used and at a minimum must support 125KHz proximity and 13.56 MHz (iClass, MIFARE, DESFire). Additionally, where available, low power Bluetooth support should also be specified.
- H. In the case of Assa Abloy products, this is typically specified by calling out the BIPS credential.

2.13 INTRUSION DETECTION CONTACTS

- A. Where possible Intrusion Detection signals should be received from the Card Access hardware.
- B. On standard person doors without Card Access hardware, the contact shall be mounted in the top of the doorframe, 4-6" from the lock edge of the door.
- C. The electronic configuration for IDS contacts is normally closed and supervised.

2.14 EGRESS MOTION DETECTORS

- A. Use of motion detection for egress is not permitted without obtaining an exemption from DPS Access Control, Door and Hardware Center Locksmith Foreperson, and the Director of Risk Management.
- B. If approval is given:
 - 1. Egress motion detectors shall be ceiling mounted whenever possible. When the detector must be wall or frame mounted above the door, it will be angled down as far as possible, to provide the proper coverage.
 - 2. The coverage pattern shall reach from the detector to the level of the floor and shall not protrude more than 12" out from the surface of the door, nor more than 6" past the doorframe on either side. Masking of the detector is acceptable to meet the coverage pattern.

2.15 ACCEPTABLE MANUFACTURERS AND RESELLERS

- A. The equipment, components, and accessories shall be as specified in the contract documents. Requests for authorization to substitute, vary or change the specified equipment, components or accessories of the approved manufacturer must be submitted, in accordance with Cornell University's General Requirements.
- B. Equipment must be purchased through an authorized reseller for
 - 1. Access Control: RS2/AccessIT Access Control software to ensure that licensing needs are met.
 - 2. Video Surveillance: AXIS Camera reseller.

2.16 IDENTIFICATION

- A. Provide lettered phonetic identification plates on the following equipment, components, and accessories as noted below:
 - 1. Building System Control Processors (SCPs).
 - 2. Control Modules.
 - 3. Interface Modules.
 - 4. Remote Power Supplies.
 - 5. Provide computer-generated adhesive labels on system devices (Brady, Dymo, P-Touch).

- a. The label shall indicate the address and must be located on the device or adjacent to the device if this is not practical.
6. Intrusion Alarm dialer connections to be labeled per CIT standard 270000.
- 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 Software Labeling and Identification:
 1. System notes shall include:
 - a. Access Control Panel locations, installing technicians name, and date of installation.
 - b. Surveillance Cameras shall have label identifying the name of installing technician, date of installation, and a still image capture of the approved field of view.
 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. SCPs shall be labeled SCP-U, where U is a value from 1-9.
 2. DRIs shall be labeled DRI-UVWX, where U indicates its respective SCP numeral; and V is the SCP'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 SCP numeral; and V is the SCP'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. SCP-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 System Control Processor in the building.

PART 3 - EXECUTION

3.01 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 University's Door and Hardware Center Electrical Foreperson prior to installation start.

3.02 SYSTEM PROGRAMMING – CARD ACCESS

- A. Cornell's DPS Access Control Program (ACP) will perform the initial setup programming prior to the installation.
 - 1. All IP based devices must be delivered to DPS Access Control Program for configuration no less than three weeks prior to scheduled installation. Door and Hardware Center Electrical Tech or a Software certified installer shall provide all required wiring and terminations on the board prior to ACP configuration.
 - a. Certification in AccessIT! Essentials and ACRE Hardware Essentials can be obtained from <https://training.acre-co.com/> and proof of certification for each installer must be provided to the DPS ACP Project management team prior to picking up any hardware for installation.
 - 2. ACP will perform initial setup programming to include:
 - a. SCP 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).
 - 3. Door and Hardware Center Electrical Tech or a Software certified installer will install and configure:
 - a. RIM (reader interface module) configuration and labeling.
 - b. Initial test Time Zones and Access Levels.
 - c. Initially name devices.
 - i. Facility Name, Room number, Room purpose, compass direction of installation while inside secure room, Interior(INT) or Exterior(EXT).
 - ii. Devices with no reader associated will have “-No RDR” appended to the end of the name.
 - iii. Devices with ADA Operators will have “-ADA” appended to the end of the name.
- B. The security system installer is responsible for initial alarm programming and commissioning for intrusion devices with approval and collaboration of CUPD Community Engagement and DPS Communications Center.

3.03 SYSTEM PROGRAMMING – VIDEO SURVEILLANCE

- A. Cornell's DPS Access Control Program (ACP) will perform the initial setup programming prior to the installation.

1. The project will provide ACP with the devices no less than three weeks prior to scheduled installation.
 2. ACP will perform initial setup programming to include:
 - a. Camera configuration and labeling.
 - b. Device hardening.
 - c. User/Password configuration.
 - d. Creation of the device instance in the video management software.
 3. Cornell's Door and Hardware Center Electrical Tech or a certified installer will:
 - a. Mount the device.
 - b. Assist ACP with camera positioning during commissioning.
- B. The building/unit Network video surveillance system operator (NVSSO), for the building implementing the security measures, shall approve camera views post commissioning.
1. NVSSO and their designees will be trained for local management by DPS Access Control program. Access to the system will not be granted until training and completion of the authorization and activation forms has occurred.
 2. Authorization forms must be in place prior to this training.

3.04 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 Door and Hardware Center prior to commissioning.
- C. Installation's project and/or construction manager shall schedule asystems commissioning with the DPS 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 DPS Access Control Project 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 DPS Access Control Project Manager. Turnover of a portion or the entirety of the system to the ACC may be withheld due to commissioning failures until resolved.
- E. Coordinate with the Cornell Police and the DPS Communications Center to enable monitoring of the critical alarms during commissioning. Alarms will only be responded to after CUPD and DPS Communications have been satisfied that the location(s) in question have passed their certification process.

3.05 PROJECT CLOSE OUT

- A. Record drawings shall include but are not limited to the following information prior to the closeout of the project:

1. Head end equipment location and interface panel locations.
2. Power supply locations.
3. Battery calculations (vendor provided via submittals).
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 28 13 16

SECTION 28 - ELECTRONIC SAFETY AND SECURITY

SECTION 28 31 00 - FIRE ALARM DETECTION SYSTEM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The Contract Documents and the General Provisions of the Contract, including the General Conditions of the Contract for Construction, Supplementary Conditions, Special Conditions and Division 1 Specification Sections, apply to the Work of this Section.
- B. The Work of Section 26 05 00 - Electrical Basic Materials and Methods, Section 26 05 26 - Grounding, and Section 26 05 23 - Electrical Equipment Identification apply to the Work of this Section.

1.02 WORK INCLUDED

The work of this Section shall include providing all materials, labor, services, permits and related work to furnish a complete, operating, tested, functioning, documented Fire Alarm Detection System, including all work shown, specified, or required for proper system operation including but not limited to the following:

- A. Prior to construction start, check all loops and circuits for grounds and mapfaults. Identify circuit number and location of any defects and provide a written report to the Engineer as a submittal. Provide a dirty device report for all devices $\geq 20\%$ dirty.
- B. Removal and protection of existing devices to be reused.
- C. Demolition and removal of existing circuits, devices, and fixtures, where shown, removal of all debris from site and proper disposal of same.
- D. Protect existing system devices from entrance of construction dust, debris. Pay special attention to fire alarm signal devices.
- E. Maintain fire alarm, signaling and central reporting at all times.
- F. Maintain reporting of tamper and flow events for active existing sprinkler system.
- G. Provide new addressable system devices as shown.
- H. Provide new notification devices as shown.
- I. Provide and install new conduit pathways and boxes for new fire alarm circuiting as shown on Drawings.
- J. Provide equipment and conductor identifications as per Division 26.
- K. Provide testing of equipment and conductors as per Division 26.
- L. Provide fire alarm system testing per Section 28 08 00.
- M. Provide a clear “green” system with no troubles, grounds, mapfaults or devices $\geq 20\%$ dirty.

- N. Provide Certificate of Compliance and fees for permits and inspections.
- O. Provide openings in existing construction as required for the work of this Division.
- P. Provide maintenance of system in good condition until final acceptance.
- Q. Provide Submittals, Shop Drawings and Coordination Drawings as per Division 26.
- R. Provide programming with designators approved by Owner.
- S. Provide startup, testing and troubleshooting services as required.
- T. Provide one (1) year warranty from date of final acceptance.
- U. Provide Owner training.
- V. Provide Operational and Maintenance Manuals in the form of a single composite electronic PDF file.
- W. Provide "As-Built" Drawings.

1.03 QUALIFICATIONS OF CONTRACTORS

- A. The Electrical Contractor proposing to perform the installation of the fire alarm and detection work shall have experience in the installation, start-up and testing of power, network and data conductors and raceways for fire alarm systems and in the installation and start-up of addressable fire alarm and detection systems similar to those specified.

1.04 QUALIFICATIONS OF CONTRACTOR WORKFORCE

- A. The workforce of the Electrical Contractor proposing to perform the installation of the fire alarm and detection work shall include, as a minimum, one foreperson (male or female), who has been foreperson on the installation of at least three addressable fire alarm and detection projects containing two hundred addressable devices or more. The workforce shall also include a minimum of two workers of experience equivalent to journeyman (male or female) qualifications, who are each experienced in the installation and start-up of cabling, raceway devices and equipment for addressable fire alarm systems in a conduit system with a minimum of two hundred addressable devices.

1.05 QUALIFICATIONS OF FIRE ALARM SYSTEM VENDOR

- A. Fire alarm system vendor shall be approved by the equipment manufacturer to provide the sale, installation, and maintenance of FCI brand fire alarm systems by Gamewell/Honeywell.
- B. Fire alarm system vendor shall provide a fire alarm technician responsible for programming, start-up, testing and other tasks as required to provide a complete, tested and fully operating fire alarm system. Technician shall have a minimum of five (5) years' experience in programming and installation of FCI Brand fire alarm systems, and/or a minimum of two (2) years' experience in programming and installation of FCI Brand fire alarm systems at the Cornell University campus. The technician shall be manufacturer qualified and have a minimum of two (2) years' experience on the E3 fire alarm control panel.

- C. Fire alarm system vendor shall identify the name and relevant experience of the primary fire alarm technician in the submittal package for review. The Owner/Engineer reserves the right to reject any and all fire alarm technicians and request that alternate technicians be provided as required to ensure that a complete, operational, and tested fire alarm system is provided in a timely manner.
- D. Fire alarm field technicians in charge of testing and commissioning shall have a NICET certification in fire alarm systems, minimum of Level II.
- E. Fire alarm project managers in charge of system design and submittal creation shall have a NICET certification in fire alarm systems, minimum of Level IV.

1.06 AGENCY APPROVALS

- A. All equipment shall be listed by Underwriters Laboratories, Inc. or approved by Factory Mutual or as accepted by the authority having jurisdiction.
- B. The fire alarm system in its entirety shall be in compliance with all applicable fire and electrical codes and comply with the requirements of the local authority having jurisdiction over said systems.
- C. Accessory components as required shall be catalogued by the manufacturer and UL listed to operate with the manufacturer's control panel.

1.07 SPECIFIC U.L. PROVISIONS

- A. The system shall comply with the applicable provisions of the following U.L. Standards and Classifications:
 - 1. #864, Control Units for Fire Protective Signaling System.
 - 2. UOJZ, Control Units, System.
 - 3. UOXX, Control Unit Accessories, System.

1.08 SPECIFIC NFPA STANDARDS

- A. The system shall comply with the applicable provision of the following current National Fire Protection Association (NFPA) standards:
 - 1. NFPA 70 National Electric Code.
 - 2. NFPA 72 National Fire Alarm Code.
 - 3. NFPA 90 A.
 - 4. NFPA 101 Life Safety Code.

1.09 SUBMITTALS

- A. General Requirements:
 - 1. The installing Contractor shall be licensed by the State of New York to engage in the business of installing fire alarm systems. Provide copy of valid license.
 - 2. Delivery dates of the equipment to be supplied shall be furnished.
 - 3. Installation and final test/acceptance dates of the equipment installed shall be coordinated with the inspector and shall be prior to the date of project substantial completion.
 - 4. Substituted equipment shall not be allowed.
 - 5. Provide a copy of technician's NICET certificate.

6. Provide a copy of Project Manager's NICET certificate.

B. Fire Alarm System:

1. Contractor shall supply cut sheets for all proposed fire alarm system equipment, including but not limited to:
 - a. Fire alarm conductors.
2. For projects expanding onto an existing fire alarm control system, it shall be the Contractors responsibility to supply product that can integrate under normal operation with the existing system.

C. Shop Drawings:

1. Fire alarm shop drawings shall include, at a minimum:
 - a. Title sheet with Project location, Owner, Engineer, installing Contractor's address and contact, along with a list of drawings in the package.
 - b. Device legend and symbols.
 - c. Floor plans with all devices that make up the modifications to the system shown.
 - d. Riser diagram with wire sizes and type.
 - e. Control unit diagrams (i.e., fan shutdown).
 - f. All pertinent wiring diagrams.
 - g. Input/output matrix.
 - h. Notification appliance circuit voltage drop calculations.

D. Satisfying the Entire Intent of these Specifications:

1. It is the Contractor's responsibility to meet the entire intent of these Specifications. Deviations from the specified items shall be at risk of the Contractor until the date of final acceptance by the Architect and Engineer.
2. All costs for removal, relocation, or replacement of a substituted item shall be at the risk of the Electrical Contractor.

1.10 CODES AND STANDARDS

- A. The Fire Alarm and Detection System shall comply with all local and state codes with no exception.

PART 2 - PRODUCTS

2.01 EQUIPMENT MATERIAL AND GENERAL REQUIREMENTS

- A. All equipment furnished for this project shall be new and unused. All components and systems shall be designed for uninterrupted duty. All equipment, materials, accessories, devices, and other facilities covered by this specification or noted on contract drawings and installation specifications shall be the best suited for the intended use and shall be provided by a single manufacturer. If any of the equipment provided under this Specification is provided by different manufactures, then that equipment shall be recognized as compatible by both manufacturers, and "Listed" as such by Underwriters' Laboratories.

- B. System installation and operations shall be verified by the manufacturer's representative and a verification certificate presented upon completion. The manufacturer's representative shall be responsible for an on-site demonstration of the operation of the system and initial staff training as required by the Consulting Engineer.
- C. The system shall be capable of detecting the electrical location of each intelligent device.

2.02 SINGLE INPUT MODULE

- A. Intelligent single input module shall provide one (1) supervised Class 'B' input circuit capable of four (4) personalities, each with distinct operation. Input module shall support following circuit types:
 - 1. Normally-Open Alarm Latching (Manual Stations, Heat Detectors, etc.).
 - 2. Normally-Open Alarm Delayed Latching (Waterflow Switches).
 - 3. Normally-Open Active Non-Latching (Monitor, Fans, Dampers, Doors, etc.).
 - 4. Normally-Open Active Latching (Supervisory, Tamper Switches).
- B. FCI Model AMM-4S.

2.03 DUAL INPUT MODULE

- A. Intelligent dual input module shall provide two (2) supervised Class 'B' input circuits similar to single input module.
- B. FCI Model AMM-2IF.

2.04 CONTROL RELAY MODULE

- A. Intelligent control relay module shall provide one form 'C' dry relay contact rated at two (2) amps at 24 VDC to control external appliances or equipment shutdown. The position of the relay contact shall be confirmed by the system.
- B. FCI Model AOM-2RF.

PART 3 - EXECUTION

3.01 GENERAL

- A. Conform to Division 26 Specifications for installation and execution of work.

3.02 FIRE ALARM SYSTEM

- A. Coordinate closely with the Owner and Engineer for routing of conduits and locating junction boxes.
- B. Coordinate core drilling with building structure, avoid drilling next to columns and structural steel.
- C. Allow a minimum of eight (8) hours' support for one electrician for start-up after testing and troubleshooting of fire alarm devices and modules during tie in of new system.
- D. Coordinate fire alarm test period with the Owner for testing all functions of the fire alarm system.

3.03 SYSTEM OPERATION

A. Operation of any alarm initiating device shall automatically:

1. Display on the control panel and identify any off normal condition and log each condition into the system database as an event.
2. Sound all audible speaker appliances with a prerecorded message. Audible devices shall have the ability to be silenced.
3. Activate all strobe appliances throughout the building. All strobe appliances throughout the building shall be synchronized with each other, regardless of location or fire doors. Visual devices shall be non-silenced unless the system is successfully reset.
4. Operate control relay contacts to shut down all HVAC units serving the floor of alarm initiation.
5. Operate control relay contacts to release all magnetically held smoke doors throughout the building.
6. Visually annunciate the individual point of alarm on all remote annunciator panels. The visual indication shall remain on until the alarm condition is reset to normal.
7. Transmit an alarm condition, via the integral central station communicator, to the public safety office station/Local Fire Department (as required by the AHJ).
8. Operation of any detection device located in spaces covered by preaction sprinkler systems shall release waterflow to the piping in the space.

B. Programming:

1. The FACP messages must be approved by the Owner and AHJ. Custom messages shall be provided as directed. Refer to the included labeling template on the following page for a guideline indicating the initial panel programming configuration.
2. FACP descriptors shall utilize room/space designations and numbers to be used by the facility after occupancy.
3. The Contractor shall allow for three (3) reprogrammings of the system as directed by the Owner.

C. Cornell Standard Device Descriptions:

1. Provide device descriptions and labels per Cornell University Standard. Provide submittal of proposed device labeling prior to final testing to the Engineer for review.

3.04 WIRING

- A. For fire alarm use, wire and cable shall be UL listed and a minimum of 18 AWG as required by local codes and authority having jurisdiction. Provide stranded, twisted wire for communication circuits. All fire alarm and detection circuits shall be in conduit, unless shown otherwise.
- B. Provide wiring between main control panel devices as required for specified operation.
- C. Raceways containing conductors identified as "Fire Protective Alarm System". Conduit shall not contain any other conductors and no AC current carrying conductors shall be allowed in the same raceway with the D.C. fire alarm detection and signaling conductors.
- D. All network and power wiring from panel to panel and from panel to annunciator shall utilize Class 'A' wiring and shall be circuited with 2-hour rated Circuit Integrity Cabling in separate raceways.
- E. Provide low voltage line surge protection on any circuit leaving the building (i.e., PIV tamper).

3.05 INSTALLER'S RESPONSIBILITIES

- A. The installer shall coordinate the installation of the fire alarm equipment with the manufacturer or his authorized distributor.
- B. All conductors and wiring shall be installed according to the manufacturer's recommendations.
- C. It shall be the installer's responsibility to coordinate with the supplier regarding the correct wiring procedures before installing any conduits or conductors.

3.06 INSTALLATION OF SYSTEM COMPONENTS

- A. System components shall be installed in accordance with the latest revisions of the appropriate NFPA pamphlets, the requirements contained herein, National Electrical Code, local and state regulations, the requirements of the fire department and other applicable authorities that have jurisdiction.
- B. Low energy UL listed fire protective signaling circuit cable with 105°C insulation may be used when allowed by the local authority having jurisdiction, however, all conductors shall be in conduit, unless shown otherwise.
- C. Installer shall verify that smoke detectors are mounted not less than three (3) feet from air supply diffusers.

3.07 GUARANTEE AND FINAL TEST

- A. General:
 - 1. The Contractor shall guarantee all equipment and wiring free from inherent mechanical and electrical defects for one year (365 days) from the date of final acceptance.
- B. Final Test: Before the installation shall be considered completed and acceptable by the Owner, a test on the system shall be performed as follows:
 - 1. The Contractor's job foreman, in the presence of a representative of the manufacturer, a representative of the Owner and the fire department, shall operate each modified, moved, changed, etc. building fire alarm device to ensure proper operation of the device, and correct annunciation at the control panel, the remote annunciator and building alarms. 10% of unmodified fire alarm devices shall also be tested.
 - 2. One half of all tests shall be performed on battery stand-by power.
 - 3. The signaling circuits shall be opened in at least two (2) locations per zone to check for the presence of correct supervisory circuitry.
 - 4. When the testing has been completed to the satisfaction of both the Contractor's job foreman and the representatives of the manufacturer and Owner, a notarized letter co-signed by each attesting to the satisfactory completion of said testing shall be forwarded to the Engineer and the fire department.
 - 5. The Contractor shall leave the fire alarm system in proper working order, and without additional expense to the Owner, shall replace any defective materials or equipment provided by him under this Contract, within one year (365 days) from the date of final acceptance by the Owner.
 - 6. Prior to the final test the fire department must be notified in accordance with local requirements.
 - 7. Final tests shall only be allowed after all the program changes have been made and input into the system.

3.08 AS-BUILT DRAWINGS, TESTING AND MAINTENANCE INSTRUCTIONS

A. As-Built Drawings:

1. A complete set of reproducible “As-Built” Drawings showing installed wiring, color coding and wire tag notations for exact locations of all installed equipment, shall be delivered to the Engineer upon completion of system.

B. Operating and Instruction Manuals:

1. Operating and instruction manuals shall be submitted prior to testing of the system. Provide manuals in the form of a single composite electronic PDF file to the Engineer prior to request for punch list.
 2. Testing Frequency Instructions: Complete, accurate, step-by-step testing instructions giving recommended and required testing frequency of all equipment, methods for testing each individual piece of equipment and a complete trouble-shooting manual explaining how to test the primary internal parts of each piece of equipment, shall be included in the operation and instruction manuals.
 3. Maintenance instructions shall be complete, easy to read, understandable, and shall provide the following information:
 - a. Instructions on replacing any components for the system, including internal parts.
 - b. Instructions on periodic cleaning and adjustment of equipment with a schedule of these functions.
 - c. A complete list of all equipment and components with information as to the address and phone number of both the manufacturer and local supplier of each item.
- C. User operating instructions shall be provided prominently displayed on a separate sheet located next to the control unit in accordance with UL Standard #864.

END OF SECTION 28 31 00

DIVISION 28 ELECTRONIC SAFETY AND SECURITY SYSTEMS

SECTION 28 84 00 - FIRESTOPPING AND SMOKESTOPPING FOR ELECTRONIC SAFETY AND
SECURITY SYSTEMS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Provide firestopping and smokestopping for Electronic Safety and Security Systems to comply with IBC 714.
- B. Provide submittals and installation detail sheets.
- C. Coordinate products to be used with the General Contractor and other trades so as to provide one product that will be used by all trades on this project. Submit on this elected product only.

1.02 SUBMITTALS

- A. Provide a schedule of each type of penetration together with the proposed method of protecting that penetration type. Schedule shall include the following details:
 - 1. Penetrated item (e.g., wall, floor, roof).
 - 2. Construction of item (e.g., metal studwall with gypsum wallboard).
 - 3. Fire rating of item (e.g., 1 hour wall).
 - 4. Description of penetrating item (e.g., 1" to 3" Schedule 40 pipe).
 - 5. Identification of penetrating seal to be used in this case (e.g., Rectorseal Biostop pipe collar).
 - 6. UL or FM detail sheet (e.g., per attached example).
 - 7. UL or FM system number (e.g., WL1200).
- B. The submittal shall include complete details for each penetration covered by this Division.
- C. It is intended that the submittal include each detail in full for each system used, so that it is clear that the installing Contractor has the correct reviewed information in the field.

1.03 QUALITY ASSURANCE

- A. Firestopping Materials: Provide penetration seal assemblies whose fire-resistance ratings have been determined by testing in the configurations required and which have fire-resistance ratings at least as high as that of the fire-rated assembly in which they are to be installed.
 - 1. Comply with all applicable codes including but not limited to:
 - a. American Society of Testing and Materials (ASTM).
 - b. ASTM E 84 Test Method for Surface Burning Characteristics of Building Materials.
 - i. ASTM E 119 Method of Fire Tests of Building Construction Materials.
 - ii. ASTM E 814 Test Method for Fire Tests of Through Penetration Firestops.

- iii. ASTM C 665 (Corrosion & Microbial Resistance Portions) Standard Specification for Mineral-Fiber Thermal Insulation for Light Frame Construction and Manufactured Housing.
 - iv. ASTM E 90 Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.
2. Listed by Underwriters Laboratories (UL) and/or Factory Mutual Research Corporation for each specific intended application.
- a. UL Building Materials Directory.
 - b. UL Fire Resistance Directory.
 - c. UL 2079 Test.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Firestopping and smokestopping materials shall allow normal expansion and contraction (intumescent) of the penetrating item without failure of the penetrations seal and shall be heat absorbing (endothermic). Products may not emit hazardous, combustible, or irritating by-products during installation or curing. Products shall not require special tools for installation.

2.02 MASONRY EXEMPTION

- A. The Contractor shall note IBC 714.3.1 Exemption, which states:
- 1. Exception: Where the penetrating items are steel, ferrous or copper pipes, tubes or conduits, the annular space between the penetrating item and the fire-resistance-rated wall is permitted to be protected by either of the following measures:
 - a. In concrete or masonry walls where the penetrating item is a maximum 6-inch (152 mm) nominal diameter and the area of the opening through the wall does not exceed 144 square inches (0.0929 m²), concrete, grout or mortar is permitted where installed the full thickness of the wall or the thickness required to maintain the fire-resistance rating.
 - b. The material used to fill the annular space shall prevent the passage of flame and hot gases sufficient to ignite cotton waste when subjected to ASTM E119 or UL 263 time-temperature fire conditions under a minimum positive pressure differential of 0.01 inch (2.49 Pa) of water at the location of the penetration for the time period equivalent to the fire-resistance rating of the construction penetrated.

2.03 MANUFACTURERS

- A. Manufacturers: Provide products complying with requirements of the Contract Documents and made by one of the following:
- 1. Rectorseal.
 - 2. Hilti, Inc.
 - 3. 3M Fire Protection Products.
 - 4. Specified Technologies Inc.
 - 5. U.S. Gypsum Company.
 - 6. Johns Manville.

7. BlazeMaster.

2.04 FIRESTOPPING PRODUCTS

A. Provide Firestopping Products which:

1. Provide firestopping systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases and maintain fire resistance rating of assembly.
 - a. F-rated systems in accordance with ASTM 814.
 - b. T-rated systems in accordance with ASTM 814.

B. Firestopping Flamespread Performance Requirements:

1. Provide products with flame-spread ratings of less than 25 and smoke-development rating of less than 50 as determined in accordance with ASTM E 84.

C. Firestopping UL Performance Requirements:

1. Provide products with UL ratings specified for assembly indicated as determined in accordance with UL listing.

D. FM approval in lieu of UL shall be accepted by the Owner.

E. Where a specific firestopping product is identified on the drawings, either that product or a similar product which has been tested in the exact application shown on the drawings shall be employed, after review by the Engineer.

F. Firestop caulk shall be Johns Manville Firetemp CI, Rectorseal Biostop 500+, or approved equal, except where otherwise shown on the drawings.

2.05 SMOKESTOPPING PRODUCTS

A. Provide smokestopping products which:

1. Allow normal expansion and contraction movement of the penetrating item without the failure of the penetration seal.
2. Maintain at least the smoke resistance of the barrier penetrated.
3. Firestop caulk shall be Johns Manville Firetemp CI or approve equal.

PART 3 - EXECUTION

3.01 INSTALLATION AND QUALITY ASSURANCE

- A. Install firestopping materials in exact accordance with the manufacturer's instructions and conditions of the testing; provide all accessory materials required.
- B. Provide the services of a factory representative of the fireproofing product to review the installation practices and conduct training of the applications.

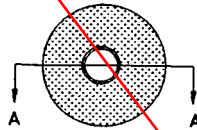
- C. The installer shall be trained to perform work.
- D. Inspection: The Authority Having Jurisdiction (AHJ) shall have a final inspection review of all work performed. Contractor shall make modifications to completed and uncompleted work as directed by the AHJ at the Contractor's expense.
- E. Refer to the Certified Installation Instructions sheet on the following page for an example of an acceptable installation method.

3.02 FIRESTOPPING AND SMOKESTOPPING ITEMS

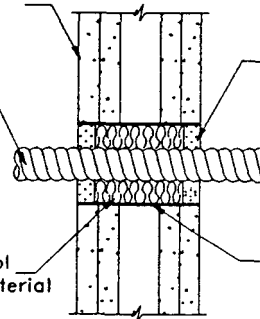
- A. Under Division 28, provide and pay for all firestopping materials, assemblies, and labor to provide complete firestopping and smokestopping.
- B. Provide firestopping of penetrations at each fire-rated floor, wall, or roof assembly of the following components:
 - 1. Raceways provided by Division 28.
 - 2. Conduits provided by Division 28.
 - 3. Other equipment provided by Division 28.

Attachment(s): Example Detail Sheet

END OF SECTION 28 84 00

RECTORSEALSystem No.
WL1200**FIRESTOPS**500+GW-92
Wall Penetration
1, 2 Hr. Rating1 layer of 5/8"
UL Classified
Gypsum Wallboard
for 1 Hr. Rating
or
2 layers of 5/8"
for 2 Hr. RatingMax. 1" Corrugated
Stainless Steel Tubing
(PVC Coated)1/2" depth
Metacaulk® 1000

PLAN

Mineral Wool
Backing MaterialSteel Sleeve/
Wire Mesh

SECTION A-A

EXAMPLE**SYSTEM CONFIGURATION INFORMATION**

PRODUCT(S)			PENETRATING ITEM(S)			HOLE SIZE	ANNULAR SPACING			ADDITIONAL INSTALLATION MATERIALS AND AIDS			BACKING MATERIAL		ASTM E 814 RATING	
FILL MAT'L	MIN. THICK.	OTHER	TYPE	SIZE	INSULATION	MAX.	MIN.	MAX.		WIRE MESH	STEEL SLEEVE	OTHER	TYPE	DEPTH	T	F
500+	1/2" both sides	none	PVC Coated Corrugated Stainless Steel Tubing	up to 1"	none	3"	1/4"	1 1/2"		No. 8 steel wire mesh	min. 20 gauge	none	minimum 4.0 pcf mineral wool	N/A	0 0	2 1

INSTALLATION INSTRUCTIONS

These instructions are for the installation of through-penetration fire stop system 500+GW-92 in minimum 4 1/2 inch thick steel or wood stud fire rated gypsum wallboard partitions as listed by Underwriters Laboratories Inc. Refer to above drawings and System Configuration Information for component details.

Step Procedure

- 1 Cut hole in wall in required size to accommodate pipe penetrations and allowable annular spacing. Do not exceed maximum specified hole diameter.
- 2 Install - 1 inch PVC Coated Corrugated Stainless Steel Tubing. Support pipe rigidly on both sides of wall.
- 3 Install specified wire mesh or minimum 20 gauge steel sleeve cut to size, formed to hole shape centered inside wall around tubing and allowed to spring back snugly against periphery of hole.
- 4 Install backing material by tightly packing annular space in between and around tubes with specified mineral wool flush with wall. Recess mineral wool 1/2" on both sides of wall.
- 5 Apply a 1/2" depth of Biostop™ 500+ into annular space around tubing on both sides of wall. Tool surface to a smooth defect-free finish.

JOBNAME:

ARCHITECT:

CUSTOMER:

CUSTOMER ORDER NO:

CONTRACTOR:

REPRESENTATIVE:

REPRESENTATIVE ORDER NO:

RECTORSEAL

2601 SPENWICK HOUSTON, TEXAS 77055

REVISION NUMBER: 121499

SHEET NUMBER: OF