BRIGHAM YOUNG

UNIVERSITY

CONTINUING EDUCATION OFFICE REMODEL LEVEL 1&4

CONTINUING EDUCATION

HARMAN CONTINUING EDUCATION BUILDING - LEVEL 1 - 111 & LEVEL 2 - 403

SPECIFICATIONS

FACILITIES PLANNING

240 BRWB PROVO, UTAH 84602
PHONE: (801) 422-5504
FAX: (801) 422-0566

DATE OF RECORD: FEB. 12, 2024

BYU WORK ORDER

N1864 & N3482

CONSTRUCTION DOCUMENTS

SECTION 000103

PROJECT DIRECTORY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Identification of project team members and their contact information.

1.02 OWNER:

A. Name: Brigham Young University
   1. Address: Provo, Utah 84602
   2. Telephone: (801) 422-5406

B. Primary Contact: All correspondence from the Contractor to the Architect will be through this party, unless alternate arrangements are mutually agreed upon at preconstruction meeting.
   1. Name: Edgar Coca (Construction Project Manager)
   2. Email: edgar_coca@byu.edu
   3. Telephone: (801) 377-9795

1.03 CONSULTANTS:

A. Architect: Design Professional of Record. All correspondence from the Contractor regarding construction documents authored by Architect's consultants will be through this party, unless alternate arrangements are mutually agreed upon at preconstruction meeting.
   1. Company Name: BYU Facilities Planning
   2. Primary Contact: Shelbey King
      a. Email: shelbey_king@byu.edu
      b. Telephone: 801-319-1983

B. Interior Designer:
   1. Company Name: BYU Facilities Planning
   2. Primary Contact: Carolyn Crawford
      a. Email: carolyn_crawford@byu.edu
      b. Telephone: (801) 422-2644

C. Structural Engineer:
   1. Company Name: BYU Facilities Planning
   2. Primary Contact: Richard Nelson
      a. Email: Richard_nelson@byu.edu
      b. Telephone: (801) 623-8894

D. Mechanical Engineering:
   1. Company Name: BYU Facilities Planning
   2. Primary Contact: Jon Jensen
      a. Email: jon_jensen@byu.edu
      b. Telephone: (801-422-0726

E. Electrical Engineering:
   1. Company Name: BYU Facilities Planning
   2. Primary Contact: Luke Moore
      a. Email: luke_moore@byu.edu
      b. Telephone:

END OF SECTION

BRIGHAM YOUNG UNIVERSITY

STANDARD CONTRACT REQUIREMENTS

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BRIGHAM YOUNG UNIVERSITY

STANDARD CONTRACT REQUIREMENTS

8 February 2024

(Attached is a list of bidders invited to bid.)

Re: Invitation to Bid – HCEB Continuing Education Office Remodel Floors 1 & 4
W.O. N1864 & N3482

To Whom It May Concern:

You are invited to bid on the above-referenced project. This project consists of renovating 4800 square feet of the testing center space into office space on the 1st floor. This project also consists of renovating 710 square feet of current office space into new office and conference room space on the 4th floor. The completion date for this project is 15 August 2024.

Plans will be available at the mandatory pre-bid which has been scheduled for 15 February 2024 at 10 AM in Room 198 BRWB. Bids will be opened and read aloud on 29 February 2024 at 2 PM in Room 198 of the Brewster Physical Facilities Building at Brigham Young University. A performance bond and a labor and materials payment bond for 100% of the contract will be required for this project and must be included in your bid.

We hope that you will be able to bid this project.

Sincerely,

Anthony Burdette

ARB/mh
Attachment

NOTICE TO BIDDERS

SECTION l--PROJECT: HCEB Continuing Education Office Remodel Floors 1 & 4

WORK ORDER NUMBER: N1864 & N3482

SECTION 2--LOCATION: Brigham Young University

SECTION 3--OWNER: Brigham Young University

SECTION 4--DESIGNER: Brigham Young University

SECTION 5--STANDARD CONTRACT REQUIREMENTS:

The Bidder is directed to the Brigham Young University Standard Contract Requirements (revised October 2017). This volume is an integral part of the contract documents and is hereby made a part of the contract.

SECTION 6--DATES:

A. Start Date: 29 April 2024

B. Completion Date: 15 August 2024

SECTION 7--PREBID CONFERENCE

A. Prebid Conference will be:

Date: 15 February 2024

Time: 10 AM

Place: Room 198, Brewster Building

SECTION 8--RECEIPT AND OPENING OF BIDS:

A. Bids will be received:

Date: 29 February 2024

Time: 2 PM

Place: Room 198, Brewster Building

By: Ole M. Smith

B. The Owner reserves the exclusive right to release all publicity relating to the proposals and the project.

SECTION 9--DEPOSIT FOR CONTRACT DOCUMENTS:

A. A deposit of $0.00 will be required for each set of contract documents (plans and specifications) taken.

SECTION 10--GENERAL CONTRACTORS

A. Bidding by General Contractors will be by invitation only.

BRIGHAM YOUNG UNIVERSITY

FORM OF PROPOSAL

NAME OF PROJECT HCEB Continuing Education Office Remodel Floors 1 & 4

WORK ORDER NUMBER N1864 & N3482

NAME OF CONTRACTOR _____

DATE OF PROPOSAL _____

The undersigned, hereinafter referred to as the Bidder, certifies that the following facts and/or circumstances have occurred or exist relating to the proposed work: HCEB Continuing Education Office Remodel Floors 1 & 4 prepared by _____.

1. That Bidder has received the contract documents for the above entitled project.

2. That Bidder has received Brigham Young University General Conditions Requirements, revised October 26, 2017.

3. That Bidder is familiar with such documents, has examined the site of the proposed work, including availability of access, utilities, and other similar items relating to performance of the work and is thoroughly familiar with all general and local conditions which could in any way affect this work.

4. That no verbal agreements or representations with or by any officer, agent, or employee of the Owner exist or have been made to the Bidder and the Bidder in submitting this proposal is in no way relying thereon.

5. That if this proposal is accepted, Bidder will enter into a contract with the Owner in substantially the form contained in the contract documents, and will provide the bonds, insurance coverage and all other items required by the contract documents.

6. The term "base bid" shall be understood to include all work contained in the contract documents excluding any substitutes or alternates. The Owner will have the right to accept Alternates in any order or combination, and to determine the low Bidder on the basis of the sum of the Base Bid and Alternates accepted.

Bidder hereby proposes to furnish all materials, labor, equipment, tools, transportation, services, licenses and permits necessary for the completion of all the work set forth in the contract documents for the sum of:

Base Bid* ($)

*Base bid to include the cost of a Performance Bond and a Labor/Materials Payment Bond. See General and Supplementary Conditions.

1. The bidder agrees to complete the work on or before 15 August 2024

2. The bidder acknowledges receipt of addenda No.(s)_____

3. The Bidder's Utah contractor's license number is_____

4. Is your bonding capacity adequate for this job? Yes No

5. For verification call_____

6. Telephone number_____

PROPOSED SUBSTITUTE MATERIALS

The total sum of the Bidder's proposal shall include the furnishing and installing of all materials, equipment, and labor as called for in the contract documents as a base bid.

Hereafter give the total amount to be added or deducted for a complete installation of equipment or materials other than those specified and those approved by addendum are submitted for the Owner's consideration. All materials and equipment proposed for substitution shall be listed below and must meet the requirements of the contract documents. During the time of consideration of the proposals, complete information shall be submitted immediately to the Architect and Owner's Representative. The Contractor is referred to Page 3 of the Instructions to Bidders, Section 9, prior approvals and substitutions for requirements relative to proposed substitutions.

Proposed Substitute	Manufacturer and Catalog Numbers	$ Add	$ Deduct

TYPE OF BIDDER'S ORGANIZATION:

Official Name of Organization

Corporation, Co-partnership, Individual, or Other

Address

Name of individual Members of Firm:

Name of President of Corporation:

Name of Secretary of Corporation:

Corporation is organized under the laws of the State of:

Signature

( )
)Seal(
( )

Title or Office

Legal Address

BIDDER'S LIST OF SUBCONTRACT BIDS USED IN PROPOSAL

(LIST OF SUBCONTRACTORS)

PROJECT NAME HCEB Continuing Education Office Remodel Floors 1 & 4

WORK ORDER NUMBER N1864 & N3482

OWNER'S NAME Brigham Young University

DIVISION	SUBCONTRACT CLASSIFICATIONS	SUBCONTRACTOR USED	AMOUNT

INSTRUCTIONS TO BIDDERS

SECTION 1 -- BIDDING BY INVITATION

A. Bidding shall be by written invitation only. Those wanting to be considered for such invitation shall apply to:

Assistant Administration Vice President
Physical Facilities
202 Brewster Building
Provo, UT 84602

B. The Owner reserves the right to accept or reject any or all bids.

SECTION 2 -- CONTRACT DOCUMENTS

A. The Contract documents may be obtained by contractors from:

Construction Department
Physical Plant
240 Brewster Building
Provo, UT 84602

B. Subcontractors and suppliers who want to obtain Contract documents (plans and specifications) may do so by requesting the documents and paying the printing costs.

C. All Contract documents must be returned within ten (10) days after the bid opening, or the deposit will be forfeited. Those documents purchased outright by the Bidders are exempted.

D. The Contract documents (plans and specifications) may be deposited with local Bid Depositories. Bidders may contact the Invited General Contractors for locations. The Contract documents may be examined free at:

Construction Department
Physical Plant
240 Brewster Building
Provo, UT 84602

SECTION 3 -- CONTRACT METHOD

A. All work specified is to be done under one general contract. Bids will be accepted by the Owner from prime contractors only.

SECTION 4 -- INTERPRETATION OF CONTRACT DOCUMENTS

A. If any Bidder doubts the true meaning of any of the Contract documents, or finds errors, discrepancies or omissions, he shall request a clarification from the Architect in writing. Any interpretations or corrections will be made only by written addenda duly issued by the Owner. All addenda will be mailed, faxed or otherwise delivered to each person receiving a set of the Contract documents. Requests for clarifications must be submitted to the Architect at least five (5) days before bid opening. Unwritten instructions or interpretations will have no validity.

B. Should discrepancies appear in the Contract documents that are not resolved by an addendum, it is expressly understood that the Contractor has used the most expensive method and/or material in the bid.

SECTION 5 -- REQUIREMENTS BEFORE SUBMITTING BIDS

A. The Contractor shall become thoroughly familiar with the site and structures located there (if any). The Contractor shall thoroughly examine all Contract documents in relation to all conditions that might directly or indirectly affect the contract work. The bid amount shall reflect all such conditions.

SECTION 6 -- PREPARING AND SUBMITTING BIDS

A. To receive consideration, a bid must be made according to the following instructions:

1. Bids shall be prepared on BYU bid forms.
2. Bids shall have all items or blanks filled. Numbers shall be stated both in writing and in figures. If there is a discrepancy between the two, the written number shall govern.
3. Bids shall be without interlineations, alterations or erasures.
4. Signatures shall be by those authorized to execute the Contract.
5. The Bidder's legal name, business address and telephone number shall be stated.
6. Neither oral bids nor modifications shall be considered.
7. You may email your bid to the Construction Department Secretary, but it is not official until it is printed, inserted into an envelope, and delivered to the designated person opening the bids prior to the appointed bid opening time. It is suggested that the bidder call in advance to make these arrangements. We do not accept responsibility for email, printing, delivery, or other problems.
8. It is the Bidder's sole responsibility to see that the bid is received at the proper time. Any bid received after the scheduled bid opening time will be returned unopened to the Bidder.
9. Bidders shall accept proposals from only those subcontractors who are approved by the Owner or those who have shown to the Bidder's satisfaction that they are financially capable of handling the work. Furthermore, subcontractors must have the technical ability, personnel, plant, experience and reputation to carry out their portions of the work. It will be assumed that the question of bonding subcontractors, where considered desirable or necessary by the Contractor, including the cost of such bonds, has been resolved before bids have been submitted.
10. In order for the bid to be considered valid, two or more Bidders bidding as a "joint venture" must have the written approval of the Owner before submitting a bid. All members of a joint venture shall sign the bid and an official representative of the joint venture shall be designated in the proposal.
11. The term "base bid" shall be understood to include all work contained in the Contract, excluding any alternates or substitutes. The Owner shall have the right to accept alternates in any order or combination, and to determine the low Bidder based on the sum of the base bid and alternates accepted.
12. Substitutes or alternates accepted by the Owner may be included in the Contract or added by Change Order. In determining the low Bidder, the Owner will not consider substitutes.
13. Bids may be withdrawn by the Bidder, either in person or by a written request before bid opening. Once opened, the Bidders will have 24 hours to review and withdraw their bids. After the 24-hour period, the bids may not be withdrawn and must remain fixed as submitted for 45 days after opening. Envelopes must contain nothing but the proposal and bid breakdown forms if required. Envelopes shall be opaque, sealed and bear the Bidder's name.

SECTION 7 -- APPROVAL OF CONTRACTORS AND SUBCONTRACTORS

A. As soon after the bid opening as is practicable, the Owner will interview the apparent low Bidder and if deemed advisable, the second or third low Bidders. Within two hours of the bid opening, the low Bidder and the second or third low Bidders will provide to the Owner a list of subcontractors and their dollar amounts that were used in formulating their bid. The list of subcontractors will be examined by the Owner as soon as possible. The Owner reserves the right to accept or reject any subcontract proposal.

B. Provide Unit Prices within 24 hours of Bid Opening if requested in Form of Proposal.

C. If a Bidder doubts the correctness or acceptability of any subcontract proposal, the Bidder may submit the names and amount of other competing subcontractors for consideration, making sure that he clearly states which one he has used in formulating his proposal.

SECTION 8 -- FACTORS AFFECTING AWARD OR REJECTION OF BID

A. The Bidder's and subcontractor's past performance, organization, equipment and ability to perform and complete their contract as specified will be vital elements, as well as the amount of their bids, in the award of the Contract.

B. The Owner reserves the right to reject any or all bids, or to waive any irregularities or informalities in bids received. The

Owner reserves the right to accept the bid that will, in the Owner's opinion, best serve the interests of the Owner.

C. If a schedule is requested on form of proposal - The Owner reserves the right to reject a bid that provides a date that is past the requested substantial completion. Further, the Owner reserves the right to award the project based on proposed substantial completion regardless of whether such bid is the lowest.

SECTION 9 -- PRIOR APPROVALS AND SUBSTITUTIONS

A. Several acceptable brands of equipment, manufactured articles or methods of construction may have been identified in the Contract. It is not intended to close the Contract against other brands, articles, or methods that may warrant consideration. However, unspecified materials must have prior approval by the Owner to be considered.

B. Prior Approvals: Requests for approval of unspecified materials must be made to the Architect at least five days before bid opening. The requests for prior approval shall be considered by the Architect if time permits and if properly documented. The Architect is not bound to consider these items despite their apparent validity.

C. Fully detailed technical data, references and other information shall be furnished simultaneously with the requests for prior approval items.

D. Such requests shall be reviewed by the Architect and the Owner. If accepted, the approved requests will be included in an addendum.

E. The Contractor's "base bid" shall include the furnishing of only those items that are explicitly specified or which have received prior approval by addendum.

F. Substitutions: Besides the "base bid," any equipment or material supplier and any contractor or subcontractor may, at his option, submit a substitute price and product for any item specified which he feels warrants consideration by the Owner. This proposed substitution is to be listed where indicated on the bid form.

G. Any proposed substitute submitted by a Bidder shall include the amount by which the "base bid" would be increased or decreased.

H. The Owner may accept or reject any substitute proposed. In determining the low Bidder, the Owner will not consider substitutes.

I. If requested, the Contractor shall furnish information or data concerning the substitute. The Owner may request the Contractor, at his own expense, to have the substitute tested by an approved testing laboratory.

SECTION 10 -- FORM OF CONTRACT

A. Copies of the form of the Contract that the successful Bidder will be required to execute are included in this specification.

SECTION 11 -- ADDENDA

A. All addenda issued before bid opening shall be included in the bid and shall be a part of the Contract.

SECTION 12 -- REQUIREMENTS IMMEDIATELY AFTER SIGNING THE CONTRACT

A. Immediately after signing the Contract, the Contractor shall furnish the following to the Owner:
   1. Executed performance, labor and material payment bonds, each in an amount equal to 100 percent of the contract sum as specified in the General Conditions.
   2. Insurance certificates as specified in the General Conditions.
   3. A cost breakdown of the work that may, as approved by the Owner, serve as a basis for making monthly payments to the Contractor.
   4. A project schedule as to how he intends to construct the project. This must be, in the opinion of the Owner, a realistic method of analyzing and scheduling each component of the work. It must show when all trades or crafts start and finish their work. This schedule must be reviewed weekly in the OAC meeting and updated as

required. A critical path method of scheduling is preferred. If the Contractor cannot produce and maintain such a schedule, this service must be obtained from an outside consultant. The schedule must be approved by the Owner's Representative before the Contractor submits the first payment request.

B. The Contractor shall issue subcontracts as mutually agreed between the Owner and the Contractor. A complete list of subcontractors and major suppliers including names, addresses and telephone numbers are required within fourteen (14) days of the Owner=s subcontractorreview.

SECTION 13 -- DISQUALIFICATION

A. If the above requirements are not satisfied, the bid may be disqualified at the discretion of the Owner.

CONTRACT

Project Name

AT

BRIGHAM YOUNG UNIVERSITY

LONG FORM CONTRACT NO.
Project No.:
(Work Order No.:)

THIS CONTRACT, made and executed as of the day day of month, year, by and between BRIGHAM YOUNG UNIVERSITY, a non-profit Utah corporation of Provo, Utah (hereinafter referred to as "Owner"), and Contractor Name (hereinafter referred to as "Contractor").

WITNESSETH:

That for and in consideration of the payments hereinafter specified to be paid by the Owner to the Contractor and the covenants and agreement herein contained to be kept and performed by the parties hereto, the Contractor agrees to build and construct the proposed Project Name at Brigham Young University in Provo, Utah (hereinafter referred to as the "Project") and to furnish and deliver all materials, and perform and supervise all services (hereinafter, the “Work”) as required herein and by the contract documents hereinafter identified, all of which shall collectively constitute the contract, and shall hereinafter be referred to collectively as the "Contract".

ARTICLE I. THE IDENTIFICATION OF CONTRACT DOCUMENTS

A. The Plans entitled "Name on plans" were prepared by Brigham Young University, reviewed by Richard or Ray or whomever, Title of Reviewer, and approved by Ole Smith, Assistant Administration Vice-President of Brigham Young University, on date.

B. The Specifications entitled "Name on Specs" were prepared by Brigham Young University, reviewed by Richard or Ray or whomever, Title of Reviewer, and approved by Ole Smith, Assistant Administration Vice-President of Brigham Young University, on date.

C. Addendum Number One, dated Month Day, Year.

D. Addendum Number Two, dated .

E. The Brigham Young University General Conditions are a part of this Contract.

ARTICLE II. THE CONTRACT SUM

The Owner agrees to pay to the Contractor, in accordance with the terms hereof, the following:

Base Bid	$
Total	**$**

The Contractor agrees to accept a total of written dollar amount (check instructions for guidelines) Dollars ($) as full compensation for performing his obligation under the contract.

ARTICLE III. DATE OF COMPLETION

The Contractor agrees to complete the work required by the Contract on or before midnight, date (Month Day, Year). Time is hereby expressly declared to be of the essence of the Contract.

ARTICLE IV. THE CONTRACTOR'S REPRESENTATIVE

The Contractor's Representative is Name of the Contractor.

ARTICLE V. THE OWNER'S REPRESENTATIVE

The Owner's Representative is Ole M. Smith.

IN WITNESS WHEREOF, the Owner has caused this instrument to be signed by its President, attested by its Secretary, and its corporate seal to be hereunto affixed, and the Contractor has hereunto affixed his signature as of the day and year above written.

ACKNOWLEDGED: BRIGHAM YOUNG UNIVERSITY	CONTRACTOR
Ole M. Smith Assistant Administration Vice President	contractor rep contractor company
Steve Hafen Administration Vice President	Date
Shane Reese President	

BRIGHAM YOUNG UNIVERSITY

(Tax Exempt No. 11691946-003-STC)

SALES TAX EXEMPTION CERTIFICATE

In Lieu of Form TC-721

TO: contractor name _____

Pursuant to Utah State Tax Commission Rule R865-19S-58, Brigham Young University is exempt from sales/use tax on purchases of all Construction Materials (as defined by the above Rule). You and your subcontractors are hereby authorized to purchase Construction Materials free of Utah sales tax for the Project listed below pursuant to the agreement between you and Brigham Young University dated _____.

PROJECT: _____

OWNER'S REPRESENTATIVE: _____

Assistant Administration Vice-President Date
202 BRWB, Provo, UT 84602-8100
(801) 422-5500

CONTRACTOR'S (OR SUB'S) AFFIDAVIT

TO (Name of Vendor): _____

I certify that the purchases of Construction Materials from the Vendor above are made in behalf of Brigham Young University for the above referenced Project *only*. I further certify that the Construction Materials purchased will be installed or converted into real property owned by Brigham Young University.

NAME OF CONTRACTOR/SUB: _____

Street Address: _____ **Phone:** _____
Address City State/Zip

By: _____ **Title:** _____ _____
Authorized Representative Position or Job Title Date

NOTE: Vendor must keep this certificate on file for audit review. Contractor or Sub must keep a copy of this certificate on file and must notify vendors of cancellation, modification, or limitation of the exemption claimed. Contractor or Sub is liable for sales tax on any Construction Materials purchased which are not used on the Project above or which do not otherwise qualify for exemption.

GENERAL CONDITIONS

SECTION 1 - DEFINITIONS

A. OWNER - Brigham Young University, Provo, UT, referred to as the "Owner."

B. OWNER'S REPRESENTATIVE - The Assistant Administration Vice President - Physical Facilities, 202 Brewster Building, Brigham Young University, Provo, UT 84602.

C. ARCHITECT - The Architect is a licensed architect, engineer, or organization so designated in the Contract. The term "Architect" means the Architect or his authorized representative.

D. CONTRACTOR - The Contractor is the person or organization identified as such in the Contract and referred to throughout the Contract as if singular in number and masculine in gender. The term "Contractor" means General Contractor or his authorized representative.

E. SUBCONTRACTOR - The person, firm or corporation supplying direct or indirect labor and/or materials at the site of the Project and under separate contract or agreement with the Contractor.

F. PROJECT MANAGER - The BYU personnel who acts as liaison between the Owner and the Contractor for the Project. [CITY INSPECTOR ISSUE]

G. THE WORK - The work includes all labor necessary to produce the construction, demolition, or other delivery of goods and services required by the Contract and all materials and equipment incorporated or to be incorporated in such work.

H. THE PROJECT - The Project is the total construction designed by the Architect. The Work performed under the Contract may be the whole or a part of the work required to be performed under the Project.

I. WRITTEN NOTICE - Written notice shall have been duly served if delivered in person to the Project Manager or the Contractor's designated representative. Written notice is also served by a registered or certified mailing to the last known address of the corporation, if delivered to the direction of the Project Manager or the Contractor's designated representative.

J. CONTRACT - The Contract consists of the Brigham Young University short or long form contract; the Instructions to Bidders; the Supplementary Conditions; the General Conditions; the Drawings; the Specifications; Addenda; and Change Orders describing the Work and signed or acknowledged between the Owner and Contractor.

SECTION 2 - THE CONTRACT DOCUMENTS

A. The Contract represents the entire agreement between the parties and supersedes all prior negotiations, representations or agreements, either written or oral, including the bidding documents. After written execution of the Contract, the Contract shall be amended or modified only by a Change Order.

B. Words that have well-known technical or trade meanings are used herein by such recognized meanings.

C. Within the Contract there shall be the following order of precedence, (1) being the highest precedent:
   1. The BYU Short Form or Long Form Contract takes precedence over all other documents.
   2. Supplementary General Conditions take precedence over General Conditions.
   3. General Conditions take precedence over Drawings and Specifications.
   4. Addenda or modifications of any nature, to the Drawings and Specifications, take precedence over the original.

5. Specifications take precedence over Drawings.
6. Within the Working Drawings, the larger scale takes precedence over smaller, figured dimensions over scaled and noted materials over graphic indications.

SECTION 3 - DISCREPANCIES IN THE CONTRACT

A. Should any question arise regarding the Contract, the Contractor shall request written interpretation and clarification from the Architect before proceeding. Without such request and written authorization, the Contractor proceeds at his own risk.

SECTION 4 - ADDITIONAL DRAWINGS & INSTRUCTIONS

A. The Architect shall promptly furnish any additional instructions or clarification necessary for proper execution of the Work specified in the Contract.

SECTION 5 - OWNERSHIP AND MAINTENANCE OF DRAWINGS

A. All drawings and specifications furnished to the Contractor, including electronic file versions, are the property of the Owner. They are not to be used on other work and must be returned to the Owner if so requested. One copy may be retained by the Contractor, but may not be used for any third-party work without the express written consent of the Owner.

B. The Owner shall furnish, free of charge to the Contractor, all copies of drawings and specifications reasonably necessary for the execution of the Work. The Contractor shall maintain in good order on the Project one copy of drawings, addenda and specifications that shall be readily available to the Architect and the Project Manager.

SECTION 6 - PROGRESS MEETINGS

A. Contractor shall be required to attend weekly Owner, Architect, and Contractor (OAC) meetings. The agenda and meeting minutes will be prepared by the Architect. The Architect shall distribute meeting minutes within seven days of the meeting. The Contractor shall attend such meetings and shall require subcontractors to attend as necessary. These meetings are to:
    1. Insure that all activities are being coordinated properly on the Project.
    2. Review the schedule.
    3. Check the status of:
        a. Submittals, including shop drawings and samples.
        b. Change Orders and Proposal Requests.
        c. Payment requests.
        d. Any other matters that may need to be reviewed.

SECTION 7 - PROJECT SCHEDULE

A. Before the first payment request, the Contractor shall prepare and submit for review an estimated Project schedule for the Work. The Project schedule shall be in sufficient detail to include, but not be limited to:
    1. Significant elements of the Work.
    2. Period for each element of Work with a beginning and ending date.
    3. Percentage of progress of Work completed or to be completed in a monthly period.
    4. Early start anticipated schedule of all Owner Provided/Contractor Installed (OP/CI) mechanical controls.

B. The Project schedule shall be updated monthly and submitted with each payment request and shall show the original Project schedule or revised Project schedule, one entry for each item of work, as follows:
    1. All Work already completed and paid for by Owner.

2. Work during current period for which payment is being requested.
3. Remaining Work to be done, itemized in the Schedule of Values.

SECTION 8 - EMERGENCIES

A. In case of an emergency endangering life or threatening the safety of the structure or of adjoining property, the Contractor may, without waiting for specific authorization from the Architect or Owner, act at his own discretion to safeguard life or property. Compensation and time shall be allowed the Contractor for such emergency work. The amount of both shall be decided between the Contractor, the Architect, and the Owner.

B. The Contractor shall notify the Project Manager immediately and shall make a full written report of such emergency action to the Project Coordinator within seven days of the event.

SECTION 9 - SUBMITTALS, SHOP DRAWINGS, AND SAMPLES

A. General:

1. The Contractor shall deliver submittals, shop drawings or samples to the Owner and Architect as indicated below. Furthermore, the Contractor shall accompany each submittal with a transmittal letter indicating the title of the Project, the name of the Contractor, the title of the submittal and the specification section number.

B. Submittal Schedule:

1. The Contractor shall, within twenty-one (21) calendar days after receipt of the signed contract, furnish a submittal schedule listing all items that the Contract requires for review. This schedule shall include shop drawings, manufacturers' literature, certificates of compliance, material samples, material colors, guarantees, etc.
2. The schedule shall show the type of item, the Contract requirement reference, the Contractor's scheduled dates for submitting the items and the projected need dates for review by the Architect. The schedule shall show a minimum of fourteen (14) calendar days for review by the Architect. If resubmittal is required, an additional seven (7) days will be allowed. The Contractor shall revise and update this schedule as appropriate and submit it with each payment request until all items have been submitted and reviewed.
3. The Contractor shall coordinate the submittal schedule with the Project schedule for all the work. The Contractor shall revise and update the submittal schedule to insure consistency with the Project schedule. The Contractor shall promptly provide such revised submittal schedules to the Owner.
4. Furnishing of the submittal schedule or subsequent revisions shall not be interpreted as relieving the Contractor of the obligation to comply with all Contract requirements for items on the schedule.

C. Definitions:

1. Shop drawings are drawings, diagrams, illustrations, electronic files, schedules, performance charts, brochures and other data prepared by the Contractor or subcontractor, manufacturer, supplier, or distributor. Shop drawings illustrate some portion of the work and confirm dimensions and conformance to the Contract.
2. Samples are physical examples furnished by the Contractor to illustrate materials, equipment, color, or construction and to help establish standards by which the work will be judged.

D. Procedure:

1. The Contractor shall review and stamp his certification that the products and methods meet the requirements specified in the Contract. The Contractor shall submit one (1) electronic copy of shop drawings to the Architect and one (1) electronic copy to the Owner, with reasonable promptness and in orderly sequence. Shop drawings and samples not required by the Contract

but requested by the Contractor, or supplied by those under contract to him, need not be submitted to the Architect and Owner for approval. These shop drawings shall meet all specified shop drawing requirements, except those relating to submission to the Architect and Owner.

2. The Contractor shall reject shop drawings not in conformance with the Contract.
3. Shop drawings shall be complete and detailed. If reviewed by the Architect, each copy of the shop drawings shall be stamped and dated by the Architect. If review "with exception" or "as noted" by the Architect is so identified, stamped and dated, the Contractor shall comply with notations shown. If the Architect requires resubmission of submittals, the Contractor shall make any corrections at the Contractor's expense. The Contractor shall not copy Project drawings and use those drawings as submittals.
    a. Any shop drawing which does not conform to the Contract shall be explicitly noted on the drawings and in the transmittal letter. This shall not be construed as approval to proceed with performing or providing the changed work until specifically approved by the Owner and a Change Order accordingly issued. If shop drawings show variations from Contract requirements because of standard shop practice, or for any other reason, such variations shall be explicitly noted in the transmittal letter. Shop drawing review shall be general. It shall not relieve the Contractor of responsibility for accuracy of such shop drawings, nor for proper fitting, construction of work, furnishing of materials or work required by Contract and not shown on shop drawings.
    b. All transmittal of shop drawings may be by email or other electronic means.

E. By approving shop drawings and samples, the Contractor determines and certifies that all field measurements, field construction criteria, materials, catalog numbers and similar data conform to the Contract. The Contractor determines and certifies that he has checked and coordinated each shop drawing and sample with requirements of the Contract.

F. No work requiring a shop drawing or sample submission shall be commenced until submission has been approved in writing by the Architect.

G. Samples:
1. Where specified or required, the Contractor shall submit samples to the Architect with specification material, affidavits, and other documentation as required by the Architect or the Owner.
2. It is the Contractor's specific responsibility to ascertain that samples have been checked and approved before being submitted.
3. Cost of samples, including transportation, delivery and any other costs, shall be paid by the Contractor. Unless specified otherwise, samples shall be submitted in triplicate for the Architect, the Owner and the Contractor. The Contractor shall keep his samples on the jobsite. Where samples are specifically required to be submitted for approval, no work involving the sampled materials shall proceed until written approval has been obtained from the Architect.

H. Review by the Architect and the Owner:
1. Review of shop drawings by the Architect and the Owner shall not be construed as a complete check, but will show only that the general method of construction and detailing is satisfactory. Review of such drawings will not relieve the Contractor of responsibility for any error that may exist in the submittals.

SECTION 10 - ROYALTIES & PATENTS

A. The Contractor shall pay all royalties and license fees. The Contractor shall defend and hold the Owner harmless from all suits or claims for infringement of any patent rights.

SECTION 11 - CONTRACTOR'S LIABILITY INSURANCE AND BONDS

A. Insurance:

1. The Contractor shall not commence work under this Contract until he has obtained the insurance required and evidence of such insurance has been submitted to and approved by the Owner. The submittal of said evidence to the Owner shall not relieve or decrease the liability of the contractor.
    a. Workers' Compensation & Employers' Liability Insurance as required by statute.
    b. Commercial General Liability Insurance – the current version of ISO Form CG 00 01 or equivalent, Occurrence Policy, with -
        (1) Limits of not less than -

(a)	General Aggregate	$ 2,000,000.00
(b)	Products - Comp/OPS Aggregate	$ 2,000,000.00
(c)	Personal and Advertising Injury	$ 1,000,000.00
(d)	Each Occurrence	$ 1,000,000.00
(e)	Fire Damage (any one fire)	$ 50,000.00
(f)	Medical Expense (any one person)	$ 5,000.00

        (2) Endorsements attached thereto including the following or their equivalent -
            (a) The current version of ISO Form CG 25 03, Amendment of Limits of Insurance (Designated Project or Premises), describing the subject Contract and specifying the limits as shown above.
            (b) The current version of ISO Form CG 20 10, Additional Insured -- Owners, Lessees, or Contractors (Form B), naming the Owner as an additional insured and containing the following statement - "This endorsement also constitutes primary coverage in the event of any occurrence, claim, or suit."
    c. Automobile Liability Insurance, with -
        (1) Limits of not less than $1,000,000.00 Combined Single Limit per accident.
        (2) Coverage applying to any auto.

B. Certificate of Insurance, on the current version of ACORD 25-S Form, or equivalent, filed with the Owner identifying:
    1. Owner, as defined in the Construction Contract, as Certificate Holder and Additional Insured.
    2. Endorsements, as listed above. (Note: If forms other than ISO forms are used, copies of the non-ISO forms are to be attached to this certificate).
    3. Project as defined in the Construction Contract.
    4. Cancellation clause of the certificate amended to read, "Should any of the above described policies be canceled before the expiration thereof, the issuing company will mail a notice within thirty (30) days to the certificate holder named."
    5. Insurance companies providing coverage - All companies listed must be rated "A-" or better in the Standard and Poor's Solvency Review Guide Property & Casualty (current edition.)
    6. The Name, Address, and Telephone Number of The "Producer" - The certificate is to bear an original signature of the Authorized Representative of the Producer. Facsimile or mechanically reproduced signatures will not be accepted.

C. Performance Bond and Labor & Material Payment Bond:
    1. The Contractor shall furnish the Owner a performance bond, and a labor and a material payment bond each in an amount equal to 100 percent of the Contract amount as security for all obligations arising under the Contract. Such bonds shall –
        a. Be written on Form AIA Document A312. Where the laws of the state in which the project is located mandate a statutory payment bond form, such mandated payment bond form shall be used but is to be accompanied by the AIA Document A312 Performance Bond.
        b. Be issued by a surety company or companies licensed in the state in which the Project is located and holding valid certificates of authority under applicable federal insurance law as acceptable sureties or reinsurance companies on federal bonds. The penal sum

obligation assumed by each surety, shall not exceed the maximum amount permitted by law.

c. Be accompanied by a certified copy of the Power of Attorney stating the authority of the Attorney-in-fact executing the bonds on behalf of the Surety.

D. The Owner reserves the right to reject any insurance company, policy, endorsement, certificate of insurance, surety company, performance bond, or labor and material payment bond with or without cause.

E. The cost of such insurance and such bonds as required above shall be the obligation of the Contractor.

SECTION 12 - HOLD HARMLESS AGREEMENT

A. Besides obtaining insurance coverage as required above, the Contractor shall indemnify and save the Owner, the Architect, and their agents and employees harmless from and against any liability, demands, causes of action or claims thereof, whether well founded or otherwise, including the cost of defending the same, for bodily injury to any person whosoever (including the employees of the Owner or the Architect) or damage to property of any person during construction because of the negligence of the Contractor, their subcontractors or material suppliers, their agents or employees.

B. The Contractor shall defend the Owner and Architect in any lawsuit filed by any of their subcontractors or material suppliers. Where liens have been filed against the Owner's property, this shall require the Contractor or his bonding company to obtain lien releases and record them in the appropriate county or local jurisdiction so as to unencumber and provide the Owner with a title free and clear from any liens.

C. No subcontract shall relieve the Contractor of any of his liability or obligation under the Contract. The Contractor agrees that he is fully responsible to the Owner for acts or omissions of his subcontractors and their material suppliers and of persons either directly or indirectly employed by them.

SECTION 13 - BUILDERS RISK LOSSES

A. The Owner will provide Builder's Risk Insurance or reimburse the Contractor for losses to the Project, described herein, to the extent to which such losses are or would be covered by the Owner's Policy Form of F.M. Global's "All Risk" insurance policy covering Builders Risk Insurance. 1. Deductible Clause - All claims for loss or expense arising out of one occurrence shall be adjusted as one claim, and from the amount of such adjusted claim, there shall be deducted the sum of:

a. $2,500.00 on all Projects. The deductible amount is the responsibility of the Contractor or Subcontractor.

2. Loss Reporting Procedure - All losses requiring reimbursement under this Section shall be reported to the Project Coordinator as soon as practical and always before the beginning of repairs so that details of the loss can be obtained and verified to simplify a prompt loss adjustment.

B. Copies of the insurance forms are available from the Owner at the Brigham Young University Physical Facilities, Construction Section offices.

SECTION 14 - PERMITS, INSPECTIONS, CERTIFICATES, AND REGULATIONS

A. Permits:

1. The Contractor shall obtain, and the Owner shall pay cost of, permits necessary for completion of this work. "Permits," as used in this paragraph includes any permits necessary for the Contractor to complete the Work, including but not limited to: excavation, footing, and foundation permits; building permits; hot work permits; elevator permits; fire sprinkler permits; boiler permits; demolition permits; specialty permits from the State of Utah or other federal or state

governmental entities, such as Health Department permits; etc. The responsibility for obtaining, and any resulting liability for failing to obtain, such permits shall rest with the Contractor.

2. The Contractor shall schedule and coordinate all necessary inspections and shall notify the Project Manager and the Authority Having Jurisdiction of all inspections. The Contractor shall be responsible for securing a certificate of occupancy that may be required by Authorities Having Jurisdiction over the Work. The Contractor shall deliver these certificates to the Project Manager before execution of the Certificate of Substantial Completion.
3. The Contractor will be required to notify the Utah Division of Air Quality of any demolition projects and obtain all permits required by the State, County, and/or Provo City. The Contractor shall include all demolition permit fees in his bid.
4. The Contractor shall hold harmless, defend, and indemnify Owner from and against any and all claims, demands, allegations, fines, and damages associated with or arising from the Contractor's failure to obtain required permits.

B. Regulations:

1. The Contractor and others working under his jurisdiction, supervision, or control shall do all work according to laws, regulations, and ordinances required by governmental authority or other agencies having jurisdiction over this work.
2. If the Contractor observes that the Contract is in variance with any laws, regulations or ordinances, he shall notify the Project Manager and shall not proceed unless necessary changes required for compliance with said laws, regulations and ordinances have been made as provided in the General Conditions, Section 24. The Contractor shall be fully responsible for any work knowingly done contrary to laws, regulations and ordinances. The Contractor shall fully indemnify the Owner against loss and bear all costs and penalties arising from those violations.
3. The Contractor shall hold harmless, defend, and indemnify Owner from and against any and all claims, demands, allegations, fines, and damages associated with or arising from the Contractor's failure to follow applicable regulations.

SECTION 15 - MEASUREMENTS, SURVEYS, BUILDING LAYOUT & SITE EXAMINATION

A. The Contractor shall be responsible for:

1. Establishing lot lines and bench marks.
2. Laying out the work on the building site.
3. The proper observance of property lines and set back requirements.
4. The location and layout of buildings as noted in the drawings with respect to the position on the property and elevation in relation to the grade.

B. If existing conditions shown in the Contract documents differ materially from those the Contractor encounters in the performance of the work, the Contractor shall immediately notify the Architect and the Owner in writing.

C. The Architect and the Owner shall promptly investigate the reported conditions. If they find that such conditions do materially differ and cause an increase or decrease in the Contractor's cost or the time required for performance of any part of the work, the Owner shall make an equitable adjustment by Change Order.

D. As the work progresses, the Contractor shall lay out on the forms, or floors, the exact locations of all partitions as a guide to all trades. Subcontractors providing work that is to be placed in connection with walls and/or partitions shall check such locations and immediately notify the Contractor of any conflicts in structure or changes necessary to adapt services, utility lines or equipment required by the Contract. Subcontractors and others failing to make such checks and give notice as outlined above shall be required to assume any costs resulting from their failure to do so.

E. Before ordering materials or doing work, the Contractor shall verify all measurements to properly size or fit

the work. No extra charge or compensation will be allowed by the Owner resulting from the Contractor's failure to comply with this requirement.

SECTION 16 - INSPECTION OF WORK

A. The Architect, Owner, and other inspectors or government officials as appropriate shall always have full access to all phases of the work. The Contractor shall provide adequate means to simplify inspection.

1. The Contractor shall notify the Project Manager and local authorities twenty-four (24) hours before doing work that covers or otherwise makes it difficult to inspect structural, plumbing, mechanical, electrical, or other work.
2. Should any of the work be covered before it is inspected by Project Manager and local authorities, the Contractor shall uncover that work for inspection at his own expense.
3. The Contractor shall schedule the work so an inspection team may inspect the mechanical, electrical, and plumbing work before it is covered up. This inspection team will furnish a list of items that must be completed before the work is concealed.

SECTION 17 - SUPERVISION & CONSTRUCTION PROCEDURES

A. The Contractor shall be solely responsible for all construction means, methods, techniques, sequences, and procedures and for coordinating all portions of the work under the Contract. The Contractor shall not change project managers or superintendents without the written consent of the Owner.

SECTION 18 - ARCHITECT'S STATUS AND DECISIONS

A. The Architect shall assist the Project Manager during the construction period.

1. The Architect will make frequent visits to the site to familiarize himself with the progress and quality of the work and to determine if the work is proceeding according to the Contract and schedule. During periodic visits the Architect may condemn work that fails to conform to the Contract.
2. The Architect shall interpret the conditions of the Contract and be the judge of its performance. He shall use his powers under the Contract to enforce its faithful performance by the Contractor. The Architect will review shop drawings and prepare Proposal Requests. The Architect will conduct inspections with the Project Manager to determine the dates of substantial completion and final completion.
3. In general, the Architect shall work with and coordinate with the Project Manager and the Contractor for the accomplishment of the Work. However, in the event that the Architect and Project Manager disagree on how a work should be accomplished, the Contractor shall take final direction from the Project Manager.
4. Neither the Owner nor the Architect will be responsible for construction means, methods, techniques, sequences or procedures, or for safety precautions and programs concerning the Work. Neither the Owner nor the Architect will be responsible for failure of the Contractor, subcontractor, material supplier or their employees to carry out the Work according to the Contract.

SECTION 19 - MATERIAL & EQUIPMENT

A. DELIVERY, STORAGE, & HANDLING

1. Materials shall be delivered to the site in original packaging with labels and trademarks intact, and such labels and trademarks shall remain intact until used. Structural steel, piping and fittings shall be manufactured in the United States of America.
2. The Contractor shall confine his apparatus, storage of materials, and operations of his workers to limits indicated by law, ordinances and permits. The Contractor shall arrange and maintain storage of materials within contract limit lines in an orderly manner leaving all walks, driveways, roads and entrances unencumbered. The Contractor and the Contractor’s employees shall park

only in the areas designated by Owner.

3. All new and existing equipment on the site shall be protected from physical damage and from the elements by measures satisfactory to the Architect and the Project Coordinator. All rotating equipment shall be rotated four turns weekly during construction.
4. If any material is found not conforming to the Contract, the Contractor shall remove such nonconforming materials at his expense.

B. PRODUCT OPTIONS & SUBSTITUTIONS

1. When several materials are specified in the Contract by name for one use, the Contractor may select any one of those so specified. The mixing of different products specified by name for one use is prohibited.
2. Items and material not specified in the Contract shall be removed and replaced by specified items and material at no additional cost to the Owner. No additional time will be added to the Contract for removal or replacement.
3. Wherever words "approved by," "satisfactory to," "submitted to," "inspected by," or similar phrases are used in this specification, they shall be understood to mean that the material or item referred to shall be approved by, be satisfactory to, submitted to, or inspected by the Architect and the Project Manager.

SECTION 20 - TEMPORARY CONSTRUCTION FACILITIES

A. TEMPORARY ELECTRICITY

1. The Contractor shall arrange with the proper authority (State, County, City, Owner, etc.) for all power required by the Contractor during the construction period until the Certificate of Substantial Completion is issued. If the power is coming from a BYU owned source, it will be paid for by BYU with the exception of the installation cost of equipment, conduit, wire, etc. BYU may provide transformer(s) and meter(s) at their discretion. Contractor to coordinate with BYU Construction Project Manager prior to bid. If no coordination takes place prior to bid, contractor is to provide transformer and meter at no additional cost to the owner after bid. Contractor shall bare the cost of any damages to owner provided equipment due to contractor's negligence. The method of metering, connections, etc., must have the written approval of the authority furnishing the utility to the Contractor. The Contractor shall be responsible for all utilities needed for his use during the entire construction period.
2. The Contractor shall provide all temporary wiring, outlets, metering (if the source of power is other than a BYU source), and associated materials. The temporary electrical system shall comply with local codes and the current, adopted version of the National Electrical Code.
3. The Contractor shall provide electrical power to distribution centers only.
4. If utility service is available from the Owner's permanent utilities, the Contractor may, by arranging with the Owner, use these permanent utilities. The Owner assumes no responsibility for damage caused by the Contractor using any of the Owner's utilities due to interruption of services by the Owner, whatever the cause.

5 The contractor may not use BYU provided power for welding equipment or other major equipment without written approval of BYU. Anything needing power other than for small tools, temporary lighting and project start up and function of permanent equipment (for example: elevator and mechanical equipment) shall be approved in writing by the BYU project Manager.

B. TEMPORARY LIGHTING

1. The Contractor shall provide wiring, outlets and fixtures for temporary lighting.
2. The Contractor shall provide pigtails and other lights for all areas within and around the building, sufficient to meet OSHA regulations, or to provide the following intensities, whichever is greater:

a. All working areas	3 foot candles
b. Stairs, landings, ramps	5 foot candles
c. Outdoor floodlighting within contract limit lines	3 foot candles
d. All areas involving finish work	30 foot candles

C. TEMPORARY HEATING, COOLING & VENTILATING

1. All temporary heating and cooling shall be arranged and paid for by the Contractor. Heating and cooling from the central plant will be charged at $12.00 per million BTUs, if available and payable monthly to the Owner. BYU will provide the meter and contractor will install.
2. New Additions and New Buildings:
    a. The Contractor shall be responsible for installation and operation of temporary heating, cooling, and ventilating units including fuel, temporary piping, fittings, wiring, and connections in new additions and new buildings as necessary.
    b. The Contractor shall be responsible for damage to building and contents caused by cold, heat, and dampness.
    c. The Contractor shall maintain safe conditions for use of temporary heating, cooling, and ventilating systems including, but not limited to, the following:
        (1) Operate equipment following the manufacturer's instructions.
        (2) Provide fresh air ventilation required by the equipment manufacturer.
        (3) Keep temperature of fuel containers stabilized.
        (4) Secure fuel containers from overturning.
        (5) Operate equipment away from combustible materials.
        (6) Provide adequate fire extinguishers.
3. Existing Building:
    a. Where practicable and unless otherwise specified, existing facilities may be used, at the Owner's expense, to maintain minimum heating and cooling requirements. Normal setback temperature patterns shall not be interfered with except as specifically required to meet construction requirements. The existing system shall be protected by the Contractor from contamination, construction dust and debris. Filters shall be maintained in a clean condition and replaced with new filters at the completion of construction.
4. Specific heating requirements, unless otherwise specified by industry or manufacturer specifications, include but are not limited to:
    a. Gypsum Plaster – Uniform minimum temperature of 55 deg F for a week before application of plaster, during plastering operations, and until plaster is dry.
    b. Gypsum Board - 55 degrees F minimum day and night during entire joint treatment operation and until execution of Certificate of Substantial Completion.
    c. Ceramic Tile - 50 deg F minimum during preparation of mortar bed, laying of the tile, and for 72 hours after completion of the tile work.
    d. Acoustical Tile - 70 deg F minimum during setting of the tile.
    e. Resilient Flooring - 70 deg F minimum during application.
    f. Painting - 55 deg F minimum during painting operations and until dry.
5. When temporary heating, cooling, or ventilating is no longer required, the Contractor shall dismantle the temporary system and remove it at his own expense. The Contractor shall return permanent mechanical equipment to 'like-new' condition for the Substantial Completion Inspection. All warranties will begin at substantial completion regardless of when the equipment was started.

D. TEMPORARY WATER

1. The Owner will allow the Contractor usage of existing water facilities required for construction, at the Contractor’s expense. If additional water is needed which cannot be supplied by existing facilities, the Contractor is to pay for installation of all valves, piping and metering, and arrange with the proper authority for connection of the additional water. BYU will provide the meter and contractor will install.

E. TEMPORARY SANITARY FACILITIES

1. The Contractor shall provide and maintain sanitary, temporary toilets.
2. The Contractor shall at all times maintain such facilities clean, neat and sanitary.
3. Temporary outside toilets shall be removed at completion of the job.

F. SCAFFOLDING AND PLATFORMS

1. The Contractor or his subcontractors shall furnish and maintain all equipment such as temporary stairs, ladders, ramps, platforms, scaffolds, hoists, runways, derricks, chutes, elevators, etc., as required for proper execution of the Work.
2. All apparatus, equipment, and construction shall meet all requirements of labor laws, safety regulations and other applicable Federal, State or local laws.
3. Temporary stairs shall be built whenever needed. The Contractor shall provide temporary treads, handrails and shaft protection as needed or as required by governing codes.

H. TREE & PLANT PROTECTION

1. Before commencing site work, the Owner shall build and maintain protective fencing around existing trees and vegetation as identified on the Project drawings.
    a. Individual trees shall have protective fencing built beyond the drip line and to the satisfaction of the Project Manager.
    b. Groups of trees and other vegetation shall have protective fencing built around the entire group to the satisfaction of the Project Manager.
    c. Areas within protective fencing shall remain undisturbed and shall not be used for any purpose.
2. The Contractor shall protect all other trees, shrubs, lawns and all landscape work from damage and shall provide appropriate guards and covering. If normal sprinkling system is disrupted, the Contractor shall coordinate with BYU grounds to make sure the trees are watered by BYU or the Contractor.
3. Vegetation designated on drawings to be protected that has died or has been damaged beyond repair shall be removed and replaced by the Owner and back charged to the Contractor.

I. TEMPORARY ENCLOSURES

1. When walls and roof are in place, the Contractor shall provide temporary, weather tight enclosures for all exterior openings to protect all work. Openings into existing structure shall be made weatherproof.

J. PROTECTION FROM SNOW & ICE

1. The Contractor shall remove all snow and ice as may be required for the proper safety, protection and execution of the Work.

K. BRACING, SHORING, & SHEATHING

1. The Contractor shall design, furnish, install, and maintain all shoring, bracing, and sheathing as required for safety and proper execution of the Work and have the same removed if required when the Work is completed.

L. PROTECTION OF PERSONS

1. The Contractor shall provide, install, and maintain all necessary precautions to protect all persons on the site, including the public. Such measures shall include:
    a. Posting of appropriate warning signs in hazardous areas.
    b. Providing guardrails, fencing and barricades of adequate heights around all openings in floors or roofs, and around all excavations. All guardrails shall meet all applicable codes.
    c. Providing warning lights around obstructions, pits, trenches, or similar areas on-site or in adjacent streets, roads, sidewalks, or in the structure itself.
    d. When use or storage of hazardous materials or equipment is necessary for the execution of the Work, the Contractor shall exercise the utmost care and shall carry on such activities under the supervision of properly qualified personnel, and shall perform the work in accordance with all applicable codes or regulations.

M. PROTECTION FROM WEATHER

1. The Contractor shall provide protection against weather and protect all work, materials, apparatus, and fixtures. At the end of the day all work that might be damaged shall be covered.

2. If low temperatures or other weather conditions make it impossible to continue operations safely in spite of precautions, the Contractor shall cease work and notify the Project Manager.

N. PROTECTION OF EXISTING WORK
1. The Contractor shall protect all streets, private roads, and sidewalks, including overhead protection where required, and shall make all necessary repairs to damaged Work at his own expense.
2. The Contractor shall provide proper protection of all existing Work, furnishings, and fixtures likely to be damaged. When exterior openings are made in existing Work, they shall be covered with weather tight protection at the end of the day.
3. Before commencing work, the Contractor shall survey the site, and shall photograph and note any damage to existing structures including walks, curbs and utilities and shall provide copies of the photographs to the Project Manager before proceeding with work. Any damage not noted by the Contractor will be repaired or replaced by the Contractor.
4. Any Work damaged by failure to provide protection shall be removed and replaced at Contractor's expense.

O. FIRE PROTECTION
1. The Contractor shall provide at least one approved fire extinguisher in plain sight on each floor at each usable stairway prior to introduction of any combustible materials into the building.
2. Fires shall not be built on the premises.
3. In existing buildings with fire alarm/detection devices, the Contractor shall cover all smoke detectors within the work area each morning before work begins and remove dust covers at the end of the day. Fire detection devices must be functioning in the work area when the Contractor is not on the site.

P. PROTECTION OF ADJACENT PROPERTY
1. The Contractor shall provide all necessary protection and support of adjacent property.

Q. CONSTRUCTION CLEANING
1. The Contractor shall keep premises broom clean during progress of the work.
2. The Contractor shall remove waste materials and rubbish left by employees, subcontractors, and material suppliers. Roads inside and outside the Project shall be cleaned daily when hauling.
3. Before and during painting and varnishing, the Contractor shall clear the area of all debris, rubbish, and building materials that may cause dust. Sweep floors as required and take all possible steps to keep area dust free.

R. SURFACE WATER CONTROL
1. The Contractor shall protect the excavation, trenches and building from water damage by:
   a. Providing pumps, equipment and enclosures necessary for such protection.
   b. Constructing and maintaining temporary drainage and pumping as necessary to keep the site free of water.
2. The cost of water control shall be borne by the Contractor. The Owner may, if promptly notified of adverse underground water conditions, negotiate reasonable financial relief for the Contractor where such conditions could not have been learned from the Soils Engineer's Report, the Contract, or by commonly known local conditions.

S. OFFICES
1. The Contractor shall provide and maintain a weather tight office at the construction site. This building is to be located outside of, and detached from the building under construction. Connection of utilities and monthly utility costs shall be paid by the Contractor. This building shall be the property of the Contractor and shall be removed upon completion of the Project.

T. SHEDS AND TRAILERS

The Contractor shall provide and maintain neat, weather-tight storage sheds or trailers for storage of all materials that might be damaged or affected by weather or moisture. These sheds or trailers shall

have wood floors raised above the ground and will be outside of and detached from the building under construction. They shall be property of the Contractor and shall be removed upon completion of the work.

U. CODE OF CONDUCT

Contractor recognizes that BYU is an affiliate of the Church of Jesus Christ of Latter-day Saints, and that students and employees at BYU expect to work and learn in an environment consistent with the principles of the Church. Contractor agrees that all of Contractor's employees will A) Refrain from consuming alcohol, tobacco, or other illegal drugs on BYU campus, except that smoking may be permitted in designated, outdoor, areas; B) Refrain from using profanity; C) Observe modest standards of dress and behavior; D) be courteous and respectful to all members of the BYU campus community. Violations of these expectations may be grounds for terminating the Contractor's engagement or for asking the Contractor to dismiss a particular, offending employee from the Project.

SECTION 21 - TESTING

A. Testing companies will be selected by the Owner.

B. The Owner and/or the Architect reserve the right to have tests taken at any time.

C. Tests not specified as part of a trade section shall be paid by the Owner.

D. Should tests reveal a failure of the Work to meet Contract requirements, subsequent tests related to the failure shall be paid by the Contractor.

E. Tests shall be made according to recognized standards by a competent, independent testing laboratory.

F. Materials found defective or not in conformance with the Contract shall be promptly replaced or repaired at the expense of the Contractor.

G. Samples required for testing shall be furnished by the Contractor and selected as directed by the Architect or Project Manager.

SECTION 22 - EXISTING UTILITIES

A. Prior to execution of the Work the Contractor is to locate all existing vaults, manholes, valves, meters, etc. Contractor is to photograph, GPS, measure from existing structures and facilities that are to remain and keep this information readily available at the site/construction trailer. Contractor is also to mark the above utilities by staking and maintaining stakes for fast and accurate locating of all existing utilities in case of emergencies.

B. BYU will initially provide all on campus blue staking information. It is the Contractor's responsibility to maintain the blue staking locations and information by staking, painting, keeping GPS coordinates or any alternative ways that the Contractor can keep current, accurate information.

SECTION 23 - CUTTING AND PATCHING

A. The Contractor shall coordinate all cutting, fitting, or patching of the Work (including but not limited to cutting or patching of floorings; ceilings; roofs; walls; mechanical, electrical and plumbing; and all other surfaces and structures) that may be required to make the several parts of the Work come together properly. The Contractor shall coordinate all portions of the Work so as to receive or to be received by other portions of the Work, whether previously existing or newly created. The Contractor shall make proper repair or

closure of the Work as needed or as directed by the Architect or the Project Manager.

B. The Contractor shall refrain from cutting or digging in a manner that is harmful to the Owner's premises. Contractor agrees that Contractor will not cut or alter any section of the Owner's premises except as indicated on the plans and specifications without prior consent of the Architect and the Project Manager. The Contractor shall give 48-hour Blue Stake notice to the Project Manager and local Blue Stakes location center.

C. In the event that Contractor shall cause damage to the Owner's premises while cutting or digging, Contractor shall cause the damage to be repaired at the Contractor's expense.

D. All concrete slabs whether suspended or on-grade shall be scanned by the general contractor and/or verified by BYU before demoing, drilling, coring or cutting. It is the responsibility of the general contractor to repair or replace the slab, it's reinforcements and other parts, utilities in the slab and adjacent surfaces as a result of failure to scan the slab.

SECTION 24 - CONDEMNATION OF WORK

A. The Owner or the Architect shall have the right to condemn and require removal of the following at the Contractor's expense:
   1. Any portions of the Work that do not meet the requirements of the Contract either in substance or installation.
   2. Any portions of the work damaged or rendered unsuitable during installation or resulting from the Contractor's failure to properly protect the work.

SECTION 25 - CHANGES IN THE WORK

A. The Owner may make changes within the general scope of the Contract, including but not limited to changes:
1. In the Contract.
2. In the method or manner of performance of the Work.
3. In the Owner-furnished facilities, equipment, materials, or site.
4. In directing acceleration of the Work.

B. Any written order from the Owner or Architect which changes the scope of the work shall be a Change Order.

C. The Architect is authorized to order minor changes during the Work that will not involve significant extra cost or time. The price of such minor changes will be mutually agreed upon between the Project Manager and the Contractor. The Contractor will proceed with the changed work immediately. These minor field changes will subsequently be included in a Change Order.

D. Proposal Requests may be issued which ask the Contractor to submit a price for proposed changes in the scope of the Work. The Contractor is to promptly provide costs associated with the prospective changes, including credits for deleting any unnecessary Work. Cost breakdowns are to be submitted in sufficient detail to verify that the complete scope of the Work is understood by the Contractor, Architect, and Project Manager.

E. Change Orders -
   1. Except for emergencies as covered in Section 8, and to avoid delays, no changes in the work shall be made without a written Change Order. The Contractor's proposal shall be the basis of negotiation for the Change Order price and/or time adjustments.
   2. If the Owner decides it is necessary to proceed with changed work to avoid delay before prices or times have been negotiated, he may order the Contractor to proceed on a time and materials basis or on a mutually agreed not-to-exceed price and time extension. This notice to proceed shall be issued by the Owner's Representative. Upon receipt of such order, the Contractor shall immediately perform the changed work. The Owner and the Contractor will then negotiate the price and/or time when practicable, and a Change Order will be issued.

3. When submitting proposals for Change Orders, the Contractor shall furnish a price breakdown itemizing costs as required by the Owner. Unless otherwise directed, the breakdown shall be in sufficient detail to allow an analysis of all material, labor, equipment, overhead costs and profit, and shall cover all Work involved in the change, whether such Work was deleted or added. Any amount claimed for subcontractors shall be supported by a similar price breakdown. In addition, if the proposal includes a time extension, a justification shall be furnished. The proposal, with the price breakdown and time extension justification, shall be furnished within fourteen (14) days of the date that the first request was made by the Owner's Representative. In such proposals, profit and overhead shall be computed as follows:

a. The Subcontractor's profit and overhead shall not exceed 15% of total direct costs.
b. The Contractor's profit and overhead on work done by his own crews shall not exceed 15% of total direct costs.
c. The Contractor's profit and overhead on work performed by subcontractors shall not exceed 5% of total direct costs or in the case of a CMGC Contract the Contractor's profit and overhead fee on change orders shall not exceed the pre-contract negotiated fee.
d. The subcontractor's profit and overhead on work performed by any of his subcontractors shall not exceed 5% of total direct costs. Contractor's profit and overhead will not exceed 5% of total direct costs.
e. On credit changes, profit and overhead on the originally estimated work will not have to be returned to the Owner.
f. No supervision costs, office managerial costs, or office expenses can be added to Change Orders.
g. Upon signing a Change Order, the Contractor releases the Owner from any further claim for money or time because of the changed work.

SECTION 26 - CLAIMS FOR EXTRA COST

A. If the Contractor intends to assert any additional claim for equitable adjustment of cost or time, he must, within fourteen (14) calendar days of the events or circumstances giving rise to the change, submit to the Architect and the Owner a written statement of the nature and monetary extent of such claim. If a mutually acceptable settlement of the claim cannot be reached within a reasonable time, the parties to the Contract shall handle the matter as a dispute under Section 27 "DISPUTES."

SECTION 27 - DELAYS AND EXTENSION OF TIME

A. All time limits stated in the Contract are of the essence. Contractor agrees to carry out the Work according to the time durations and limits as specified in the Contract.

B. If the Contractor is delayed any time during the progress of the work because of labor disputes, abnormal weather, unusual delays in transportation, or any other causes beyond the Contractor's control, the Contractor may be given additional time to complete the work by Change Order.
   1. All requests for time extensions shall be made in writing to the Project Manager.
      a. Claims for time extension due to abnormal weather shall be made within fourteen (14) days of the abnormal weather.
      b. Claims made beyond these time limits shall not be considered by the Owner.
   2. Requests for time extensions shall be fully documented by including copies of daily logs, letters, shipping orders, delivery tickets and other supporting information.
   3. In case of a continuing cause of delay only one claim is necessary.

SECTION 28 - DISPUTES

A. Except as otherwise provided in the Contract, any dispute concerning a question of fact arising under this Contract that is not disposed of by agreement shall be decided by the Owner's Representative (as represented by the Assistant Administration Vice President/Physical Facilities of Brigham Young University). The decision shall be rendered in writing and mailed or otherwise given to the Contractor. If

the decision is not agreeable to the Contractor, the Contractor will, within fourteen (14) days of the decision, mail or otherwise furnish to the Owner's Representative a written appeal addressed to the Owner.

SECTION 29 - CORRECTION & WARRANTY OF WORK

A. The Contractor shall promptly correct any work that fails to conform to the requirements of the Contract during the progress of the Work. The Contractor shall remedy any defects due to faulty materials, equipment or construction that appear within one year from substantial completion of the Contract or within such longer periods as may be prescribed by law or by the terms of any applicable extended guarantee required by the Contract. The Contractor shall promptly correct all faulty work or pay all costs of correcting the faulty work.

SECTION 30 - OWNER'S RIGHT TO DO WORK

A. If the Contractor defaults or neglects to carry out the Work according to the Contract or fails to perform any provision of the Contract, the Owner may, upon approval of the Architect, after providing seven days written notice to the Contractor and without prejudice to any other remedy Owner may have, make good such deficiencies. In such case, an appropriate Change Order will be issued deducting the cost of correcting such deficiencies, including the cost of the Architect's additional services made necessary by such default, neglect or failure. If the payments due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. .

SECTION 31 - CONTRACTOR'S PAY REQUEST

A. The Contractor shall submit to the Project Manager a monthly payment request based on the estimated value of the work completed and materials on the site as of that date. The payment request shall be on the form provided in this document, or on the then-current AIA G702 Application and Certification for Payment (or equivalent) Form. Such payment request shall be based on the schedule of values submitted by the Contractor. The Contractor warrants that title to all work, materials and equipment covered by the payment request, whether incorporated in the Project or not, will pass to the Owner upon the receipt of such payment by the Contractor, free and clear of all liens, claims, security interests or encumbrances. The Project Manager may audit Contractor payments to subcontractors or suppliers anytime.

SECTION 32 - PAYMENTS TO CONTRACTOR

A. Upon approval of the Contractor's monthly payment request, the Owner will, within fourteen (14) days after receipt of said certification, mail to the Contractor a sum equal to 95% of the amount requested, less previous payment thereon. The retention that is withheld by the Owner will be placed in an interest-bearing account and paid to the Contractor after the project is completed and accepted by the Owner.

B. Upon receipt of a payment by the Owner, the Contractor shall pay each subcontractor within fourteen (14) calendar days, the amount allowed to the Contractor for the subcontractor's work.

C. The Contractor's monthly payment request, which shall show the amount paid under the subcontract, shall be made available to the Project Manager for examination. Full and final payment of the Contract amount shall be made within thirty (30) days of the completion of the following requirements:

1. The Architect's and Owner's written acceptance of the work.
2. Payment of all labor and material bills, and receipt of all final lien waivers or lien releases from all subcontractors, mechanics and suppliers.
3. No payment made under this Contract shall be construed to be an acceptance of defective or improper materials or construction.

D. A schedule of dollar values shall be submitted to the Architect and the Owner before the Contractor’s first

payment request will be processed.

E. The schedule of values shall be submitted on the Owner's standard payment request form.
   1. This breakdown shall follow the trade divisions of the specification. Each item shall include its pro rata part of overhead and profit so that the sum of the items will equal the Contract price.
   2. The breakdown will correspond exactly to items of work in the Project schedule including work of subcontractors.

F. The Contractor shall make arrangements to receive all payments from the Owner by direct deposit.

SECTION 33 - PAYMENTS WITHHELD

A. Payments may be withheld from the Contractor by the Owner to protect the Owner from loss due to:
   1. Defective work not remedied.
   2. Liens or claims filed or reasonable evidence of probable filing.
   3. The Contractor's failure to promptly pay subcontractors for labor and materials accepted by the Contractor.
   4. The Architect's or the Project Manager's reasonable doubt that the Project can be completed for the unpaid balance of the Contract price.
   5. Damage to another contractor.
   6. Failure to maintain scheduled progress.

B. Upon satisfactory correction of the above conditions, withheld payments will be made.

SECTION 34 - CONTRACTOR RESPONSIBILITIES

A. The Contractor is fully responsible for the Project and all materials and work until the Owner has accepted the completed Project in writing. The Contractor shall replace or repair, at his own expense, any materials or work damaged or stolen even if the Contractor has received payment for the work or materials.

B. By executing the Contract, the Contractor represents that he has visited the site, familiarized himself with the local conditions under which the Work is to be performed, and correlated his observations with the requirements of the Contract.

C. The Contractor shall employ a competent superintendent satisfactory to the Architect and the Owner. The superintendent shall be present at the Project site during the progress of the Work. This superintendent shall not be changed except with the prior consent of the Project Manager or unless the superintendent ceases to be in the Contractor's employment. The replacement superintendent shall also be subject to these conditions. The superintendent shall represent the Contractor, and all communications given to the superintendent shall be as binding as if given to the Contractor.

D. The Contractor shall designate a responsible member of his organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated in writing by the Contractor to the Owner and the Architect.

E. In the event that the Contractor receives purported directions regarding the Work from anyone other than the Project Manager, the Contractor shall forward/direct all communications to the Project Manager.

F. Unless otherwise directed, the Contractor shall, within two (2) hours after the bid opening, furnish the Architect and the Owner a list of the proposed subcontractors who will be working on the Project. The Owner will notify the Contractor in writing if any of the subcontractors are unacceptable.

G. The Contractor shall not contract with any subcontractor who has been rejected by the Owner or the Architect. The Contractor will not be required to contract with any subcontractor, person or organization

against whom he has a reasonable objection if such objection is made before the bid opening. The Contractor is not to use or accept any bid from a subcontractor unless the Contractor is willing and able to work with that subcontractor.

H. If the Owner or the Architect requires a change of any proposed subcontractor or person or organization previously accepted by them, the Contract amount shall be increased or decreased by the difference in cost occasioned by such change and an appropriate Change Order shall be issued.

I. The Contractor shall not make any substitution of a subcontractor who has been accepted by the Owner and the Architect unless the substitution is accepted in writing by the Owner and the Architect. Any increase in cost shall paid by the Contractor.

J. All damage or loss to any property caused in whole or in part by the Contractor, any subcontractor, or by either of their agents, shall be remedied by the Contractor at no cost to the Owner.

K. The Contractor shall be solely responsible for initiating and supervising all safety programs including, but not limited to:
   1. The protection of all persons on the site, including the public.
   2. All conditions specified in this contract.
   3. All conditions required by codes and/or governmental regulations including OSHA.
   4. The protection of all property on the site or affected by the Work.
   5. The Contractor shall designate a responsible member of its organization at the site whose duty will be the prevention of accidents. This person will be Contractor's onsite representative unless otherwise designated in writing by Contractor to Owner and Architect.

L. The Contractor shall be responsible for:
   1. Limiting all Work at the site to Monday through Saturday, between the hours of 7:00 A.M. to 10:00 P.M. No Sunday work is to be performed. Any exceptions to the working hours or days must be made by prior written authorization by the Owner.
   2. Requiring all personnel on site to be appropriately dressed. This includes protective clothing and equipment as needed. Shirts are to be worn at all times.
   3. Limiting all Work at the site according to local noise ordinances or other ordinances.

M. The Contractor's employees shall not be allowed to use radios, boom boxes, etc., are on the site.

N. Renderings representing the Work are the property of the Owner. All photographs of the Work, whether taken during construction or at completion, are the property of the Owner. The Owner reserves all rights including copyrights to renderings and photographs of the Work. Buildings shall not be photographed, and no renderings or photographs shall be taken, obtained, used, or distributed without the prior written consent of the Owner.

O. All information regarding the cost of the Project shall be considered confidential and shall not be disclosed by the Contractor to any third party without the prior written consent of the Owner.

SECTION 35 - SUBCONTRACTORS

A. The Contractor's responsibility for this Project includes the work of all subcontractors and material suppliers, including those recommended or approved by the Owner. The Contractor shall be held responsible to the Owner for proper completion and guarantee of all construction and materials under subcontracts and for the acts and omissions of his subcontractors or their employees. Any warranties required for such work shall be obtained by the Contractor in favor of the Owner and delivered to the Owner. It is expressly agreed that there is no contractual relationship between the Owner and any subcontractor, and under no circumstances shall the Owner be responsible for the nonperformance or financial failure of any subcontractor.

B. The Contractor shall require each subcontractor to agree:
   1. To be bound by terms of the Contract as far as applicable to the subcontractor's work.
   2. To assume toward the Contractor the same obligations the Contractor has assumed toward the Owner, including the prompt payment of his employees and material suppliers affected by this work.
   3. To submit his applications for payment to the Contractor in time to allow the Contractor to make timely application to the Owner.
   4. To execute claim or lien releases or lien waivers as requested by the Contractor for payments made by the Contractor.
   5. To make all claims for extra work or for extensions of time to the Contractor in the same manner the Contractor is to make this type of claim to the Owner.

C. The Contractor agrees in his relationship with the subcontractors:
   1. To bind himself to the subcontractors by all the obligations that the Owner assumes to the Contractor.
   2. To pay the subcontractors within fourteen (14) calendar days upon receipt of payment from the Owner that portion of the funds received as represents the subcontractor's portion of the Work completed to the Contractor's satisfaction for which payment was made by the Owner.

SECTION 36 - LOCKOUT/TAGOUT, CONFINED SPACE, HAZARD COMMUNICATION PROGRAMS, HOT WORK and EXCAVATION PERMIT PROGRAMS

A. The Contractor and the subcontractors will have a written "Lockout/Tagout" program. A copy of this program will be submitted to the Project Manager.

B. The Contractor and subcontractors shall evaluate all work places to determine if any spaces are permit-required confined spaces in accordance with any applicable OSHA regulations. If the workplace contains permit spaces, the Contractor shall inform exposed employees by posting danger signs in compliance with OSHA regulations. If the Contractor decides that its employees will enter permit spaces, the Contractor shall implement a written confined space program. The written program shall be made available to all persons (whether employees of the Contractor or not) and submitted to the Project Manager. The confined space program shall inform the persons that the workplace contains confined spaces that require a permit to enter those spaces. The Contractor shall identify the hazards that may be encountered in the confined space. The Contractor shall specify any precautions or procedures required for the protection of persons in or near confined spaces.

C. Besides complying with the confined space requirements that apply to all employers, the Contractor shall:
   1. Obtain any available information regarding permit space hazards and entry operations.
   2. Coordinate entry operations when both contractor and subcontractor personnel will be working in or near permit spaces.

D. The Contractor shall inform the Project Manager of the methods the Contractor will use to inform all employees on the site of any precautionary measures that need to be taken for protection during the workplace's normal and emergency operating conditions. The Contractor will specify the methods to inform the employees of the labeling system for hazardous materials. The Contractor may rely on an existing hazard communication program to comply with these requirements if it is current with OSHA regulations.

E. The Contractor shall make the written hazard communication program available to all personnel working on the Project and to the Project Manager.

H. In addition to the Hot Work permit required under Section 14, above, the Contractor shall have and implement a Hot Work permitting program that complies with all OSHA regulations. This program must be

communicated to all those who might be involved with Hot Work. Copies of this program shall be made available to the Project Manager upon request.

I. The Contractor shall have and implement a written excavation permitting program that complies with all OSHA regulations. This program must be communicated to all those who might be involved with related work. Pre-task planning and job hazards must be assessed prior to any excavations on the Project. Existing utilities must be identified and procedures put in place to avoid damage or interruptions to existing buildings or operations. Copies of this program shall be made available to the Project Manager upon request.

SECTION 37 - OWNER'S RIGHT TO CANCEL CONTRACT

A. The Contractor shall give the Owner at least twenty-one (21) days written notice before filing any petition for bankruptcy. The Contractor shall be in material breach of the Contract if the Contractor fails to give this notice.

B. Should the Contractor make a general assignment for the benefit of his creditors, or if he should persistently refuse or fail to apply enough properly-skilled workers or proper materials to correctly execute the Work, or if he should fail to make prompt payment to the subcontractors or material suppliers for accepted material or labor, or constantly disregard laws, ordinances or instructions of the Architect and the Owner, or otherwise be guilty of substantial violation of any provision of the Contract, then the Owner may, without any prejudice to any other right or remedy and after giving the Contractor seven (7) days written notice, terminate employment of the Contractor and take possession of the premises and all materials, tools and appliances, and finish the Work by whatever method the Owner deems expedient. In such case, the Contractor shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract price exceeds the expense of finishing the Work, including compensation for additional administrative services, such excess shall be paid to the Contractor. If such expense shall exceed the unpaid balance, the Contractor shall pay the difference to the Owner.

SECTION 38 - CONTRACTOR'S RIGHT TO STOP WORK OR TERMINATE CONTRACT

A. If the Work should be stopped under court order, or other public authority for thirty (30) days, or the Owner shall fail to pay the Contractor within thirty (30) days of receipt of a properly prepared and completed payment request, then the Contractor may, on seven (7) days written notice to the Owner and the Architect, terminate this Contract and recover from the Owner the percentage of the Contract price represented by the work completed as of the date of termination with any loss sustained which can be established.

SECTION 39 - SEPARATE CONTRACTS

A. The Owner reserves the right to award separate contracts concerning other portions of the Project under these or similar conditions of the Contract to other contractors.

B. The Contractor shall afford separate contractors reasonable opportunity for the introduction and storage of their materials and equipment and the execution of their work, and shall properly connect and coordinate his work with theirs.

C. If any part of the Contractor's work depends upon the work of another separate contractor, the Contractor shall inspect and promptly report to the Project Manager any apparent discrepancies or defects in such work that render it unsuitable for proper execution and results. Failure of the Contractor to inspect the work is an acceptance of the work of the separate contractor unless defects develop in the other separate contractor's work after the execution of the Contractor's work.

SECTION 40 - ASSIGNMENT

A. The Contractor shall not assign or sublet this Contract or any part of it or any monies due him without prior written consent of the Owner.

SECTION 41 - LIQUIDATED DAMAGES

A. For each calendar day that the Work or any portion of the Work remains incomplete after the expiration of the time limit set in the Contract or by Change Order, the amount per calendar day shown in the Supplementary Conditions will be deducted from the money due or to become due to the Contractor. This deduction is not a penalty, but is liquidated damages and may include additional expenses such as administrative and inspection costs.

B. At the time of substantial completion, and after the meeting to certify substantial completion, the Owner, Architect and Contractor shall agree upon the time that will be allowed for the Contractor to complete the remaining Work on the Project. If the Contractor does not complete the Work within the agreed time, the liquidated damages will continue at a reduced amount as stated in the Supplementary Conditions. The liquidated damages shall be in full force and effect, not as a penalty but as liquidated damages for each additional calendar day it takes to complete the Project. If liquidated damages are required, they shall be accrued and deducted from the money due the Contractor.

SECTION 42 - ACCELERATION OF WORK

A. If, in the judgment of the Architect or the Owner, it becomes necessary at any time to accelerate the Work or part of it, the Contractor shall deploy the workers in such portions of the Project to enable others to properly engage and carry on their work. If circumstances require that the entire Work or a portion of it be completed at a date earlier than the Contract completion date as adjusted by Change Orders, the Contractor shall increase his forces, equipment, hours of work, or number of shifts, and shall speed delivery of materials to meet the altered completion date or dates ordered or directed. Any increase in cost to the Contractor according to such orders or directives will be adjusted by Change Order.

B. If the Work is behind schedule and the rate of placement of work is inadequate to regain scheduled progress, the Contractor shall immediately take action to ensure timely completion of the Work.
   1. This shall be accomplished by any one or a combination of the following or other suitable measures:
      a. An increase in working forces.
      b. An increase in equipment or tools.
      c. An increase in hours of work or number of shifts.
      d. Expediting delivery of materials.
   2. The Contractor shall notify the Project Manager of specific measures taken or planned to increase the rate of progress with an estimate of when scheduled progress will be regained.
   3. Acceleration of work will continue until scheduled progress is regained. Scheduled progress shall be established from the latest revised and approved Project schedule for the job.
   4. Timely completion will be understood as the Contract completion date as revised by all time extensions.
   5. The Contractor shall not be entitled to additional compensation for efforts to regain scheduled progress.

SECTION 43 - CONTRACTOR'S QUALITY CONTROL

A. MATERIAL QUALITY
   1. Materials incorporated into the Project shall be new except as otherwise indicated in the specifications. Materials shall be of specified quality and furnished in sufficient quantity to simplify proper and timely execution of the Work.
   2. The Contractor shall furnish evidence of the quality of materials incorporated into the Project as required by the Contract or at request of the Architect or the Project Manager.
   3. Materials not meeting requirements of the Contract shall be removed from the Project and replaced with materials meeting the Contract requirements by the Contractor at no additional expense to the Owner.

B. ASBESTOS

1. The Contract has been prepared following generally accepted professional architectural and engineering practices. Accordingly, no asbestos or products containing asbestos have been knowingly specified for this Project. The Contractor agrees to notify the Project Manager immediately for instructions if:
   a. Materials containing asbestos are brought to the site for inclusion in the Work.
   b. Asbestos materials are encountered in any existing structures upon which work is being done.
2. At the Architect's direction and with the Owner's approval, an independent testing laboratory will perform testing procedures on suspect materials at Owner's expense.
3. The Contractor shall certify, based upon his best knowledge, information, inspection and belief, that no building materials containing asbestos were used in the construction of the Project. The Contractor will submit certification on form provided by the Owner.

SECTION 44 - TEMPORARY OR TRIAL USAGE OF ANY MECHANICAL DEVICES

A. Temporary or trial usage by the Owner of mechanical devices, machinery, apparatus, elevators, equipment or other work or materials supplied under this Contract before written acceptance by the Owner shall not be construed as evidence of the Owner's acceptance.

SECTION 45 - PROJECT CLOSEOUT

A. FINAL CLEANING

1. Upon completion of the Work, the Contractor shall remove all tools, scaffolding, surplus materials and all rubbish from under and about the building. The Contractor shall leave the building clean and habitable, having thoroughly swept or vacuumed floors, cleaned windows and dusted flat surfaces such as cabinet tops and window sills.
2. Besides general cleaning noted above, the Contractor shall do the following special cleaning for all trades at the completion of the work:
   a. Remove putty or caulking stains from glass. Wash and polish inside and outside, exercising care not to scratch glass.
   b. Remove marks, stains, fingerprints, other soil and dirt from painted, decorated and stained work.
   c. Clean and polish woodwork.
   d. Clean and polish hardware for all trades. This shall include removal of stains, dust, dirt, paint and other similar materials.
   e. Remove spots, soil and paint. Wash tile work.
   f. Clean fixtures and equipment, and remove stains, paint, dirt and dust.
   g. Remove temporary floor protection and clean floors. Spray and buff resilient flooring.
   h. Clean exterior and interior metal surfaces, including doors and windows, required to have polished finishes. Remove oils, stains, dust, and dirt. Polish surfaces, leaving them without fingerprints or other blemishes.
3. If the Contractor fails to clean up, the Owner may do so and the cost will be withheld from the Contractor's final payment.

B. PROJECT RECORD DOCUMENTS

The Contractor shall deliver to the Architect before the substantial completion inspection:

1. Accurate Project "record" drawings, including redline drawings.
2. Certificates of occupancy that may be required by Authorities Having Jurisdiction over the work.

C. OPERATING & MAINTENANCE DATA

Before execution of the certificate of substantial completion, the Contractor shall furnish the operating instructions and maintenance manuals as called for in the Contract.

D. WARRANTIES & GUARANTEES

1. When written guarantees beyond one year after substantial completion are required of any section of the Work, the Contractor shall secure such guarantees properly addressed and signed and in favor

of the Owner. These documents shall be delivered to the Project Manager upon substantial completion of the Contractor's work and before execution of the certificate of substantial completion.

2. Delivery of guarantees and warranties shall not relieve the Contractor from any obligation assumed under any other provisions of his Contract.
3. Nothing within the Contract intends or implies that guarantees shall apply to work abused or neglected by the Owner.

E. PRE-SUBSTANTIAL, SUBSTANTIAL, & FINAL COMPLETION INSPECTIONS

1. Pre-Substantial Completion Inspection:
   a. Upon the Contractor's request and if the request is accompanied by a punch list prepared by the Contractor, the Project Manager and the Architect will make inspections and furnish a list of additional items to be corrected or completed by the Contractor.
   b. The Contractor shall notify the Project Manager when items have been corrected or completed. Upon the Project Manager's verification of correction, the Project Manager will arrange a substantial completion inspection to include the Owner, Architect, engineers and college representatives.

2. Substantial Completion Inspection:
   a. At the substantial completion inspection, unless the Work is rejected, the Architect may execute a certificate of substantial completion (to be signed by the Architect, Owner and Contractor) that states the dates for:
      (1) User occupancy,
      (2) Commencement of warranties,
      (3) Final completion inspection,
      (4) Modifications to the amount assessed for liquidated damages.
   b. After inspection, the Architect will furnish a final list of items to be corrected.
   c. The Owner, Architect and Contractor will decide how much time is to be allowed for completion of the items.
3. Final Completion Inspection:
   a. Final Completion Inspection will ensure that all deficiencies noted at the substantial completion inspection have been corrected.
   b. When all items have been corrected, the Project Manager will process the final payment and send a final completion letter indicating the final completion date to the Contractor.
   c. If all items have not been corrected as agreed, the Owner may elect to complete the work under provisions of Section 29 of the General Conditions.
   d. All lien waivers and releases are to be submitted before final payment can be made.
   e. A copy of the final payment consent form will be obtained from the surety/bonding company.

SECTION 46 - OWNER-PURCHASED MATERIALS AND EQUIPMENT

A. The Owner desires to purchase certain materials which will be utilized in the Work. Contractor's duties with respect to Owner-purchased materials are:

1. Scheduling:
   a. The Contractor shall furnish the Owner with a schedule of dates on which the Contractor requires delivery of Owner-purchased materials. The Owner will arrange for the materials to be delivered to the construction site on or before the specified dates. If delivery dates are changed, rescheduled, or otherwise varied from the original schedule, the Contractor shall notify the Owner in writing of delivery date rescheduling and the Contractor shall coordinate the delivery of the Owner-purchased materials directly with the supplier.
2. Pre-Installation Inspection:
   a. The Contractor shall be responsible for receiving, inspecting and storing all Owner-purchased materials until the materials are needed for installation by the Contractor. Regardless of any inspection performed by the Owner of the Owner-purchased materials, the Contractor shall be responsible for inspecting the Owner-purchased materials to determine suitability, quality and conformance with specifications before installation or at such other

time as the Contractor may desire in order to avoid interruptions and delays in the progress of the Project. The Contractor shall reject any material which does not meet specifications or which appears to have any defect which may make the material unsuitable for use in the Project. The Contractor shall notify the Owner and the manufacturer or supplier of all defects and assist the Owner in arranging for the repair, replacement or correction of the defective condition. The Contractor shall not be entitled to an extension of any deadline or completion date which results from failure to discover defects which the Contractor should have discovered through an inspection.

3. Defective Materials:
   a. The Contractor acknowledges that use of improper or defective material may result in costs and damages to the Owner in excess of the value of the materials; that after use in the Project it may be difficult or impossible to inspect the material to determine the cause of any failure; and that in the event of the failure of material there may be a question as to the cause of the failure. Because the Contractor's employees will be the last to handle and inspect material prior to incorporation into the Project, the Contractor will be liable to the Owner for damages resulting from failure of Owner-purchased materials during the Contractor's warranty period specified herein from any cause whatsoever unless the Contractor provides clear and convincing proof that (1) the entire loss from a failure is covered by a valid manufacturer's or supplier's warranty, or (2) the Contractor could not have prevented the failure by complying with the requirements of this Section concerning Owner-purchased materials.

4. Claims:
   a. The Contractor agrees to assist the Owner to present claims to manufacturers and suppliers for defects in Owner-purchased materials. Where there is any question as to the division of liability between the Contractor and a manufacturer or vendor, the Contractor shall provide all relevant information in the Contractor's possession which may aid the Owner in determining the division of responsibility. The Owner shall have final approval of any proposed adjustment or settlement of warranty claims.
5. Implied Warranties:
   The benefit of contractual and implied warranties with respect to Owner-purchased materials shall run to the Owner and not to the Contractor.
6. Unloading:
   Except as otherwise provided herein, the Contractor shall be responsible for unloading all Owner-purchased materials and verifying delivery amounts to the Owner.
7. Custody and Security:
   The Contractor shall use reasonable care in protecting Owner-purchased materials from loss, deterioration, damage, theft, vandalism or destruction.
8. Reports:
   At Owner's request, the Contractor shall furnish reports to the Project Manager demonstrating the Contractor's compliance with this Section.
9. Retained Ownership:
   All materials purchased by the Owner which remain after completion of the Project shall be the property of the Owner. If the Owner does not wish to retain or dispose of surplus Owner-purchased materials, the Contractor shall remove and dispose of them.

10. Rights of Ownership:

    None of the foregoing duties of the Contractor with respect to Owner-purchased materials shall prevent the Owner from exercising any prerogative of ownership of the materials.

SECTION 47 - OWNER'S SALES TAX EXEMPT STATUS

A. Contractor and subcontractors are authorized to purchase Construction Materials on behalf of Brigham Young University free of Utah sales tax, as defined by applicable Utah State Tax Rule. The grant of this contractual right is conditioned upon and made subject to the following:
   1. The construction materials must be installed or converted into real property owned by Brigham Young University and may not be used for any purpose other than constructing the Project.
   2. All construction materials purchased without sales tax must be clearly identified and segregated at all times between the time of purchase and time of installation into the Project.
   3. Contractor and subcontractors will comply with such instructions and guidance as Brigham Young University may issue from time to time to implement Tax Commission requirements for the sales tax exemption on construction materials.

B. Brigham Young University will provide the Contractor with the Sales Tax Exemption Certificate.

SECTION 48 – FOREIGN PRODUCTS AND CURRENCY

A. All foreign product costs shall be negotiated in U.S. dollars. Owner will not assume any risk for currency fluctuations after bidding. Contractor assumes all responsibility for any change in costs due to foreign currency fluctuations if the Contractor chooses to negotiate product costs in a foreign currency.

SUPPLEMENTARY CONDITIONS

SECTION 1--COMMENCEMENT, PROSECUTION & COMPLETION OF THE WORK

A. The Contractor shall be required to commence work after receipt of the contract from the Owner.

B. The Contractor shall prosecute the work diligently so as to complete it within the time limit allowed in this document.

C. The Contractor agrees to complete this work required by the Contract on or before midnight 15 August 2023.

D. Time is hereby expressly declared to be of the essence of the Contract.

SECTION 2--LIQUIDATED DAMAGES

A. The amount agreed upon and established as liquidated damages up to substantial completion is $500 per calendar day.

B. At the time of substantial completion the Owner and the Contractor will agree on how much time will be allowed for the Contractor to complete the remaining work. If the Contractor exceeds the time allowed, liquidated damages will continue at one third (1/3) of the amount of the original liquidated damages or $500 per calendar day.

SECTION 3--FIRE/SMOKE ALARMS

A. The Contractor shall be charged $1,000.00 for any fire alarm or smoke alarm that is caused by the Contractor and disrupts the building occupants. BYU fire alarm technicians are available to answer any questions concerning the alarm systems. The Contractor is to contact the Project Manager to coordinate alarm technicians.

SECTION 4—EXISTING UTILITIES

A. Prior to execution of the work the contractor is to locate all existing vaults, manholes, valves, meters, etc. Contractor is to photograph, GPS, measure from existing structures and facilities that are to remain and keep this information readily available at the site/construction trailer. Contractor is also to mark the above utilities by staking and maintaining stakes for fast and accurate locating of all existing utilities in case of emergencies.

B. BYU will initially provide all on campus blue staking information. It is the contractor's responsibility to maintain the blue staking locations and information by staking, painting, keeping GPS coordinated or any alternative ways that the contractor can keep current, accurate information.

SECTION 5—CONTRACTOR WORKING HOURS

A. No work will be performed between the hours of 10:00 p.m. and 7 a.m. without prior written authorization or in case of emergency situation approved by BYU Project Manager. No work is allowed on Sunday.

SECTION 6—BUILDER'S RISK INSURANCE

Section 13 of the General Conditions is deleted in its entirety and replaced with the following:

SECTION 13—BUILDERS RISK LOSSES

A. If the Contract Sum is over $100,000, prior to performing any work, Contractor will obtain and maintain during the term of this Agreement All-Risk Builders Risk Insurance Policy – ISO Form CP 00 20 (10/12), Builders' Risk Coverage (or equivalent) and ISO Form CP 10 30 (10/12), Causes of Loss Special Form, including coverage for flood, or equivalent insurance forms, with Limits of Insurance in the amount of the Contract Sum. An installation floater may be used, if approved in writing by Owner. The Policy will:

a. cover materials stored at temporary storage locations and materials in transit;
b. include Owner and all Subcontractors as additional named insureds;
c. be subject to a deductible payable by Contractor of not less than $2,500 per occurrence of any loss, which will be the responsibility of Contractor and will not be included in the Cost of the Work or be a reimbursable expense; and
d. provide that such insurance is primary, non-contributory and not excess coverage.

B. Contractor will provide evidence of this insurance coverage to Owner by providing, if applicable, a Certificate of Insurance on ACORD 27, Evidence of Property Insurance, for the Builder's Risk Insurance Policy, identifying the Project as defined in the Contract, submitted to Owner, attaching the endorsement giving evidence that the Owner and all Subcontractors are listed as named insureds on the Builder's Risk Policy.

Contact the BYU Construction Department (construction@byu.edu) for an electronic Excel version of this form.

Brigham Young University

Physical Facilities -- Construction Department

MONTHLY PAYMENT REQUEST

Date _____
Request No. _____
Period From _____ to _____
TAX ID# _____

Payable To:
Contractor _____
Address _____
City, State, Zip _____

Project Name _____
Project No. _____
Contract No. _____
Contract Date _____

APPLICATION FOR PAYMENT

HOLD FOR PICKUP ☐

1. ORIGINAL CONTRACT AMOUNT		$ -
2. NET CHANGE BY CHANGE ORDERS		$ -
3. CONTRACT AMOUNT TO DATE (line 1 plus line 2)		$ -
4. TOTAL EARNED (work completed and materials stored to date)		$ -
5. **AMOUNT THIS REQUEST**		$ -
6a. RETAINAGE HELD THIS REQUEST (5% of line 5)	$ -	
6b. RETAINAGE RELEASED THIS REQUEST	$ -	
6c. RETAINAGE RELEASED TO DATE (total of line 6b above plus previous pay app line 6c)	$ -	
6d. TOTAL HELD RETAINAGE TO DATE (5% of line 4 minus line 6c)		$ -
7. TOTAL EARNED LESS RETAINAGE HELD TO DATE (line 4 minus line 6d)		$ -
8. LESS PREVIOUS PAYMENTS (line 7 from previous pay app)		$ -
9. **CURRENT PAYMENT DUE** (line 7 minus line 8) (to check take line 5 minus line 6a plus line 6b)		$ -
10. BALANCE TO FINISH, Including Retainage (line 3 minus Line 4 plus Line 6d)	$ -	

Contractor's Representative _____
Date _____

Owner's Representative _____
Date _____

Project Manager _____ Date _____
Director of Construction _____
Director of Planning _____
Accounting _____
Architect _____

Legend
data input

SCHEDULE of VALUES

Project Name _____ **Contractor** _____

Item NO.	DESCRIPTION	Subcontractor or Supplier	% Item of Total	CONTRACT Amount	% THIS ESTIMATE	AMOUNT THIS ESTIMATE	% TO DATE	AMOUNT TO DATE	% of Rentention	Retention Withheld
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										
26										
27										
28										
29										
30										
31										
32										
TOTALS										

SECTION 013000

ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL **UPDATED 26 MARCH 2021**

1.01 SECTION INCLUDES **SEE BOLDED UPATES**

A. General administrative requirements.
B. Preconstruction meeting.
C. Progress meetings.
D. Construction progress schedule.
E. Contractor's daily reports.
F. Progress photographs.
G. Submittals for review, information, and project closeout.
H. Number of copies of submittals.
I. Requests for Interpretation (RFI) procedures.
J. Submittal procedures.

1.02 RELATED REQUIREMENTS

A. Section 00 00000 - BYU Standard Contract Requirements
B. Section 016000 - Product Requirements: General product requirements.

1.03 GENERAL ADMINISTRATIVE REQUIREMENTS

A. Conform to requirements of Section 017000 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.
B. Make the following types of submittals to Architect:
    1. Requests for Interpretation (RFI).
    2. Requests for substitution.
    3. Shop drawings, product data, and samples.
    4. Design data.
    5. Manufacturer's instructions and field reports.
    6. Progress schedules.
    7. Coordination drawings.
    8. Correction Punch List and Final Correction Punch List for Substantial Completion.
    9. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING

A. Owner will schedule a meeting after Notice of Award.
B. Attendance Required:
    1. Owner.
    2. Architect.
    3. Contractor.
C. Agenda:
    1. Execution of Owner-Contractor Agreement.
    2. Submission of executed bonds and insurance certificates.
    3. Distribution of Contract Documents.

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Signature & Date: _____

4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
5. Submission of initial Submittal schedule.
6. Designation of personnel representing the parties to Contract, _____ and Architect.
7. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
8. Scheduling.
9. Scheduling activities of a Geotechnical Engineer.

D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.02 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the work at maximum weekly intervals.

B. Architect will prepare agenda with copies for participants and will conduct the meeting.

C. Attendance Required:
1. Contractor.
2. Owner.
3. Architect.
4. Contractor's superintendent.
5. Subcontractors by invitation.

D. Agenda:
1. Review minutes of previous meetings.
2. Review overall project schedule. Are we on schedule?
3. Review project budget and potential chage orders.
4. Review of work progress.
5. Field observations, problems, and decisions.
6. Identification of problems that impede, or will impede, planned progress.
7. Review of submittals schedule and status of submittals.
8. Review of RFIs log and status of responses.
9. Review of off-site fabrication and delivery schedules.
10. Maintenance of progress schedule.
11. Corrective measures to regain projected schedules.
12. Review three week rolling schedule.
13. Maintenance of quality and work standards.
14. Effect of proposed changes on progress schedule and coordination.
15. Other business relating to work.

E. Architect will record meeting minutes and distribute copies to those who attended the meeting within two days following the meeting.

3.03 CONSTRUCTION PROGRESS SCHEDULE

A. Within 10 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of work, with a general outline for remainder of work.

B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.

3.04 DAILY CONSTRUCTION REPORTS

A. Include only factual information. Do not include personal remarks or opinions regarding operations and/or personnel.

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B. Prepare a daily construction report recording the following information concerning events at Project site and project progress:
   1. Date.
   2. High and low temperatures, and general weather conditions.
   3. List of subcontractors at Project site.
   4. Approximate count of personnel at Project site.
      a. Include a breakdown for supervisors, laborers, journeymen, equipment operators, and helpers.
   5. Major equipment at Project site.
   6. Material deliveries.
   7. Safety, environmental, or industrial relations incidents.
   8. Meetings and significant decisions.
   9. Unusual events (submit a separate special report).
   10. Stoppages, delays, shortages, and losses. Include comparison between scheduled work activities (in Contractor's most recently updated and published schedule) and actual activities. Explain differences, if any. Note days or periods when no work was in progress and explain the reasons why.
   11. Meter readings and similar recordings.
   12. Emergency procedures.
   13. Directives and requests of Authority(s) Having Jurisdiction (AHJ).
   14. Change Orders received and implemented.
   15. Testing and/or inspections performed.
   16. List of verbal instruction given by Owner and/or Architect.
   17. Signature of Contractor's authorized representative.

3.05 PROGRESS PHOTOGRAPHS

A. Maintain one set of all photographs at project site for reference.

B. In addition to periodic, recurring views, take photographs of each of the following events:
   1. Completion of site clearing.
   2. Excavations in progress.
   3. Foundations in progress and upon completion.
   4. Structural framing in progress and upon completion.
   5. Enclosure of building, upon completion.
   6. Final completion, minimum of ten (10) photos.

3.06 REQUESTS FOR INTERPRETATION (RFI)

A. Definition: A request seeking one of the following:
   1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in the Contract Documents.
   2. A resolution to an issue which has arisen due to field conditions and affects design intent.

B. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of the Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
   1. Prepare a separate RFI for each specific item.
      a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
      b. Do not forward requests which solely require internal coordination between subcontractors.
   2. Prepare in a format and with content acceptable to Owner.

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C. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
   1. Include in each request Contractor's signature attesting to good faith effort to determine from the Contract Documents information requiring interpretation.
   2. Unacceptable Uses for RFIs: Do not use RFIs to request the following::
      a. Approval of submittals (use procedures specified elsewhere in this section).
      b. Approval of substitutions (see Section - 016000 - Product Requirements)
      c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
   3. Improper RFIs: Requests not prepared in conformance to requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.

D. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
   1. Official Project name and number, and any additional required identifiers established in Contract Documents.
   2. Owner's, Architect's, and Contractor's names.
   3. Discrete and consecutive RFI number, and descriptive subject/title.
   4. Issue date, and requested reply date.
   5. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
   6. Annotations: Field dimensions and/or description of conditions which have engendered the request.
   7. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.

E. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.

F. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
   1. Indicate current status of every RFI. Update log promptly and on a regular basis.
   2. Note dates of when each request is made, and when a response is received.
   3. Highlight items requiring priority or expedited response.
   4. Highlight items for which a timely response has not been received to date.

G. Review Time: Architect will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
   1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.

H. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.
   1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
   2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.

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3. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.
4. Notify Architect within seven calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

3.07 SUBMITTAL SCHEDULE

A. Submit to Architect for review a schedule for submittals in tabular format.
   1. Coordinate with Contractor's construction schedule and schedule of values.
   2. Format schedule to allow tracking of status of submittals throughout duration of construction.
   3. Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, and role and name of subcontractor.
   4. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.
      a. For assemblies, equipment, systems comprised of multiple components and/or requiring detailed coordination with other work, allow for additional time to make corrections or revisions to initial submittals, and time for their review.

3.08 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
   1. Product data.
   2. Shop drawings.
   3. Samples for selection.
   4. Samples for verification.

B. Submit to Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.

C. Samples will be reviewed for aesthetic, color, or finish selection.

D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 017800 - Closeout Submittals.

3.09 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
   1. Design data.
   2. Certificates.
   3. Test reports.
   4. Inspection reports.
   5. Manufacturer's instructions.
   6. Manufacturer's field reports.
   7. Other types indicated.

B. Submit for Architect's knowledge as contract administrator or for Owner.

3.10 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submit Correction Punch List for Substantial Completion.

B. Submit Final Correction Punch List for Substantial Completion.

C. When the following are specified in individual sections, submit them at project closeout in conformance to requirements of Section 017800 - Closeout Submittals:
   1. Project record documents.
   2. Operation and maintenance data.
   3. Warranties.

D. Submit for Owner's benefit during and after project completion.

I _____ the Principal in Charge on this project have reviewed this section and it is in accordance with the Instructions to Architects & Engineers. Downloaded from SpecLink: May 05, 2023

Signature & Date: _____

3.11 NUMBER OF COPIES OF SUBMITTALS

A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

B. Documents for Review:
   1. Small Size Sheets, Not Larger Than 11 x 17 inches: Submit one copy; the Contractor shall make his own copies from original returned by the Architect after making his own file copy.

C. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
   1. After review, produce duplicates.
   2. Retained samples will not be returned to Contractor unless specifically so stated.

3.12 SUBMITTAL PROCEDURES

3.13 COMPLY WITH BYU STANDARD CONTRACT REQUIREMENTS.

A. General Requirements:
   1. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
   2. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
   3. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
      a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
   4. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.
      a. Send submittals in electronic format via email to Architect.
   5. Schedule submittals to expedite the Project, and coordinate submission of related items.
      a. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
      b. For sequential reviews involving Architect's consultants, Owner, or another affected party, allow an additional 7 days.
   6. Provide space for Contractor and Architect review stamps.
   7. When revised for resubmission, identify all changes made since previous submission.
   8. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.

B. Product Data Procedures:
   1. Submit only information required by individual specification sections.
   2. Collect required information into a single submittal.
   3. Do not submit (Material) Safety Data Sheets for materials or products.

C. Shop Drawing Procedures:
   1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting the Contract Documents and coordinating related work.
   2. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.

D. Samples Procedures:
   1. Transmit related items together as single package.
   2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.

I _____ the Principal in Charge on this project have reviewed this section and it is in accordance with the Instructions to Architects & Engineers. Downloaded from SpecLink: May 05, 2023

Signature & Date: _____

3.14 SUBMITTAL REVIEW

A. Submittals for Review: Architect will review each submittal, and approve, or take other appropriate action.

B. Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.

C. Architect's and his consultants' actions on items submitted for review:
   1. Authorizing purchasing, fabrication, delivery, and installation:
      a. "Approved", or language with same legal meaning.
      b. "Approved as Noted, Resubmission not required", or language with same legal meaning.
         1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
      c. "Approved as Noted, Resubmit for Record", or language with same legal meaning.
         1) Resubmit corrected item, with review notations acknowledged and incorporated. Resubmit separately, or as part of project record documents.
   2. Not Authorizing fabrication, delivery, and installation:
      a. "Revise and Resubmit".
         1) Resubmit revised item, with review notations acknowledged and incorporated.
      b. "Rejected".
         1) Submit item complying with requirements of Contract Documents.

D. **No Part of this section relieves the Contractor of the responsibility to comply with the Contract Documents.** **Updated 26 Mar 2021**

END OF SECTION

I _____ the Principal in Charge on this project have reviewed this section and it is in accordance with the Instructions to Architects & Engineers. Downloaded from SpecLink: May 05, 2023

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Signature & Date: _____

SECTION 014000
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Submittals.
B. Quality assurance.
C. References and standards.
D. Testing and inspection agencies and services.
E. Control of installation.
F. Mock-ups.
G. Tolerances.
H. Manufacturers' field services.
I. Defect Assessment.

1.02 RELATED REQUIREMENTS

A. Section 013000 - Administrative Requirements: Submittal procedures.
B. Section 016000 - Product Requirements: Requirements for material and product quality.

1.03 REFERENCE STANDARDS

A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants; 2008 (Reapproved 2014).
B. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation; 2017.
C. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry; 2015a, with Editorial Revision (2016).
D. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2012a.
E. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2014a.
F. IAS AC89 - Accreditation Criteria for Testing Laboratories; 2017.
G. Codes and Regulations Adopted by the State of Utah and Local Jurisdiction.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.
B. Design Data: Submit for Architect's knowledge for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents, or for Owner's information.
C. Test Reports: After each test/inspection, promptly submit a digital or one paper copies of report to owner, Architect and to Contractor.
    1. Include:
        a. Date issued.
        b. Project title and number.
        c. Name of inspector.
        d. Identification of product and specifications section.
        e. Location in the Project.

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f. Type of test/inspection.
g. Date of test/inspection.
h. Results of test/inspection.
i. Conformance with Contract Documents.

2. Test report submittals are for Architect's knowledge as for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents, or for Owner's information.

D. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.
1. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

E. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

F. Erection Drawings: Submit drawings for Architect's benefit or for Owner.
1. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.
2. Data indicating inappropriate or unacceptable Work may be subject to action by Architect or Owner.

1.05 QUALITY ASSURANCE

A. Testing Agency Qualifications:
1. Prior to start of Work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
3. Qualification Statement: Provide documentation showing testing laboratory is accredited under IAS AC89.

1.06 REFERENCES AND STANDARDS

A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

C. Obtain copies of standards where required by product specification sections.

D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.

F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.07 TESTING AND INSPECTION AGENCIES AND SERVICES

A. Owner will employ and pay for services of an independent testing agency to perform specified testing.

I _____ the Principal in Charge on this project have reviewed this section and it is in accordance with the Instructions to Architects & Engineers. Downloaded from SpecLink: May 05, 2023

Signature & Date: _____

B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have Work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 MOCK-UPS

A. Before installing portions of the Work where mock-ups are required, construct mock-ups in location and size indicated for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.

B. Accepted mock-ups establish the standard of quality the Architect will use to judge the Work.

C. Integrated Exterior Mock-ups: construct integrated exterior mock-up as indicated on Drawings. Coordinate installation of exterior envelope materials and products as required in individual Specification Sections. Provide adequate supporting structure for mock-up materials as necessary.

D. Provide a schedule that describes when mock-ups and "first-install" items are available for owner review.

E. Notify Architect and owner fifteen (15) working days in advance of dates and times when mock-ups will be constructed.

F. Provide supervisory personnel who will oversee mock-up construction. Provide workers that will be employed during the construction at Project.

G. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.

H. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

I. Obtain Architect's approval of mock-ups before starting work, fabrication, or construction.
   1. Architect will issue written comments within five (5) working days of initial review and each subsequent follow up review of each mock-up.
   2. Make corrections as necessary until Architect's approval is issued.

J. Accepted mock-ups shall be a comparison standard for the remaining Work.

K. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by Architect.

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3.03 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

3.04 TESTING AND INSPECTION

A. Testing Agency Duties:
   1. Test samples of mixes submitted by Contractor.
   2. Provide qualified personnel at site. Cooperate with Owner, Architect and Contractor in performance of services.
   3. Perform specified sampling and testing of products in accordance with specified standards.
   4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
   5. Promptly notify Owner, Architect and Contractor of observed irregularities or non-conformance of Work or products.
   6. Perform additional tests and inspections required by Architect.
   7. Submit reports of all tests/inspections specified.

B. Limits on Testing/Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency may not approve or accept any portion of the Work.
   3. Agency may not assume any duties of Contractor.
   4. Agency has no authority to stop the Work.

C. Contractor Responsibilities:
   1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
   2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
   3. Provide incidental labor and facilities:
      a. To provide access to Work to be tested/inspected.
      b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
      c. To facilitate tests/inspections.
      d. To provide storage and curing of test samples.
   4. Notify Owner, Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
   5. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor's error beyond specified requirements.

D. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Architect.

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

3.05 MANUFACTURERS' FIELD SERVICES

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

B. Submit qualifications of observer to Owner and Architect 30 days in advance of required observations.
   1. Observer subject to approval of Architect.

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2. Observer subject to approval of Owner.

C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.06 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not conforming to specified requirements.

B. If, in the opinion of Owner, it is not practical to remove and replace the Work, Owner will direct an appropriate remedy or adjust payment.

END OF SECTION

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SECTION 015000

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary utilities.

B. Temporary telecommunications services.

C. Temporary sanitary facilities.

D. Temporary Controls: Barriers, enclosures, and fencing.

E. Security requirements.

F. Vehicular access and parking.

G. Waste removal facilities and services.

H. Project identification sign.

I. Field offices.

1.02 RELATED REQUIREMENTS

A. Section 015500 - Vehicular Access and Parking.

1.03 TEMPORARY UTILITIESSEE BYU STANDARD CONTRACT REQUIREMENTS

1.04 TELECOMMUNICATIONS SERVICES

A. Provide and maintain telecommunications services to field office at time of project mobilization. Coordinate installation with the BYU Construction Project Manager.

1.05 TEMPORARY SANITARY FACILITIES SEE BYU STANDARD CONTRACT REQUIREMENTS

A. Maintain daily in clean and sanitary condition.

1.06 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.

C. Provide protection for plants designated to remain. Replace damaged plants. Refer to BYU Standard Contract Requirements for more information.

D. Protect stored materials, site, and structures from damage.

1.07 FENCING

A. Construction: Commercial grade chain link fence.

B. Provide 6 foot high fence around construction site; equip with vehicular and pedestrian gates with locks.

1.08 VEHICULAR ACCESS AND PARKING - SEE SECTION 015500

A. Comply with BYU regulations (www.relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.

B. Coordinate access and haul routes with governing authorities and Owner.

C. Provide and maintain access to fire hydrants and fire lanes free of obstructions.

D. Provide means of removing mud from vehicle wheels before entering streets.

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E. Designated existing on-site roads may be used for construction traffic.

F. Existing parking areas located at LaVell Edwards Stadium (LVES) may be used for construction parking.

1.09 WASTE REMOVAL

A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

1.10 PROJECT IDENTIFICATION

A. Provide project identification sign of design and construction indicated on Drawings.

B. Erect on site at location indicated.

C. No other signs are allowed without Owner permission except those required by law.

1.11 FIELD OFFICES

A. Office: Weathertight, with lighting, electrical outlets, heating, cooling equipment, and equipped with sturdy furniture, drawing rack, and drawing display table.

B. Provide space for Project meetings, with table and chairs to accommodate 10 persons as needed.

1.12 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.

B. Remove underground installations. Grade site as indicated.

C. Clean and repair damage caused by installation or use of temporary work.

D. Restore existing facilities used during construction to original condition, unless noted otherwise.

E. Restore new permanent facilities used during construction to specified condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 016000
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General product requirements.

B. Re-use of existing products.

C. Transportation, handling, storage and protection.

D. Product option requirements.

E. Procedures for Owner-supplied products.

F. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

A. Section 011000 - Summary: Identification of Owner-supplied products.

B. Section 014000 - Quality Requirements: Product quality monitoring.

C. Section 230513 - Common Motor Requirements for HVAC Equipment: Motors for HVAC equipment.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by the Contract Documents.

B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.

C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.

2.02 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by the Contract Documents.

B. Motors: Refer to Section 230513 - Common Motor Requirements for HVAC Equipment, NEMA MG 1 Type. Specific motor type is specified in individual specification sections.

2.03 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.04 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver and place in location as directed; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 OWNER-SUPPLIED PRODUCTS

A. See Section 011000 - Summary for identification of Owner-supplied products.

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B. Owner's Responsibilities:
   1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
   2. Arrange and pay for product delivery to site.
   3. On delivery, inspect products jointly with Contractor.
   4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
   5. Arrange for manufacturers' warranties, inspections, and service.

C. Contractor's Responsibilities:
   1. Review Owner reviewed shop drawings, product data, and samples.
   2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
   3. Repair or replace items damaged after receipt.

3.02 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.

B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

D. Transport and handle products in accordance with manufacturer's instructions.

E. Transport materials in a legal fashion in covered trucks to prevent contamination of product and littering of surrounding areas.

F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.03 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground.

F. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.

G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

H. Comply with manufacturer's warranty conditions, if any.

I. Do not store products directly on the ground.

J. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

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K. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

L. Prevent contact with material that may cause corrosion, discoloration, or staining.

M. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

N. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

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SECTION 017000

EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Requirements for alterations work, including selective demolition, except removal, disposal, and/or remediation of hazardous materials and toxic substances.

C. Pre-installation meetings.

D. Cutting and patching.

E. Surveying for laying out the work.

F. Cleaning and protection.

G. Starting of systems and equipment.

H. Demonstration and instruction of Owner personnel.

I. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

J. General requirements for maintenance service.

1.02 RELATED REQUIREMENTS

A. Section 011000 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.

B. Section 013000 - Administrative Requirements: Submittals procedures.

C. Section 014000 - Quality Requirements: Testing and inspection procedures.

D. Section 015000 - Temporary Facilities and Controls: Temporary exterior enclosures.

E. Section 015000 - Temporary Facilities and Controls: Temporary interior partitions.

F. Section 015100 - Temporary Utilities: Temporary heating, cooling, and ventilating facilities.

G. Section 015713 - Temporary Erosion and Sediment Control: Additional erosion and sedimentation control requirements.

H. Section 017800 - Closeout Submittals: Project record documents, operation and maintenance data, warranties and bonds.

I. Section 017900 - Demonstration and Training: Demonstration of products and systems to be commissioned and where indicated in specific specification sections

J. Section 019113 - General Commissioning Requirements: Contractor's responsibilities in regard to commissioning.

K. Section 024100 - Demolition: Demolition of whole structures and parts thereof; site utility demolition.

L. Standard Contract Requirements - General Conditions

M. Section 078400 - Firestopping.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
   1. On request, submit documentation verifying accuracy of survey work.

C. Cutting and Patching: Refer to BYU Standard Contract Requirements

D. Project Record Documents: Accurately record actual locations of capped and active utilities.

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1.04 QUALIFICATIONS

A. For demolition work, employ a firm specializing in the type of work required.
   1. Minimum of Three years of documented experience.

B. For design of temporary shoring and bracing, employ a Professional Civil Engineer or a Professional Structural Engineer experienced in design of this type of work and licensed in Utah.

1.05 PROJECT CONDITIONS

A. Use of explosives is not permitted.

B. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

C. Perform dewatering activities, as required, for the duration of the project.

D. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

E. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
   1. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.

F. Erosion and Sediment Control: Provide SWPPP plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
   1. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
   2. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
   3. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

G. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations to the limits established by the agency having jurisdiction.

H. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.06 COORDINATION

A. See Section 011000 for occupancy-related requirements.

B. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

C. Notify affected utility companies and comply with their requirements.

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

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

F. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

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G. Coordinate completion and clean-up of work of separate sections.

H. After Owner occupancy of premises, coordinate access to site for correction of warranty work, to minimize disruption of Owner's activities.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 016000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions. Refer also to the BYU Standard Contract Requirements.

3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.

B. Require attendance of parties directly affecting, or affected by, work of the specific section.

C. Notify Owner and Architect four days in advance of meeting date.

D. Prepare agenda and preside at meeting:
   1. Review conditions of examination, preparation and installation procedures.
   2. Review coordination with related work.

E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.04 LAYING OUT THE WORK

A. Verify locations of survey control points prior to starting work.

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B. Promptly notify Owner and Architect of any discrepancies discovered.

C. Contractor shall locate and protect survey control and reference points.

D. Control datum for survey is that indicated on drawings.

E. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

F. Promptly report to Owner and Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

G. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Owner and Architect.

H. Utilize recognized engineering survey practices.

I. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
   1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
   2. Grid or axis for structures.
   3. Building foundation, column locations, ground floor elevations.

J. Periodically verify layouts by same means.

K. Maintain a complete and accurate log of control and survey work as it progresses.

3.05 GENERAL INSTALLATION REQUIREMENTS

A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.06 ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as indicated.
   2. Report discrepancies to Owner and Architect before disturbing existing installation.
   3. Beginning of alterations work constitutes acceptance of existing conditions.

B. Keep areas in which alterations are being conducted separated from other areas that are still occupied.
   1. Provide, erect, and maintain temporary dustproof partitions of construction indicated on drawings in locations indicated on drawings.

C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; prevent water and humidity damage.
   1. Where openings in exterior enclosure exist, provide construction to make exterior enclosure weatherproof.
   2. Insulate existing ducts or pipes that are exposed to outdoor ambient temperatures by alterations work.

D. Remove existing work as indicated and as required to accomplish new work.

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1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
2. Remove items indicated on drawings.
3. Relocate items indicated on drawings.
4. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
5. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.

E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction as described in documents or directed by Owner.
1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required by Owner.
3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
    a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
    b. See Section 011000 for other limitations on outages and required notifications.
    c. Provide temporary connections as required to maintain existing systems in service.
4. Verify that abandoned services serve only abandoned facilities.
5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.

F. Protect existing work to remain.
1. Prevent movement of structure; provide shoring and bracing if necessary.
2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
3. Repair adjacent construction and finishes damaged during removal work.

G. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
1. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Owner and Architect.
2. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.
3. Where a change of plane of 1/4 inch or more occurs in existing work, submit recommendation for providing a smooth transition for Owner and Architect review and request instructions.
4. Trim existing wood doors as necessary to clear new floor finish. Refinish trim as required.

H. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.

I. Refinish existing surfaces as indicated:
1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.

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J. Clean existing systems and equipment.

K. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.

3.07 CUTTING AND PATCHING - REFER ALSO TO BYU STANDARD CONTRACT REQUIREMENTS

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. See Alterations article above for additional requirements.

C. Perform whatever cutting and patching is necessary to:
   1. Complete the work.
   2. Fit products together to integrate with other work.
   3. Provide openings for penetration of mechanical, electrical, and other services.
   4. Match work that has been cut to adjacent work.
   5. Repair new work damaged by subsequent work.
   6. Remove samples of installed work for testing when requested.
   7. Remove and replace defective and non-conforming work.

D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

E. Employ skilled and experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

G. Restore work with new products in accordance with requirements of Contract Documents.

H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 078400, to full thickness of the penetrated element.

J. Patching:
   1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
   2. Match color, texture, and appearance.
   3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.08 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.09 PROTECTION OF INSTALLED WORK - REFER ALSO TO BYU STANDARD CONTRACT REQUIREMENTS

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

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C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

F. Protect work from spilled liquids. If work is exposed to spilled liquids, immediately remove protective coverings, dry out work, and replace protective coverings.

G. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

H. Prohibit traffic from landscaped areas.

I. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.10 SYSTEM STARTUP

A. Coordinate with requirements of Section 019113 - General Commissioning Requirements_____.

B. Coordinate schedule for start-up of various equipment and systems.

C. Notify Owner and Architect and owner seven days prior to start-up of each item.

D. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.

E. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

F. Verify that wiring and support components for equipment are complete and tested.

G. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.

H. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

I. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.11 DEMONSTRATION AND INSTRUCTION

A. See Section 017900 - Demonstration and Training.

3.12 ADJUSTING

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

B. Testing, adjusting, and balancing HVAC systems: See Section 230593 - Testing, Adjusting, and Balancing for HVAC.

3.13 FINAL CLEANING

A. Execute final cleaning prior to Substantial Completion.
   1. Clean areas to be occupied by Owner prior to final completion before Owner occupancy.

B. Use cleaning materials that are nonhazardous.

C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, and others impacted surfaces.

D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

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E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned, and approved by the Owner.

F. Clean filters of operating equipment.

G. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.

H. Clean site; sweep paved areas, rake clean landscaped surfaces.

I. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.14 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.
   1. Provide copies to Architect and Owner.

B. Refer to BYU standard contract requirements for punch list procedures.

3.15 MAINTENANCE

A. Provide service and maintenance of components indicated in specification sections and coordinate with Owner.

END OF SECTION

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SECTION 017419

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

A. Owner requires that this project generate the least amount of trash and waste possible.

B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.

C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.

D. Methods of trash/waste disposal that are not acceptable are:
   1. Burning on the project site.
   2. Burying on the project site.
   3. Dumping or burying on other property, public or private.
   4. Other illegal dumping or burying.

E. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.02 DEFINITIONS

A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.

B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.

C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.

D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.

E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.

F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.

H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

I. Return: To give back reusable items or unused products to vendors for credit.

J. Reuse: To reuse a construction waste material in some manner on the project site.

K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.

M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

N. Toxic: Poisonous to humans either immediately or after a long period of exposure.

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O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

PART 3 EXECUTION

2.01 WASTE MANAGEMENT PROCEDURES

A. See Section 013000 for additional requirements for project meetings, reports, submittal procedures, and project documentation.

B. See Section 015000 for additional requirements related to trash/waste collection and removal facilities and services.

C. See Section 016000 for waste prevention requirements related to delivery, storage, and handling.

D. See Section 017000 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

END OF SECTION

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SECTION 017800

CLOSEOUT SUBMITTALS

PART 1 GENERAL **UPDATED 26 MARCH 2021**

1.01 SECTION INCLUDES **SEE BOLDED UPDATES**

A. Project Record Documents.

B. Operation and Maintenance Data.

C. Warranties.

1.02 RELATED REQUIREMENTS

A. Section 013000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

B. Section 017000 - Execution and Closeout Requirements: Contract closeout procedures.

C. Individual Product Sections: Specific requirements for operation and maintenance data.

D. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

A. Project Record Documents: Submit documents to Architect who will transfer them to the owner. Provide one hard copy and one electronic copy in pdf and rvt format.

B. Operation and Maintenance Data:
   1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
   2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
   3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Owner and Architect comments. Revise content of all document sets as required prior to final submission.
   4. **Submit one hard copy and one electronic copy in pdf format sets of revised final documents in final form within 10 days after final inspection. Updated 26 March 2021**

C. Warranties:
   1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
   2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
   3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders.
   5. Reviewed shop drawings, product data, and samples.
   6. Manufacturer's instruction for assembly, installation, and adjusting.

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7. Owner's Project Requirements document.
8. Commissioning Plan.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
1. Manufacturer's name and product model and number.
2. Product substitutions or alternates utilized.
3. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark any change from design to record actual construction including:
1. Measured depths of foundations in relation to finish first floor datum.
2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
4. Field changes of dimension and detail.
5. Details not on original Contract drawings.

3.02 OPERATION AND MAINTENANCE DATA

A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. For Each Product, Applied Material, and Finish:
1. Product data, with catalog number, size, composition, and color and texture designations.
2. Information for re-ordering custom manufactured products.

B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

C. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.

D. Additional information as specified in individual product specification sections.

E. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. For Each Item of Equipment and Each System:

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

B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.

D. Include color coded wiring diagrams as installed.

E. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

F. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

G. Provide servicing and lubrication schedule, and list of lubricants required.

H. Include manufacturer's printed operation and maintenance instructions.

I. Include sequence of operation by controls manufacturer.

J. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

K. Provide control diagrams by controls manufacturer as installed.

L. Provide Contractor's coordination drawings, with color coded piping diagrams as installed.

M. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

N. Include test and balancing reports.

O. Additional Requirements: As specified in individual product specification sections.

3.05 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections, unless otherwise directed in individual product specification sections.

B. Where systems involve more than one specification section, provide separate tabbed divider for each system.

C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 4 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

E. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.

F. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.

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G. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.

H. Text: Manufacturer's printed data, or typewritten data on 20 pound paper.

I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

J. Arrangement of Contents: Organize each volume in parts as follows:
   1. Project Directory.
   2. Table of Contents, of all volumes, and of this volume.
   3. Operation and Maintenance Data: Arranged by system, then by product category.
      a. Source data.
      b. Product data, shop drawings, and other submittals.
      c. Operation and maintenance data.
      d. Field quality control data.
      e. Photocopies of warranties.
   4. Design Data: To allow for addition of design data furnished by Architect or others, provide a tab labeled "Design Data" and provide a binder large enough to allow for insertion of at least 20 pages of typed text.

3.06 WARRANTIES

A. Obtain warranties, executed in duplicate by responsible subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until date of substantial completion is determined.

B. Verify that documents are in proper form, contain full information.

C. Co-execute submittals when required.

D. Retain warranties until time specified for submittal.

E. Include photocopies of each in operation and maintenance manuals, indexed separately on Table of Contents.

F. Manual: Bind in commercial quality 8-1/2 by 11 inch three D side ring binders with durable plastic covers.

G. Cover: Identify each binder with typed or printed title WARRANTIES, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.

H. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.

I. Separate each warranty with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

END OF SECTION

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SECTION 017900

DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.01 SUMMARY

A. Demonstration of products and systems to be commissioned and where indicated in specific specification sections.

B. Training of Owner personnel in operation and maintenance is required for:
   1. All software-operated systems.
   2. HVAC systems and equipment.
   3. Plumbing equipment.
   4. Electrical systems and equipment.
   5. Conveying systems.
   6. Items specified in individual product Sections.

C. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:
   1. Roofing, waterproofing, and other weather-exposed or moisture protection products.
   2. Finishes, including flooring, wall finishes, ceiling finishes.
   3. Fixtures and fittings.
   4. Items specified in individual product Sections.

1.02 RELATED REQUIREMENTS

A. Section 017800 - Closeout Submittals: Operation and maintenance manuals.

B. Section 019113 - General Commissioning Requirements: Additional requirements applicable to demonstration and training.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures; except:
   1. Make all submittals specified in this section, and elsewhere where indicated for commissioning purposes, directly to the Commissioning Authority.
   2. Submit one copy to the Commissioning Authority, not to be returned.
   3. Make commissioning submittals on time schedule specified by Commissioning Authority.
   4. Submittals indicated as "Draft" are intended for the use of the Commissioning Authority in preparation of overall Training Plan; submit in editable electronic format, Microsoft Word 2003 preferred.

B. Draft Training Plans: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees.
   1. Submit to Commissioning Authority for review and inclusion in overall training plan.
   2. Submit not less than four weeks prior to start of training.
   3. Revise and resubmit until acceptable.
   4. Provide an overall schedule showing all training sessions.
   5. Include at least the following for each training session:
      a. Identification, date, time, and duration.
      b. Description of products and/or systems to be covered.
      c. Name of firm and person conducting training; include qualifications.
      d. Intended audience, such as job description.
      e. Objectives of training and suggested methods of ensuring adequate training.
      f. Methods to be used, such as classroom lecture, live demonstrations, hands-on, etc.
      g. Media to be used, such a slides, hand-outs, etc.

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h. Training equipment required, such as projector, projection screen, etc., to be provided by Contractor.

C. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.
   1. Include applicable portion of O&M manuals.
   2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.
   3. Provide one extra copy of each training manual to be included with operation and maintenance data.

D. Training Reports:
   1. Identification of each training session, date, time, and duration.
   2. Sign-in sheet showing names and job titles of attendees.
   3. List of attendee questions and written answers given, including copies of and references to supporting documentation required for clarification; include answers to questions that could not be answered in original training session.
   4. Include Commissioning Authority's formal acceptance of training session.

1.04 QUALITY ASSURANCE

A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
   1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
   2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 DEMONSTRATION - GENERAL

A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by Owner.

B. Demonstrations conducted during Functional Testing need not be repeated unless Owner personnel training is specified.

C. Demonstration may be combined with Owner personnel training if applicable.

D. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.
   1. Perform demonstrations not less than two weeks prior to Substantial Completion.
   2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

E. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
   1. Perform demonstrations not less than two weeks prior to Substantial Completion.

3.02 TRAINING - GENERAL

A. Commissioning Authority will prepare the Training Plan based on draft plans submitted.

B. Conduct training on-site unless otherwise indicated.

C. Owner will provide classroom and seating at no cost to Contractor.

D. Do not start training until Functional Testing is complete, unless otherwise specified or approved by the Commissioning Authority.

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E. Provide training in minimum two hour segments.

F. The Commissioning Authority is responsible for determining that the training was satisfactorily completed and will provide approval forms.

G. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to charge Contractor for personnel "show-up" time.

H. Review of Facility Policy on Operation and Maintenance Data: During training discuss:
   1. The location of the O&M manuals and procedures for use and preservation; backup copies.
   2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
   3. Typical uses of the O&M manuals.

I. Product- and System-Specific Training:
   1. Review the applicable O&M manuals.
   2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
   3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
   4. Provide hands-on training on all operational modes possible and preventive maintenance.
   5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
   6. Discuss common troubleshooting problems and solutions.
   7. Discuss any peculiarities of equipment installation or operation.
   8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
   9. Review recommended tools and spare parts inventory suggestions of manufacturers.
   10. Review spare parts and tools required to be furnished by Contractor.
   11. Review spare parts suppliers and sources and procurement procedures.

J. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

END OF SECTION

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SECTION 024100

DEMOLITION

PART 1 GENERAL **UPDATED OCT 2022**

1.01 SECTION INCLUDES

A. **Building demolition including removal of select hazardous materials and toxic substances. Updated 10/22**

B. Selective demolition of built site elements.

C. Selective demolition of building elements for alteration purposes.

D. Abandonment and removal of existing utilities and utility structures.

1.02 RELATED REQUIREMENTS

A. Section 003100 - Available Project Information: Existing building survey conducted by Owner; information about known hazardous materials.

B. Section 015000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

C. Section 015713 - Temporary Erosion and Sediment Control.

D. Section 016000 - Product Requirements: Handling and storage of items removed for salvage and relocation.

E. **Section 260505 - Selective Demolition for Electrical.**

F. Section 311000 - Site Clearing: Vegetation and existing debris removal.

G. Section 312200 - Grading: Topsoil removal.

H. Section 312200 - Grading: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

I. Section 312323 - Fill: Filling holes, pits, and excavations generated as a result of removal operations.

1.03 REFERENCE STANDARDS

A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.

B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2013.

1.04 SUBMITTALS

A. See Section 9 of General Conditions013000 - Administrative Requirements for submittal procedures.

B. Site Plan: Showing:
   1. Vegetation to be protected.
   2. Areas for temporary construction and field offices.
   3. Areas for temporary and permanent placement of removed materials.

C. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
   1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences.
   2. Identify demolition firm and submit qualifications.
   3. Include a summary of safety procedures.

D. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

1.05 QUALITY ASSURANCE

A. Demolition Firm Qualifications: Company specializing in the type of work required.

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1. Minimum of 5 years of experience.

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.01 SCOPE

A. Remove paving and curbs as required to accomplish new work.

B. Remove and legally dispose of all materials, being demolished, indicated on plans.
   1. **Removal and dispose all asbestos containing material (ACM) under 1.49% following all Federal, State and Local requirements. ACM above 1.49% will be abated by Owner.**
   2. **Remove all light fixture ballasts (PCB's) and lamp tubes. Place in Owner-provided collection bins. Place filled bins in dock area or other accessible outdoor location as reviewed with Owner. Owner will remove bins and dispose of contents.**
   3. **Remove and dispose all lead following all Federal, State and Local requirements. Updated Oct 2022.**

C. Remove other items indicated, for salvage, relocation, and reinstallation.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
   1. Obtain required permits.
   2. Comply with applicable requirements of NFPA 241.
   3. Use of explosives is not permitted.
   4. Provide, erect, and maintain temporary barriers and security devices.
   5. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
   6. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
   7. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
   8. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.

B. Do not begin removal until receipt of notification to proceed from Owner.

C. Do not begin removal until built elements to be salvaged or relocated have been removed.

D. Do not begin removal until vegetation to be relocated has been removed and specified measures have been taken to protect vegetation to remain.

E. Protect existing elements that are not to be removed.
   1. Provide bracing and shoring.
   2. Prevent movement or settlement of adjacent structures.
   3. Stop work immediately if adjacent structures appear to be in danger.

F. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

G. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, and mercury.

H. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

3.03 EXISTING UTILITIES

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

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B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.

F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

G. Use concrete to plug and cap all open ends of abandoned underground utilities which are to remain in place. Some pipelines and conduits will require flowable fill to be placed in pipe see plans for specific areas. Provo City Standards apply to Provo City Utilities review City requirements and permit for specific direction.

H. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

I. Prepare demolition areas by disconnecting and capping utilities outside the demolition zone; identify and mark utilities to be subsequently reconnected, in same manner as other utilities to remain.

3.04 ABANDONED UTILITIES

A. GPS/Survey of Abandoned and New Utilities.
   1. Coordinate with BYU Construction Project Manager to request BYU Civil Engineer to GPS/Survey abandoned and new utilities that have been installed, capped/plugged and/or abandoned in place before burying the utility.
   2. Provide at least a 24-hour notice.
   3. Utilities include but are not limited to the following: Water, storm & sewer pipelines, valves, hydrants, manholes, catch basins, clean outs, conduits, duct banks, etc.
   4. Contractor will be responsible at their expense to uncover abandoned utilities that have not been properly GPS or surveyed by BYU.

B. Abandoning Pipelines
   1. Abandon utility pipes shown in the plans or designated by the OWNER by emptying the pipeline contents and plugging the ends with grout or flowable fill.
   2. Fill or remove the following abandoned utility pipes:
      a. Fill abandoned pipe with grout or flowable fill. Prepare grout or flowable fill to a consistency that will flow and be vibrated in order for the mix to flow uniformly into the pipe to be filled.
      b. Pipe larger than 24".
      c. Pipe located within the foot print of an existing building, the roadway typical section or the project slope stake line and one of the following:
         1) Pipe 12" to 24" diameter located less than 20 ft below finished grade.
         2) Pipe 6" to 12" diameter located less than 12 ft below finished grade and not made of ductile iron, HDPE or PVC.
         3) Located below groundwater table that could become a conduit for water movement.

C. Remove existing Utility Pipes
   1. Excavate, remove and dispose of properly any abandoned pipe to be removed when so designated in the plans or as directed. When an existing pipe is encountered that is not shown in the plans, do not remove until the Engineer is notified of its presence and has directed its removal.
   2. Remove any abandoned utility pipe exposed by grading operations to a minimum depth of 12" below subgrade elevation of the proposed roadbed or grading plan.
   3. Backfill the resulting trench and properly compact using local excavated material or select backfill as required.

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4. Salvaged pipe is the property of the Contractor unless otherwise indicated by the plans.
5. Plug all abandoned utility pipes. Use grout to plug all abandoned utility pipes at the entrance to all manholes whether the manhole is to be abandoned or not. Use grout to plug all abandoned water mains after new mains are placed in service.
6. Discharge flowable fill material directly from the truck into the space to be filled or by other approved methods. The mix may be placed full depth or in lifts as site conditions warrant.
7. Pipeline abandonment or disconnection to Provo City Utilities shall be as per Provo City Standards.

D. Abandoning Manholes
1. Abandon utility manholes in the construction limits by removing the top of the manhole to the manhole spring line or to an elevation of 2 ft below the roadway subgrade, whichever is greater and filling the manhole barrel with approved material.
2. Plug connecting utility pipes before filling or removing the manhole.
3. Remove the manhole taper, wall and base on all manholes to be removed.
4. Removed frames and covers become the property of the OWNER, unless otherwise noted.

E. Remove Water Meter
1. Remove water meters by disconnecting and plugging the water service piping at the source main and plugging the piping at the right-of-way line. Return the meter to the utility owner. Dispose of all other parts, piping, boxes and structures.
2. As per Provo City Standards

F. Remove Fire Hydrant
1. Remove fire hydrants by disconnecting and plugging the hydrant leg piping as close to the water main as possible. If the hydrant valve is within 4 ft of the main, close the valve, plug the outlet side of the valve and remove the valve box.
2. Removed hydrants become the property of the OWNER, unless otherwise noted.

3.05 SELECTIVE DEMOLITION FOR ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
1. Verify that construction and utility arrangements are as indicated.
2. Report discrepancies to Architect and BYU Construction Project Manager before disturbing existing installation.
3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

B. Separate areas in which demolition is being conducted from other areas that are still occupied.
1. Provide, erect, and maintain temporary dustproof partitions of construction indicated on drawings in locations indicated on drawings.

C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.

D. Remove existing work as indicated and as required to accomplish new work.
1. Remove items indicated on drawings.

E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, Telecommunications, and _____): Remove existing systems and equipment as indicated.
1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
3. Verify that abandoned services serve only abandoned facilities before removal.

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4. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification.

F. Protect existing work to remain.
   1. Prevent movement of structure; provide shoring and bracing if necessary.
   2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
   3. Repair adjacent construction and finishes damaged during removal work.
   4. Patch as specified for patching new work.

3.06 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Remove from site all materials not to be reused on site; dispose of these materials in a lawful manner.

C. Leave site in clean condition, ready for subsequent work.

D. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

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SECTION 064100

ARCHITECTURAL WOOD CASEWORK

PART 1 GENERAL **UPDATED 2/21, FEB 23, JULY 12, NOV**

1.01 SECTION INCLUDES **SEE CHANGES IN BOLD**

A. Specially fabricated cabinet units.

B. Cabinet hardware.

C. Factory finishing.

D. Preparation for installing utilities.

1.02 RELATED REQUIREMENTS

A. Section 061000 - Rough Carpentry: Support framing, grounds, and concealed blocking.

B. Section 088000 - Glazing: Glass for casework.

C. Section 123600 - Countertops.

1.03 REFERENCE STANDARDS

A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014, with Errata (2016).

B. AWI (QCP) - Quality Certification Program; current edition at www.awiqcp.org.

C. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014, with Errata (2016).

D. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.1; 2016, with Errata (2017).

E. BHMA A156.9 - American National Standard for Cabinet Hardware; 2015.

F. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; 2016.

G. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting not less than one week before starting work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
   1. Provide the information required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
   2. Include certification program label.

C. Product Data: Provide data for hardware accessories.

D. Samples: Submit actual samples of architectural cabinet construction, minimum 12 inches square, illustrating proposed cabinet, countertop, and shelf unit substrate and finish.

E. Samples: Submit actual sample items of proposed pulls, hinges, shelf standards, and locksets, demonstrating hardware design, quality, and finish.

F. Certificate: Submit labels and certificates required by quality assurance and quality control programs.

1.06 QUALITY ASSURANCE

A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

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1. Company with at least one project in the past 5 years with value of woodwork within 20 percent of cost of woodwork for this Project.
2. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
3. Single Source Responsibility: Provide and install this work from single fabricator.

B. Quality Certification:
1. Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section: www.awiqcp.org
2. Provide labels or certificates indicating that the installed work complies with AWI/AWMAC/WI (AWS) requirements for grade or grades specified.
3. Provide designated labels on shop drawings as required by certification program.
4. Provide designated labels on installed products as required by certification program.
5. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.
6. Replace, repair, or rework all work for which certification is refused.

1.07 MOCK-UP

A. Provide mock-up of typical base cabinet, wall cabinet, and countertop, including hardware, finishes, and plumbing accessories.

B. See Section 014000 - Quality Requirements for additional requirements.

C. Locate where directed.

D. Mock-up may remain as part of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Protect units from moisture damage.

1.09 FIELD CONDITIONS

A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Artistic Mill.

B. Huetter Mill and Cabinet Company.

C. Granite Mill and Fixture Company.

D. Fondell Woodwork.

E. Fetzer's Architectural Woodwork.

F. Johnson Brothers

G. **Substitutions: See Section 016000 - Product Requirements. Updated Feb 23, 2021**

2.02 CABINETS

A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

B. Wood Veneer Faced Cabinet:
1. Exposed Surfaces: HPVA HP-1 Grade A, Red Oak, Walnut, Maple, or Cherry, Architect to confirm cut type with BYU, Architect to confirm matching type with BYU.
2. Semi-Exposed Surfaces: HPVA HP-1 Grade A, Red Oak, Cherry, Maple, Walnut, Poplar, Pine, Architect to confirm cut type with BYU, Architect to confirm matching type with BYU.

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3. Concealed Surfaces: Manufacturer's option using plywood materials, not particle board or MDF.
4. All cabinet material shall be a minimum of 3/4" thick.
5. No particle board or MDF is allowed in the cabinet construction.

C. Plastic Laminate Faced Cabinets: Not allowed, unless specifically requested by BYU.

D. Cabinets:
1. Finish - Exposed Exterior Surfaces: Wood.
2. Finish - Exposed Interior Surfaces: Wood.
3. Finish - Semi-Exposed Surfaces: Wood
4. Finish - Concealed Surfaces: Manufacturer's option using plywood materials, not particle board or MDF.
5. Door and Drawer Front Edge Profiles: Square edge with thin applied band.
6. Grained Face Layout for Cabinet and Door Fronts: Flush panel.
   a. Custom Grade: Doors, drawer fronts and false fronts wood grain to run and match vertically within each cabinet unit.
7. Cabinet Design Series: As indicated on drawings.
8. Adjustable Shelf Loading: 50 lbs. per sq. ft.
   a. Deflection: L/144.
9. Cabinet Doors and Drawer Fronts: As indicated.
10. Drawer Side Construction: Multiple-dovetailed.
11. Drawer Construction Technique: Dovetail joints.

2.03 LAMINATE MATERIALS

A. Manufacturers:
1. Formica Corporation; ____: www.formica.com
2. Panolam Industries International, Inc; Nevamar; ____: www.nevamar.com
3. Wilsonart; ____: www.wilsonart.com

B. Thermally Fused Laminate (TFL): Melamine resin, NEMA LD 3, Type VGL laminate panels.
1. Manufacturers:
   a. Wilsonart; _____: www.wilsonart.com

C. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications.

D. Provide specific types as follows:
1. Horizontal Surfaces: HGS, 0.048 inch nominal thickness, through color, color as selected, finish as indicated.
2. Vertical Surfaces: VGS, 0.028 inch nominal thickness, through color, _____ color, finish as indicated.

2.04 COUNTERTOPS

A. Countertops are specified in Section 123600.

2.05 ACCESSORIES

A. Adhesive: Type recommended by AWI/AWMAC to suit application.

B. Plastic Edge Banding: Extruded PVC, flat shaped; smooth finish; self-locking serrated tongue; of width to match component thickness.
1. Color: As selected by Architect from manufacturer's standard range.
2. Use at all exposed plywood edges.
3. Use at all exposed shelf edges.
4. **Min. 3mm edge band thickness.** **Updated July 12, 2021**

C. Glass: Type A as specified in Section 088000.

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D. Fasteners: Size and type to suit application.

E. Concealed Joint Fasteners: Threaded steel.

F. Grommets: Standard plastic, painted metal, or rubber grommets for cut-outs, in color to match adjacent surface.

2.06 HARDWARE

A. Hardware: BHMA A156.9, types as indicated for quality grade specified.

B. Adjustable Shelf Supports: Standard back-mounted system using surface mounted metal shelf standards and coordinated cantilevered shelf brackets, satin chrome (Anochrome) finish, for nominal 1 inch spacing adjustments. Maximum spacing between standards shall not exceed 32-inches. Attachment of standard shall be into studs or solid backing. The brackets shall be seismically -anchored to the wall standard. The shelves shall be seismically-anchored to the brackets.
   1. Product: KV #85, double-slot standard; KV #185 double-slot bracket manufactured by Knape and Vogt (KV).

C. Drawer and Door Pulls: "U" shaped wire pull, steel with satin finish, 4 inch centers.

D. Sliding Door Pulls: Circular shape for recessed installation, steel with satin finish.

E. Cabinet Locks: Keyed cylinder, two keys per lock, master keyed, **steel with chrome finish, with manufacturer's lock number stamped on lock face. Updated 2/21.**
   1. **Use Deadbolt Style. CompX National Lock C8703-MKKD-14A Updated July 12, 2021**

F. Catches: Magnetic.

G. Drawer Slides:
   1. Type: Full extension.
   2. Static Load Capacity: medium-duty (150-lbs or less), heavy-duty (more than 150-lbs).
   3. Mounting: side-mounting; a screw in each screw hole..
   4. Stops: Integral type.
   5. Manufacturers:
      a. Accuride International, Inc; Web Address: www.accuride.com
      b. Knape & Vogt Manufacturing Company; Heavy-Duty Drawer Slides: www.knapeandvogt.com
      c. Substitutions: See Section 016000 - Product Requirements.

H. Hinges: European style concealed self-closing type, steel with satin finish.
   1. Manufacturers:
      a. Hettich America, LP; Web Address: www.hettich.com
      b. Blum, Inc; Web Address: www.blum.com
      c. No more than 24-inches between hinges..

I. Soft Close Adapter: Concealed, frame-mounted, screw-adjustable damper ; steel with brushed nickel finish.

J. Sliding Door Track Assemblies: Upper and lower track of satin anodized aluminum, with matching shoe equipped with nylon rollers.

2.07 FABRICATION

A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.

B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.

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C. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.

D. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners.
   1. Cap exposed plastic laminate finish edges with material of same finish and pattern.

E. Matching Wood Grain: Comply with requirements of quality standard for specified Grade and as follows:
   1. Provide center matched panels at each elevation.
   2. Provide sequence matching across each elevation.

F. Mechanically fasten back splash to countertops as recommended by laminate manufacturer at 16 inches on center.

G. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, and fixtures and fittings. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.

2.08 SHOP FINISHING

A. Sand work smooth and set exposed nails and screws.

B. For opaque finishes, apply wood filler in exposed nail and screw indentations and sand smooth.

C. On items to receive transparent finishes, use wood filler matching or blending with surrounding surfaces and of types recommended for applied finishes.

D. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
   1. Transparent:
      a. **System - 5, Varnish, Conversion** **Updated Nov 2021**
      b. **Stain: As selected by Architect.**
      c. **Sheen: Semigloss. AWI Sheen Level 50 - 70.**
      d. **Products:**
         1) **MEGAVAR, Water White Conversion Varnish 1M.430X (1A.622 Catalyst) by Lenmar Coatings, www.lenmar-coatings.com. _____.**
            (a) **Application:**
               (1) **Two Coats.**
               (2) **Apply in strict compliance with manufacturer's technical data sheet.**
         2) **Substitutions: Section 016000 - Product Requirements.**

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify location and sizes of utility rough-in associated with work of this section.

3.02 INSTALLATION

A. Install work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.

B. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.

C. Use fixture attachments in concealed locations for wall mounted components.

D. Use concealed joint fasteners to align and secure adjoining cabinet units.

E. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.

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F. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

G. Site glaze glass materials using the Interior Dry method specified in Section 088000.

3.03 ADJUSTING

A. Adjust installed work.

B. Adjust moving or operating parts to function smoothly and correctly.

3.04 CLEANING

A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION

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SECTION 081416
FLUSH WOOD DOORS

PART 1 GENERAL **UPDATED MARCH 2022**

1.01 SECTION INCLUDES **SEE BOLD FOR UPDATES**

A. Flush wood doors; flush and flush glazed configuration; fire-rated, non-rated, and acoustical.

B. Transom panels.

1.02 RELATED REQUIREMENTS

A. Section 062000 - Finish Carpentry: Wood door frames.

B. Section 081113 - Hollow Metal Doors and Frames.

C. Section 087100 - Door Hardware.

D. Section 088000 - Glazing.

E. Section 099123 - Interior Painting: Field finishing of doors.

1.03 REFERENCE STANDARDS

A. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.

B. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).

C. ASTM E413 - Classification for Rating Sound Insulation; 2016.

D. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014, with Errata (2016).

E. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.1; 2016, with Errata (2017).

F. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.

G. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

H. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.

C. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.

D. Samples: Submit two samples of door veneer, 12 x 12 inch in size illustrating wood grain, stain color, and sheen.

E. Certificate: Submit labels and certificates required by quality assurance and quality control programs.

F. Test Reports: Show compliance with specified requirements for the following:
   1. Sound-retardant doors and frames; sealed panel tests are not acceptable.

G. Manufacturer's Installation Instructions: Indicate special installation instructions.

H. Specimen warranty.

I. Warranty, executed in Owner's name.

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1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with not less than three years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Package, deliver and store doors in accordance with specified quality standard.

B. Accept doors on site in manufacturer's packaging. Inspect for damage.

C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges if stored more than one week. Break seal on site to permit ventilation.

1.07 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Interior Doors: Provide manufacturer's warranty for the life of the installation.

C. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Wood Veneer Faced Doors:
   1. **Masonite: www.masonite.com** **Updated March 2022**
   2. Marshfield DoorSystems, Inc; ____: www.marshfielddoors.com.
   3. Oshkosh Door Company.
   4. VT Industries
   5. All hardware locations to be per CECO standard locations.

B. Sound-Rated Wood Doors:
   1. Overly Door Company; ____: www.overly.com
   2. Oshkosh Door Company.

2.02 DOORS AND PANELS

A. Doors: Refer to drawings for locations and additional requirements.
   1. Quality Standard: Custom Grade, Heavy Duty performance, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
   2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.

B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
   1. Provide solid core doors at each location.
   2. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with UL 10C - Positive Pressure; Underwriters Laboratories Inc (UL) labeled without any visible seals when door is open.
   3. Smoke and Draft Control Doors (Indicated as "S" on Drawings): In addition to required fire rating, provide door assemblies tested in accordance with UL 1784 with maximum air leakage of 3.0 cfm per sq ft of door opening at 0.10 inch wg pressure at both ambient and elevated temperatures for "S" label; if necessary, provide additional gasketing or edge sealing.
   4. Sound-Rated Doors: Minimum STC of 35, calculated in accordance with ASTM E413, tested in accordance with ASTM E90.

C. Transom Panels: Same construction and finish as door; same performance rating as door.

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2.03 DOOR AND PANEL CORES

A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.

B. Fire-Rated Doors: Mineral core type, with fire resistant composite core (FD), plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.

C. Sound-Rated Doors: Equivalent to type, with particleboard core (PC) construction as required to achieve STC rating specified; plies and faces as indicated above.

2.04 DOOR FACINGS

A. Veneer Facing for Transparent Finish: Architect to confirm species type with BYU, veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with Architect to confirm matching type with BYU between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.
   1. Vertical Edges: Same species as face veneer.
   2. "Running Match" each pair of doors and doors in close proximity to each other.
   3. Transoms: Continuous match to doors.

B. Veneer Facing for Opaque Finish: Medium density overlay (MDO), in compliance with indicated quality standard.

2.05 DOOR CONSTRUCTION

A. Fabricate doors in accordance with door quality standard specified.

B. Cores Constructed with stiles and rails:
   1. Provide solid blocks at lock edge for hardware reinforcement.
   2. Provide solid blocking for other through bolted hardware.

C. Where supplementary protective edge trim is required, install trim after veneer facing has been applied full-width.

D. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.

E. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
   1. Exception: Doors to be field finished.

F. Provide edge clearances in accordance with the quality standard specified.

2.06 FACTORY FINISHING - WOOD VENEER DOORS

A. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
   1. Transparent:
      a. System - 11, Polyurethane, Catalyzed.
      b. Stain: As selected by Architect.
      c. Sheen: Semigloss.

B. Factory finish doors in accordance with approved sample.

2.07 ACCESSORIES

A. Hollow Metal Door Frames: As specified in Section 081113.

B. Glazed Openings:
   1. Heat-Strengthened and Fully Tempered Glass: ASTM C1048.

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C. Glazing Stops: Wood, of same species as door facing, butted corners; prepared for countersink style tamper proof screws.

D. Astragals for Non-Rated Double Doors: Steel, T shaped, overlapping and recessed at face edge.

E. Astragals for Fire-Rated Double Doors: Steel, T shaped, overlapping and recessed at face edge, specifically for double doors.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

D. Do not install fire rated doors in a non-rated wall or opening.

3.02 INSTALLATION

A. Install doors in accordance with manufacturer's instructions and specified quality standard.
   1. Install fire-rated doors in accordance with NFPA 80 requirements.

B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.

C. Use machine tools to cut or drill for hardware.

D. Coordinate installation of doors with installation of frames and hardware.

E. Coordinate installation of glazing.

3.03 TOLERANCES

A. Conform to specified quality standard for fit and clearance tolerances.

B. Conform to specified quality standard for telegraphing, warp, and squareness.

3.04 ADJUSTING

A. Adjust doors for smooth and balanced door movement.

B. Adjust closers for full closure.

3.05 SCHEDULE

A. Refer to Door and Frame Schedule appended to this section.

END OF SECTION

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SECTION 084313

ALUMINUM-FRAMED STOREFRONTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aluminum-framed storefront, with vision glass.

B. Infill panels of metal and glass.

C. Aluminum doors and frames.

D. Weatherstripping.

E. Door hardware.

1.02 RELATED REQUIREMENTS

A. Section 072500 - Weather Barriers: Sealing framing to weather barrier installed on adjacent construction.

B. Section 078400 - Firestopping: Firestop at system junction with structure.

C. Section 079200 - Joint Sealants: Sealing joints between frames and adjacent construction.

D. Section 084229 - Automatic Entrances.

E. Section 087100 - Door Hardware: Hardware items other than specified in this section.

F. Section 088000 - Glazing: Glass and glazing accessories.

G. Section 122400 - Window Shades: Attachments to framing members.

1.03 REFERENCE STANDARDS

A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.

B. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems; 2015.

C. AAMA 503 - Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls and Sloped Glazing Systems; 2014.

D. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.

E. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015 Errata).

F. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

G. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.

H. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

I. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.

J. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.

K. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.

L. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors; 2002 (Reapproved 2010).

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M. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference; 2015.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of other components that comprise the exterior enclosure.

B. Preinstallation Meeting: Conduct a preinstallation meeting two weeks before starting work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, internal drainage details.

C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.

D. Samples: Submit two samples 12 by 12 inches in size illustrating finished aluminum surface, glass, infill panels, glazing materials.

E. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.

F. Design Data: Provide framing member structural and physical characteristics, engineering calculations, and dimensional limitations.

G. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.

H. Report of field testing for water leakage.

I. Designer Qualifications Statement.

J. Manufacturer Qualifications Statement.

K. Installer Qualifications Statement.

L. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Designer Qualifications: Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in Utah.

B. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

C. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Handle products of this section in accordance with AAMA CW-10.

B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.08 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

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1.09 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

C. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.

D. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 BASIS OF DESIGN -- FRAMING FOR INSULATING GLAZING

A. Center-Set Style, Thermally-Broken:
   1. Basis of Design: Kawneer.
   2. Vertical Mullion Dimensions: 2 inches wide by 4-1/2 inches deep.

2.02 BASIS OF DESIGN -- FRAMING FOR MONOLITHIC GLAZING

A. Center-Set Style:
   1. Basis of Design: Kawneer.
   2. Vertical Mullion Dimensions: 1-3/4 inches wide by 4-1/2 inches deep (Interior); 2 inches wide by 4-1/2" inches deep, thermally broken (exterior)

2.03 BASIS OF DESIGN -- SWINGING DOORS

A. Wide Stile, Monolithic Glazing:
   1. Basis of Design: Kawneer.
   2. Thickness: 2 inches. Heavy Wall.

B. Wide Stile, Insulating Glazing, Thermally-Broken:
   1. Basis of Design: Kawneer.
   2. Thickness: 2 inches. Heavy wall.

2.04 MANUFACTURERS

A. Aluminum-Framed Storefront and Doors:
   1. Kawneer North America; _____: www.kawneer.com

2.05 STOREFRONT

A. Aluminum-Framed Exterior Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
   1. Glazing Rabbet: For 1 inch insulating glazing.
   2. Glazing Rabbet: For 1/4 inch monolithic glazing.
   3. Glazing Position: Centered (front to back).
   4. Vertical Mullion Dimensions: 2 inches wide by 4-1/2 inches deep.
   5. Finish: Class I natural anodized.
   6. Aluminum-Framed Storefront Door Framing Package: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
      a. Glazing Rabbet: For 1 inch insulating glazing.
      b. Glazing Rabbet: For 1/4 inch monolithic glazing.
      c. Glazing Position: Centered (front to back).
      d. Vertical and Horizontal Mullion Dimensions: 2 inches wide by 4-1/2 inches deep. Heavy wall heavy.
      e. Finish: Class I natural anodized.
   7. Finish Requirements:
      a. Factory finish all surfaces that will be exposed in completed assemblies.

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b. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.

8. Finish Color: As indicated on the drawings.
9. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
10. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
11. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
12. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
13. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
14. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
15. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glazing and inner sheet of infill panel and heel bead of glazing compound.
16. Preparation for Window Treatments: Provide reinforced interior horizontal head rail.

B. PERFORMANCE REQUIREMENTS

1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
   a. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
2. Air Leakage: 0.06 cfm/sq ft maximum leakage of storefront wall area when tested in accordance with ASTM E283/E283M at 1.57 psf pressure difference.

2.06 COMPONENTS

A. Aluminum Framing Members: Tubular aluminum sections, drainage holes and internal weep drainage system.
   1. Framing members for interior applications need not be thermally broken.
   2. Glazing Stops: Applied.

B. Glazing: As specified in Section 088000.
   1. For Exterior Framing: Type Solarband 70XL #2 surfaced, fully tempered.
   2. For Interior Framing: Type 1/4" tempered glass.
   3. Glass Spandrel Panels: Type 1/4" tempered glass.

C. Infill Panels: Insulated, aluminum sheet face and back, with edges formed to fit glazing channel and sealed.
   1. Finish: Same as storefront.

D. Swing Doors: Glazed aluminum.
   1. Thickness: 2 inches.
   2. Top Rail: 5 inches wide.
   3. Vertical Stiles: 5 inches wide.
   4. Bottom Rail: 10 inches wide.
   5. Glazing Stops: Beveled.

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6. Finish: Same as storefront.

2.07 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M).

B. Sheet Aluminum: ASTM B209 (ASTM B209M).

C. Fasteners: Stainless steel.

D. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

2.08 FINISHES

A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

B. Color: As indicated on drawings.

2.09 HARDWARE

A. For each door, include weatherstripping, sill sweep strip, and threshold.

B. Weatherstripping: Wool pile, continuous and replaceable; provide on all exterior doors.

C. Sill Sweep Strips: Resilient seal type, retracting, of neoprene; provide on all exterior doors.

D. Threshold: Extruded aluminum, one piece per door opening, ribbed surface; provide on all exterior doors.

E. Hinges: Geared type, heavy duty, concealed leaf; continuous.

F. Push/Pull Set: Standard configuration push/pull handles.

G. Exit Devices: Panic type.

H. Door Closers: Exposed overhead.

I. Automatic Door Operators and Actuators: As specified in Section 084229.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other work.

B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

3.02 INSTALLATION

A. Install wall system in accordance with manufacturer's instructions.

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.

G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.

H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

I. Set thresholds in bed of sealant and secure.

J. Install hardware using templates provided.
   1. See Section 087100 for hardware installation requirements.
   2. See Section 084229 for operator and actuator installation requirements.

K. Install glass and infill panels in accordance with Section 088000, using glazing method required to achieve performance criteria.

L. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 1/16 inches per 10 ft, whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for independent testing and inspection requirements. Inspection will monitor quality of installation and glazing.

B. Water-Spray Test: Provide water spray quality test of installed storefront components in accordance with AAMA 501.2 during construction process and before installation of interior finishes.
   1. Perform a minimum of two tests in each designated area as indicated on drawings.
   2. Conduct tests in each area prior to 10 percent and 50 percent completion of this work.

C. Provide field testing of installed storefront system by independent laboratory in accordance with AAMA 503 during construction process and before installation of interior finishes.
   1. Perform a minimum of two tests in each designated area as indicated on drawings.
   2. Conduct tests in each area prior to 10 percent and 50 percent completion of this work.
   3. Field test for water penetration in accordance with ASTM E1105 with uniform static air pressure difference (Procedure A) not less than 4.18 psf.
      a. Maximum allowable rate of water penetration in 15-minute test is 0.5 ounce that is not contained in an area with provisions to drain to exterior, or collected on surface of interior horizontal framing member.
   4. Field test for air leakage in accordance with ASTM E783 with uniform static air pressure difference of 1.57 psf.
      a. Maximum allowable rate of air leakage is 0.09 cfm/sq ft.

D. Repair or replace storefront components that have failed designated field testing, and retest to verify performance conforms to specified requirements.

3.05 ADJUSTING

A. Adjust operating hardware for smooth operation.

3.06 CLEANING

A. Remove protective material from pre-finished aluminum surfaces.

B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

C. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.

3.07 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

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SECTION 084413

GLAZED ALUMINUM CURTAIN WALLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aluminum-framed curtain wall, with vision glazing and glass and metal infill panels.

B. Column covers.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Weld plates embedded in concrete for attachment of anchors.

B. Section 051200 - Structural Steel Framing: Steel attachment members.

C. Section 055000 - Metal Fabrications: Steel attachment devices.

D. Section 072500 - Weather Barriers: Sealing framing to weather barrier installed on adjacent construction.

E. Section 078400 - Firestopping: Firestop at system junction with structure.

F. Section 079200 - Joint Sealants: Sealing joints between frames and adjacent construction.

G. Section 084313 - Aluminum-Framed Storefronts: Entrance framing and doors.

H. Section 092116 - Gypsum Board Assemblies: Metal stud and gypsum board wall at interior of curtain wall.

I. Section 122400 - Window Shades: Attachments to framing members.

J. Section _____: Window washing equipment requirements.

1.03 REFERENCE STANDARDS

A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.

B. AAMA 501.1 - Standard Test Method for Water Penetration of Windows, Curtain Walls and Doors Using Dynamic Pressure; 2017.

C. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems; 2015.

D. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015 Errata).

E. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; 2010, with 2013 Supplements and Errata.

F. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

G. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.

H. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).

I. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.

J. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2016).

K. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors; 2002 (Reapproved 2010).

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1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of other components that comprise the exterior enclosure.

B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, internal drainage details, glazing, _____, and infill.

C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.

D. Shop Drawings: Provide details of proposed structural sealant glazing (SSG) and weather sealant joints indicating dimensions, materials, bite, thicknesses, profile, and support framing.

E. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.

F. Design Data: Provide framing member structural and physical characteristics and engineering calculations, and identify dimensional limitations; include load calculations at points of attachment to building structure.

G. Structural Sealant Glazing (SSG): Submit product data and calculations showing compliance with performance requirements.

H. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Designer Qualifications: Design curtain wall and its structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed at Utah.

B. Verify that each component is appropriate for use in structural sealant glazing (SSG) application in regards to at least the following properties; size, shape, dimensions, material, self-life, storage conditions, and color.

C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with not less than three years of documented experience.

D. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Handle products of this section in accordance with AAMA CW-10.

B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.08 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.09 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

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C. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.

D. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 BASIS OF DESIGN

A. Pressure Cap at Horizontals with Two (2)-Sided Structural Sealant Glazing (SSG) at Verticals; Not Unitized, Field Assembled:
   1. Basis of Design: Kawneer.

B. Substitutions: See Section 016000 - Product Requirements.
   1. For any product not identified as "Basis of Design", submit information as specified for substitutions.

2.02 CURTAIN WALL

A. Aluminum-Framed Curtain Wall: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
   1. Fabrication Method: Shop/factory unit and mullion system.
   2. Glazing Method: Either shop/factory or field glazed system.
   3. Finish: Class I natural anodized.
      a. Factory finish surfaces that will be exposed in completed assemblies.
      b. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.
   4. Provide flush joints and corners, weather sealed, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for imposed loads.
   5. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
   6. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.

B. Structural Performance Requirements: Design and size components to withstand the following load requirements without damage or permanent set.
   1. Design Wind Loads: Comply with the applicable code.
   2. Seismic Loads: Design and size components to withstand seismic loads and sway displacement in accordance with requirements of ASCE 7.
   3. Movement: Accommodate the following movement without damage to components or deterioration of seals:
      a. Expansion and contraction caused by 180 degrees F surface temperature.
      b. Expansion and contraction caused by cycling temperature range of 170 degrees F over a 12 hour period.
      c. Movement of curtain wall relative to perimeter framing.
      d. Deflection of structural support framing, under permanent and dynamic loads.

C. Water Penetration Resistance: No uncontrolled water on indoor face when tested as follows:
   1. Test Pressure Differential: 15 psf.

D. Air Leakage: Maximum of 0.06 cu ft/min sq ft of wall area, when tested in accordance with ASTM E283 at 6.27 psf pressure differential across assembly.

E. Perimeter Containment: Provide analysis of fire rated construction connection to curtain wall. Provide UL listed system for perimeter containment.

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2.03 COMPONENTS

A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.

B. Glazing: As specified in Section 088000.

C. Column Covers: Aluminum, 20 gage, 0.032 inch minimum thickness, full contact pressure bonded to _____ for flat surface, finish to match curtain wall framing members.

END OF SECTION

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SECTION 087100
DOOR HARDWARE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hardware for solid core wood, aluminum, and hollow metal doors.

B. Hardware for fire-rated doors.

C. Electrically operated and controlled hardware.

D. Thresholds.

E. Weatherstripping and gasketing.

F. Note: Lock cylinders are furnished and installed by Owner (NIC)

1.02 PROJECT INFORMATION

A. The architect must work with the following hardware consultant: ASSA ABLOY DSS - Steve Carter (385) 228-3541 steve.carter@assaabloy.com or another person approved by the BYU Access Services Shop Manager (801) 422-5499.

B. The hardware must be coordinated through the BYU Access Services Shop: Lamar Howarth (801) 422-5499 or current shop manager and the BYU Construction PM assigned to this project.

1.03 RELATED REQUIREMENTS

A. Section 062000 - Finish Carpentry: Wood door frames.

B. Section 079200 - Joint Sealants: Sealants for setting exterior door thresholds.

C. Section 080671 - Door Hardware Schedule: Schedule of door hardware sets.

D. Section 081113 - Hollow Metal Doors and Frames.

E. Section 081116 - Aluminum Doors and Frames.

F. Section 081416 - Flush Wood Doors.

G. Section 081700 - Integrated Door Opening Assemblies.

H. Section 083323 - Overhead Coiling Doors: Door hardware, except cylinders.

I. Section 083326 - Overhead Coiling Grilles: Door hardware, except cylinders.

J. Section 083613 - Sectional Doors: Door hardware, except cylinders.

K. Section 084313 - Aluminum-Framed Storefronts: Door hardware, except as noted in section.

L. Section 084413 - Glazed Aluminum Curtain Walls: Door hardware, except cylinders.

M. Section 084426 - Structural Glass Curtain Walls: Door hardware, except cylinders.

N. Section 281000 - Access Control: Electronic access control devices.

O. Section 284600 - Fire Detection and Alarm: Electrical connection to activate door closers.

1.04 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. BHMA (CPD) - Certified Products Directory; 2017.

C. BHMA A156.1 - American National Standard for Butts and Hinges; 2016.

D. BHMA A156.2 - American National Standard for Bored and Preassembled Locks & Latches; 2017.

E. BHMA A156.3 - American National Standard for Exit Devices; 2014.

F. BHMA A156.4 - American National Standard for Door Controls - Closers; 2013.

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G. BHMA A156.6 - American National Standard for Architectural Door Trim; 2015.
H. BHMA A156.7 - American National Standard for Template Hinge Dimensions; 2016.
I. BHMA A156.8 - American National Standard for Door Controls - Overhead Stops and Holders; 2015.
J. BHMA A156.13 - American National Standard for Mortise Locks & Latches Series 1000; 2017.
K. BHMA A156.15 - American National Standard for Release Devices - Closer Holder, Electromagnetic and Electromechanical; 2015.
L. BHMA A156.16 - American National Standard for Auxiliary Hardware; 2013.
M. BHMA A156.18 - American National Standard for Materials and Finishes; 2016.
N. BHMA A156.21 - American National Standard for Thresholds; 2014.
O. BHMA A156.22 - American National Standard for Door Gasketing and Edge Seal Systems, Builders Hardware Manufacturers Association; 2017.
P. BHMA A156.25 - American National Standard for Electrified Locking Devices; 2013.
Q. BHMA A156.26 - American National Standard for Continuous Hinges; 2012.
R. BHMA A156.36 - American National Standard for Auxiliary Locks; 2016.
S. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2016.
T. BHMA A156.115W - Hardware Preparation in Wood Doors with Wood or Steel Frames; 2006.
U. DHI (H&S) - Sequence and Format for the Hardware Schedule; 1996.
V. DHI (KSN) - Keying Systems and Nomenclature; 1989.
W. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
X. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
Y. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.
Z. NFPA 101 - Life Safety Code; 2015.
AA. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2016.
AB. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2012.
AC. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.
AD. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
AE. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the manufacture, fabrication, and installation of products that door hardware is installed on.
B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.
C. Preinstallation Meeting: Convene a preinstallation meeting one week prior to commencing work of this section; attendance is required by affected installers and the following:
    1. Architect.
    2. Owner's Door Opening Consultant (ASSA ABLOY Steve Carter)
    3. Hardware Supplier.
    4. Hardware Installer.

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5. Owner's Security Consultant.
6. BYU Access Services - Lamar Howarth.
7. BYU Construction Project Manager.

D. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.

1.06 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project, and includes construction details, material descriptions, finishes, and dimensions and profiles of individual components.

C. Shop Drawings - Door Hardware Schedule: Submit detailed listing that includes each item of hardware to be installed on each door. Use door numbering scheme as included in Contract Documents.
   1. Prepared by or under supervision of Architectural Hardware Consultant (AHC).
   2. Conform to DHI (H&S) using door numbers and hardware set numbers as indicated in construction documents.
      a. Submit in vertical format, refer to Section 080671.
   3. List groups and suffixes in proper sequence.
   4. Provide complete description for each door listed.
   5. Provide manufacturer's and product names, and catalog numbers; include functions, types, styles, sizes and finishes of each item.
   6. Include account of abbreviations and symbols used in schedule.

D. Shop Drawings - Electrified Door Hardware: Submit diagrams for power, signal, and control wiring for electrified door hardware that include details of interface with building safety and security systems. Provide elevations and diagrams for each electrified door opening as follows:
   1. Prepared by or under supervision of Architectural Hardware Consultant (AHC) and Electrified Hardware Consultant (EHC).
   2. Elevations: Submit front and back elevations of each door opening showing electrified devices with connections installed and an operations narrative describing how opening operates from either side at any given time.
   3. Diagrams: Submit point-to-point wiring diagram that shows each device in door opening system with related colored wire connections to each device.

E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

F. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
   1. Submit manufacturer's parts lists and templates.

G. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

H. Project Record Documents: Record actual locations of concealed equipment, services, and conduit.

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified for commercial door hardware with at least three years of documented experience.

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C. Supplier Qualifications: Company with certified Architectural Hardware Consultant (AHC) to assist in work of this section.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Package hardware items individually; label and identify each package with door opening code to match door hardware schedule.

1.09 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Warranty against defects in material and workmanship for period indicated, from Date of Substantial Completion.
   1. Closers: Three Years, minimum.
   2. Exit Devices: Three years, minimum.
   3. Locksets and Cylinders: Three years, minimum.
   4. Other Hardware: Two years, minimum.

PART 2 PRODUCTS

2.01 DESIGN AND PERFORMANCE CRITERIA

A. Provide specified door hardware as required to make doors fully functional, compliant with applicable codes, and secure to extent indicated.

B. Provide individual items of single type, of same model, and by same manufacturer.

C. Provide door hardware products that comply with the following requirements:
   1. Applicable provisions of federal, state, and local codes.
   2. Accessibility: ADA Standards and ICC A117.1.
   3. Applicable provisions of NFPA 101.
   4. Fire-Rated Doors: NFPA 80, listed and labeled by qualified testing agency for fire protection ratings indicated, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.
   5. Hardware on Fire-Rated Doors: Listed and classified by UL (DIR) or testing firm acceptable to authorities having jurisdiction as suitable for application indicated.
   6. Hardware for Smoke and Draft Control Doors (Indicated as "S" on Drawings): Provide door hardware that complies with local codes, and requirements of assemblies tested in accordance with UL 1784.
      a. Air Leakage Rate: Tested in accordance with UL 1784, with air leakage rate not to exceed 3.0 cfm/sf of door opening at 0.10 inch of water for both ambient and elevated temperature tests.
   7. Listed and certified compliant with specified standards by BHMA (CPD).
   8. Auxiliary Hardware: BHMA A156.16.
   9. Hardware Preparation for Steel Doors and Steel Frames: BHMA A156.115.
   10. Hardware Preparation for Wood Doors with Wood or Steel Frames: BHMA A156.115W.
   11. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified.

D. Electrically Operated and/or Controlled Hardware: Provide necessary power supplies, power transfer hinges, relays, and interfaces as required for proper operation; provide wiring between hardware and control components and to building power connection in compliance with NFPA 70.
   1. Refer to Section 281000 for additional access control system requirements.

E. Lock Function: Provide lock and latch function numbers and descriptions of manufacturer's series. Refer to Section 080671 for listing of hardware sets.

F. Fasteners:

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1. Provide fasteners of proper type, size, quantity, and finish that comply with commercially recognized standards for proposed applications.
    a. Aluminum fasteners are not permitted.
    b. Provide phillips flat-head screws with heads finished to match door surface hardware unless otherwise indicated.
2. Provide machine screws for attachment to reinforced hollow metal and aluminum frames.
    a. Self-drilling (Tek) type screws are not permitted.
3. Provide stainless steel machine screws and lead expansion shields for concrete and masonry substrates.
4. Provide wall grip inserts for hollow wall construction. Provide backing for all hardware in stud walls.
5. Fire-Rated Applications: Comply with NFPA 80.
    a. Provide wood or machine screws for hinges mortised to doors or frames, strike plates to frames, and closers to doors and frames.
    b. Provide steel through bolts for attachment of surface mounted closers, hinges, or exit devices to door panels unless proper door blocking is provided.

2.02 HINGES

A. Manufacturers:
    1. Basis of Design: McKinney; an Assa Abloy Group company; www.assaabloydss.com.
    2. McKinney; an Assa Abloy Group company; _____: www.assaabloydss.com
    3. Hager Companies; _____: www.hagerco.com
    4. Stanley, dormakaba Group; _____: www.stanleyhardwarefordoors.com
    5. Substitutions: See Section 016000 - Product Requirements.

B. Hinges: Complying with BHMA A156.1, Grade 1.
    1. Butt Hinges: Complying with BHMA A156.1 and BHMA A156.7 for templated hinges.
        a. Provide hinge width required to clear surrounding trim.
    2. Continuous Hinges: Complying with BHMA A156.26.
    3. Provide hinges on every swinging door.
    4. Provide five-knuckle full mortise butt hinges unless otherwise indicated.
    5. Provide ball-bearing hinges at each door.
    6. Provide non-removable pins on exterior out swinging doors.
    7. Provide non-removable pins on interior out swinging doors at locations as indicated in Door Hardware Schedule.
    8. Provide power transfer hinges where electrified hardware is mounted in door leaf.
    9. Provide following quantity of butt hinges for each door:
        a. Doors From 60 inches High up to 90 inches High: Three hinges.
        b. Doors 90 inches High up to 120 inches High: Four hinges.
        c. Doors From 42 inches wide up to 48 inches Wide: Four hinges.
        d. Doors over 120 inches High: One additional hinge per each additional 30 inches in height.
        e. Dutch Doors: Two hinges each leaf.

2.03 FLUSH BOLTS

A. Manufacturers:
    1. Basis of Design: Rockwood, #555, an Assa Abloy Group company; www.assaabloydss.com..
    2. Ives, an Allegion brand; _____: www.allegion.com/us
    3. Trimco; _____: www.trimcohardware.com
    4. Substitutions: See Section 016000 - Product Requirements.

B. Flush Bolts: Complying with BHMA A156.16, Grade 1.
    1. Flush Bolt Throw: 3/4 inch, minimum.

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2. Provides extension bolts in leading edge of door, one bolt into floor, one bolt into top of frame.
    a. Pairs of Swing Doors: At inactive leaves, provide flush bolts of type as required to comply with code.
3. Provide dustproof floor strike for bolt into floor, except at metal thresholds.
4. Manual Flush Bolts: Provide lever extensions for top bolt at over-sized doors.
5. Self-Latching Flush Bolts: Automatically latch upon closing of door; manually retracted; located on inactive leaf of pair of doors.

2.04 EXIT DEVICES

A. Manufacturers:
    1. Sargent; an Assa Abloy Group company; 88 series: www.assaabloydss.com.

B. Exit Devices: Complying with BHMA A156.3, Grade 1.
    1. Lever design to match lockset trim.
    2. No mortise exit devices.
    3. No vertical rod exit devices.
    4. Provide rim style only.
    5. Provide cylinder with cylinder dogging or locking trim.
    6. Provide exit devices properly sized for door width and height.
    7. Provide strike as recommended by manufacturer for application indicated.
    8. Provide UL (DIR) listed exit device assemblies for fire-rated doors and panic device assemblies for non-fire-rated doors.

2.05 ELECTRIC STRIKES

A. Manufacturers:
    1. Adams Rite; an Assa Abloy Group company; #7440: www.assaabloydss.com.

B. Electric Strikes: Complying with BHMA A156.31, Grade 1.
    1. Provide UL (DIR) listed burglary-resistant electric strike; style to suit locks.
    2. Provide non-handed 24 VDC electric strike suitable for door frame material and scheduled lock configuration.
    3. Provide field selectable Fail Safe/Fail Secure modes.
    4. Connect electric strikes into fire alarm where non-rated doors are scheduled to release with fire or sprinkler alarm condition.

2.06 LOCK CYLINDERS NOT IN CONTRACT - BY OWNER

A. Manufacturers:
    1. Basis of Design: ASSA Twin 6000. Provided and installed by BYU Access Services

2.07 CYLINDRICAL LOCKSET

A. Manufacturers:
    1. Sargent; an Assa Abloy Group company; 10 Line: www.assaabloydss.com.
    2. Schlage, an Allegion brand; ND Series Clutch: www.allegion.com/us.

B. Cylindrical Lockset (Bored): Complying with BHMA A156.2, Grade 1, 4000 Series.
    1. Bored Hole: 2-1/8 inch diameter.
    2. Latchbolt Throw: 1/2 inch, minimum.
    3. Backset: 2-3/4 inch unless otherwise indicated.
    4. Strikes: Provide manufacturer's standard strike for each latchset or lockset with strike box and curved lip extending to protect frame in compliance with indicated requirements.
        a. Finish: To match lock or latch.
        b. Extra-Long-Lip Strikes: Provide for locks used on frames with applied wood casing trim.

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2.08 MORTISE LOCKS - ONLY FOR SINGLE OCCUPANCY RESTROOMS

A. Manufacturers:
   1. Sargent; an Assa Abloy Group company; 49-8266: www.assaabloydss.com.
   2. Schlage, an Allegion brand; _____: www.allegion.com/us

B. Mortise Locks: Complying with BHMA A156.13, Grade 1, Security, 1000 Series.
   1. Latchbolt Throw: 3/4 inch, minimum.
   2. Deadbolt Throw: 1 inch, minimum.
   3. Backset: 2-3/4 inch unless otherwise indicated.
   4. Strikes: Provide manufacturer's standard strike for each latchset or lockset with strike box and curved lip extending to protect frame in compliance with indicated requirements.
      a. Flat-Lip Strikes: Provide for locks with three piece antifriction latch bolts as recommended by manufacturer.
      b. Extra-Long-Lip Strikes: Provide for locks used on frames with applied wood casing trim.
      c. Finish: To match lock or latch.

2.09 ELECTROMECHANICAL LOCKSET (FOR INTERIOR APPLICATIONS ONLY)

A. Manufacturers:
   1. Sargent; an Assa Abloy Group company; 10 Line IN120: www.assaabloydss.com.

B. Electromechanical Locks: Complying with BHMA A156.25, Grade 1.
   1. Provide motor-driven or solenoid-driven locks, with strike that is applicable to frame.
   2. Type: Cylindrical (Bored).

2.10 AUXILIARY LOCKS (DEADLOCKS)

A. Manufacturers:
   1. Basis of Design: Schlage B660 Series Deadbolts.

B. Auxiliary Locks (Deadlocks): Complying with BHMA A156.36, Grade 1.
   1. Type: Bored (cylindrical).
   2. Application: Bored.
   3. Backset: 2-3/4 inch, unless otherwise indicated.
   4. Bolt Throw: 1/2 inch, with latch made of hardened steel.
   5. Provide strike that matches frame.

2.11 DOOR PULLS AND PUSH PLATES

A. Manufacturers:
   1. Rockwood; an Assa Abloy Group company; 110 x 71F: www.assaabloydss.com.
   2. Substitutions: See Section 016000 - Product Requirements.

B. Door Pulls and Push Plates: Complying with BHMA A156.6.
   1. Pull Type: Straight, unless otherwise indicated.
   2. Push Plate Type: Flat, with square corners, unless otherwise indicated.
      a. Edges: Beveled, unless otherwise indicated.
   3. Material: Stainless steel, unless otherwise indicated.
   4. Provide door pulls and push plates on doors without a lockset, latchset, exit device, or auxiliary lock unless otherwise indicated.
   5. Install pull plate and pull with through bolts for pull flush under push plate. No exposed through bolts on push plate.
   6. On solid doors, provide matching push plate on opposite faces.

2.12 DOOR PULLS AND PUSH BARS

A. Manufacturers:

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1. Rockwood; an Assa Abloy Group company; RM3311-20CTC-36" long with 3/8" mounting bolts: www.assaabloydss.com.
2. IVES - Equal to Rockwood.
3. Substitutions: See Section 016000 - Product Requirements.

B. Door Pulls and Push Bars: Complying with BHMA A156.6.
1. Bar Type: Push bar, unless otherwise indicated.
2. Material: Stainless steel, unless otherwise indicated.

2.13 CLOSERS

A. Manufacturers; Surface Mounted:
1. LCN, an Allegion brand; 4040XP Non-Handed Closers: www.allegion.com/us.

B. Closers: Complying with BHMA A156.4, Grade 1.
1. Type: Surface mounted to door.
2. Provide door closer on each exterior door.
3. Provide door closer on each fire-rated and smoke-rated door.
a. Spring hinges are not an acceptable self-closing device, unless otherwise indicated.
4. At corridor entry doors, mount closer on room side of door.
5. At out swinging exterior doors, mount closer on interior side of door.

2.14 OVERHEAD STOPS AND HOLDERS

A. Manufacturers:
1. Glynn-Johnson, an Allegion brand; 100ADJ: www.allegion.com/us.

B. Overhead Stops and Holders (Door Checks): Complying with BHMA A156.8, Grade 1.
1. Provide stop for swinging doors as indicated in hardware schedule.
2. Provide stop for all doors with automatic operator.

2.15 PROTECTION PLATES

A. Manufacturers:
1. Rockwood; an Assa Abloy Group company; K1050: www.assaabloydss.com.
2. Ives, an Allegion brand; _____: www.allegion.com/us
3. Substitutions: See Section 016000 - Product Requirements.

B. Protection Plates: Complying with BHMA A156.6.

C. Metal Properties: Stainless steel.
1. Metal, Standard Duty: Thickness 0.05 inch, minimum.

D. Edges: Beveled, on four sides unless otherwise indicated.

E. Fasteners: Countersunk screw fasteners.

2.16 ARMOR PLATES (VERIFY LOCATIONS WITH OWNER)

A. Manufacturers:
1. Rockwood; an Assa Abloy Group company; [K1050]: www.assaabloydss.com
2. Ives, an Allegion brand; _____: www.allegion.com/us

B. Armor Plates: Provide on bottom half of push side of doors that require protection from objects moving through openings that may damage door surface.
1. Size: 16 inch high by 1-1/2 inch less door width (LDW) on pull side and 2 inch LDW on push side of door.

2.17 KICK PLATES

A. Manufacturers:
1. Rockwood; an Assa Abloy Group company; [K1050]: www.assaabloydss.com

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2. Ives, an Allegion brand; _____: www.allegion.com/us
3. Substitutions: See Section 016000 - Product Requirements.

B. Kick Plates: Provide along bottom edge of push side of every door with closer, except aluminum storefront and glass entry doors, unless otherwise indicated.
1. Size: 10 inch high by 2 inch less door width (LDW) on push side of door.

2.18 MOP PLATES (VERIFY LOCATIONS WITH OWNER)

A. Manufacturers:
1. Rockwood; an Assa Abloy Group company; [K1050]: www.assaabloydss.co
2. Ives, an Allegion brand; _____: www.allegion.com/us
3. Substitutions: See Section 016000 - Product Requirements.

B. Mop Plates: Provide along bottom edge of pull side of doors to provide protection from cleaning liquids and equipment damage to door surface.
1. Size: 10 inch high by 1-1/2 inch less door width (LDW) on pull side and 2 inch LDW on push side of door.

2.19 DOOR EDGE PLATES (VERIFY LOCATIONS WITH OWNER)

A. Manufacturers:
1. Rockwood; an Assa Abloy Group company; 306-RKW: www.assaabloydss.com.
2. Ives, an Allegion brand; _____: www.allegion.com/us

B. Door Edge Plates: Complying with BHMA A156.6.
1. Provide along latching edge of door to protect from damage as objects are moved through door opening.
2. Material: Stainless steel, at least 0.050 inch thick.
3. Type: Beveled edge, mortised into edge of door.

2.20 ELECTROMAGNETIC DOOR HOLDERS

A. Manufacturers:
1. Rixson; an Assa Abloy Group company; 99X: www.assaabloydss.com.
2. Substitutions: See Section 016000 - Product Requirements.

B. Electromagnetic Door Holders: Complying with BHMA A156.15.
1. Type: Wall mounted, single unit, standard duty, with strike plate attached to door.
2. Holding Force, Standard Duty: 40 lbs.-force, minimum.
3. Voltage: 24 VDC, and provide power supplies by same manufacturer as holders.
4. Fail safe; door released to close automatically when electrical current is interrupted - for security doors only.
5. Provide interface with fire detectors and fire-alarm system for fire-rated door assemblies.

2.21 FLOOR STOPS

A. Manufacturers:
1. Rockwood; an Assa Abloy Group company; 441H: www.assaabloydss.com.
2. Substitutions: See Section 016000 - Product Requirements.

B. Floor Stops: Complying with BHMA A156.16, Grade 1 and Resilient Material Retention Test as described in this standard.
1. Provide floor stops when wall surface is not available; be cautious not to create a tripping hazard.

2.22 WALL STOPS

A. Manufacturers:
1. Basis of Design: _____.

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2. Rockwood; an Assa Abloy Group company; 409: www.assaabloydss.com.
3. Substitutions: See Section 016000 - Product Requirements.

B. Wall Stops: Complying with BHMA A156.16, Grade 1 and Resilient Material Retention Test as described in this standard.
1. Provide wall stops to prevent damage to wall surface upon opening door.
2. Type: Bumper, concave, wall stop.
3. Material: Stainless steel housing with rubber insert.

2.23 ASTRAGALS

A. Manufacturers:
1. Pemko; an Assa Abloy Group company; _____: www.assaabloydss.com
2. Substitutions: See Section 016000 - Product Requirements.

B. Astragals: Complying with BHMA A156.22.
1. Provide surface mounted astragal to cover or fill space for full door height between pair of doors or door and adjacent jamb.
2. Type: Split, two parts, and with sealing gasket.
3. Material: Steel, with neoprene weatherstripping.
4. Provide non-corroding fasteners at exterior locations.

2.24 THRESHOLDS

A. Manufacturers:
1. Pemko; an Assa Abloy Group company; _____: www.assaabloydss.com
2. Substitutions: See Section 016000 - Product Requirements.

B. Thresholds: Complying with BHMA A156.21.
1. Provide threshold at each exterior door, unless otherwise indicated.
2. Type: Flat surface.
3. Material: Aluminum.
4. Threshold Surface: Fluted horizontal grooves across full width.
5. Field cut threshold to profile of frame and width of door sill for tight fit.
6. Provide non-corroding fasteners at exterior locations.

2.25 WEATHERSTRIPPING AND GASKETING

A. Manufacturers:
1. Pemko; an Assa Abloy Group company; _____: www.assaabloydss.com
2. Substitutions: See Section 016000 - Product Requirements.

B. Weatherstripping and Gasketing: Complying with BHMA A156.22.
1. Head and Jamb Type: Self-adhesive.
2. Door Sweep Type: Encased in retainer.
3. Material: Aluminum, with brush weatherstripping.
4. Provide gasketing for smoke and draft control doors (Indicated as "S" on Drawings) that complies with local codes, requirements of assemblies tested in accordance with UL 1784.
5. Provide frame-applied intumescent gasketing on wood doors that are labeled as smoke and draft control doors (Indicated as "S" on Drawings), unless otherwise indicated.
6. Provide weatherstripping on each exterior door at head, jambs, and meeting stiles of door pairs, unless otherwise indicated; .
7. Provide door bottom sweep on each exterior door, unless otherwise indicated.
8. Provide sound-rated gasketing and automatic door bottom on doors indicated as "Sound-Rated", "Acoustical", or with "Sound Transmission Class (STC) rating"; fabricate as continuous gasketing, do not cut or notch gasketing material.

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2.26 LATCH PROTECTOR

A. Manufacturers:
   1. Rockwood; an Assa Abloy Group company; _____: www.assaabloydss.com

B. Latch Protector: Provide on door to protect latch from being tampered with while in locked position.
   1. Type: Standard latch protector.
   2. Material: Stainless steel.

2.27 SILENCERS

A. Manufacturers:
   1. Ives, an Allegion brand; _____: www.allegion.com/us
   2. Rockwood; an Assa Abloy Group company; _____: www.assaabloydss.com
   3. Substitutions: See Section 016000 - Product Requirements.

B. Silencers: Provide at equal locations on door frame to mute sound of door's impact upon closing.
   1. Single Door: Provide three on strike jamb of frame.
   2. Pair of Doors: Provide two on head of frame, one for each door at latch side.
   3. Material: Rubber, gray color.

2.28 WIRELESS ACCESS MANAGEMENT SYSTEMS

A. Manufacturers:
   1. Basis of Design: Sargent 10 Line IN120.

B. Wireless Access Management Systems: Complying with guidelines of BHMA A156.25, and including necessary hardware for fully functional system.
   1. Reader Formats: Provide proximity to activate access system functionality.
   2. Door Locking Hardware: Provide applicable cylindrical locksets or panic hardware in compliance with project access control requirements.

2.29 EXIT MOTION SENSOR

A. Manufacturers:
   1. Basis of Design: Bosch DS160.

B. Exit Motion Sensor: Interior passive infrared detection device to initiate door release of exit door magnetic lock.
   1. Power: 12 or 24 VDC.
   2. Provide adjustable detector face to allow for precise pattern configurations, and easy pattern adjustment.
   3. Provide relay that operates before transistor to prevent false alarms.
   4. Operating Temperature: 32 to 110 degrees F.

2.30 KEY SWITCH

A. Manufacturers:
   1. Securitron; an Assa Abloy Group company; _____: www.assaabloydss.com
   2. Substitutions: See Section 016000 - Product Requirements.

B. Key Switch: Mortise key type, single gang.
   1. Power: 12 or 24 VDC.
   2. Operating Temperature: 32 to 110 degrees F.

2.31 POWER SUPPLY

A. Manufacturers:
   1. Basis of Design: Life Safety .
   2. Substitutions: See Section 016000 - Product Requirements.

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B. Power Supply: Hard wired, with multiple zones providing eight (8) breakers for each output panel with individual control switches and LED's; UL (DIR) Class 2 listed.
   1. Power: 24 VDC; with 120 VAC power supply.
   2. Operating Temperature: 32 to 110 degrees F.
   3. Provide with emergency release terminals that release devices upon activation of fire alarm system.

2.32 FINISHES

A. Finishes: Provide door hardware of same finish, unless otherwise indicated.
   1. Primary Finish: 626; satin chromium plated over nickel, with brass or bronze base material (former US equivalent US26D); BHMA A156.18.
   2. Exceptions:
      a. Where base material metal is specified to be different, provide finish that is an equivalent appearance in accordance with BHMA A156.18.
      b. Hinges for Fire-Rated Doors: Steel base material with painted finish, in compliance with NFPA 80.
      c. Door Closer Covers and Arms: Color as selected by Architect from manufacturer's standard colors unless otherwise indicated.
      d. Hardware for Aluminum Storefront Doors: Finished to match door panel finish, except at hand contact surfaces provide stainless steel with satin finish, unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that doors and frames are ready to receive this work; labeled, fire-rated doors and frames are properly installed, and dimensions are as indicated on shop drawings.

B. Verify that electric power is available to power operated devices and of correct characteristics.

3.02 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions and applicable codes.

B. Install hardware on fire-rated doors and frames in accordance with applicable codes and NFPA 80.

C. Install hardware for smoke and draft control doors in accordance with NFPA 105.

D. Use templates provided by hardware item manufacturer.

E. Do not install surface mounted items until application of finishes to substrate are fully completed.

F. All hardware mounting to be per CECO locations.

G. Set exterior door thresholds with full-width bead of elastomeric sealant at each point of contact with floor providing a continuous weather seal; anchor thresholds with stainless steel countersunk screws.

3.03 FIELD QUALITY CONTROL

A. Perform field inspection and testing under provisions of Section 014000 - Quality Requirements.

B. Provide an Architectural Hardware Consultant (AHC) to inspect installation and certify that hardware and installation has been furnished and installed in accordance with manufacturer's instructions and as specified.

3.04 ADJUSTING

A. Adjust work under provisions of Section 017000 - Execution and Closeout Requirements.

B. Adjust hardware for smooth operation.

C. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.

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3.05 CLEANING

A. Clean finished hardware in accordance with manufacturer's written instructions after final adjustments have been made.

B. Clean adjacent surfaces soiled by hardware installation.

C. Replace items that cannot be cleaned to manufacturer's level of finish quality at no additional cost.

3.06 PROTECTION

A. Protect finished Work under provisions of Section 017000 - Execution and Closeout Requirements.

B. Do not permit adjacent work to damage hardware or finish.

END OF SECTION

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SECTION 090561

COMMON WORK RESULTS FOR FLOORING PREPARATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This section applies to all floors identified in the contract documents as to receive the following types of floor coverings:
   1. Resilient tile and sheet vinyl.
   2. Broadloom carpet.
   3. Carpet tile.
   4. Thin-set ceramic tile and stone tile.
   5. Porcelain Tile.

B. Removal of existing floor coverings. Verify with owner if recycling is feasible.

C. Preparation of new concrete floor slabs for installation of floor coverings.

D. Testing of concrete floor slabs for moisture and alkalinity (pH).

E. Remediation of concrete floor slabs due to unsatisfactory moisture or alkalinity (pH) conditions.
   1. Contractor shall perform all specified remediation of concrete floor slabs. If such remediation is indicated by testing agency's report and is due to a condition not under Contractor's control or could not have been predicted by examination prior to entering into the contract, a contract modification will be issued.

F. Patching compound.

G. Remedial floor coatings.

H. Remedial floor sheet membrane.

1.02 REFERENCE STANDARDS

A. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens); 2016a.

B. ASTM C472 - Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters and Gypsum Concrete; 1999 (Reapproved 2014).

C. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.

D. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2011.

E. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2017.

F. RFCI (RWP) - Recommended Work Practices for Removal of Resilient Floor Coverings; Resilient Floor Covering Institute; October 2011.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordinate scheduling of cleaning and testing, so that preliminary cleaning has been completed for at least 24 hours prior to testing.

1.04 SUBMITTALS

A. Visual Observation Report: For existing floor coverings to be removed.

B. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
   1. Moisture and alkalinity (pH) limits and test methods.

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2. Manufacturer's required bond/compatibility test procedure.

C. Testing Agency's Report:
   1. Description of areas tested; include floor plans and photographs if helpful.
   2. Summary of conditions encountered.
   3. Moisture and alkalinity (pH) test reports.
   4. Copies of specified test methods.
   5. Recommendations for remediation of unsatisfactory surfaces.
   6. Include certification of accuracy by authorized official of testing agency.
   7. Submit report directly to Owner.
   8. Submit report not more than two business days after conclusion of testing.

D. Adhesive Bond and Compatibility Test Report.

E. Copy of RFCI (RWP).

F. Remedial Materials Product Data: Manufacturer's published data on each product to be used for remediation.
   1. Manufacturer's qualification statement.
   2. Manufacturer's statement of compatibility with types of flooring applied over remedial product.
   3. Test reports indicating compliance with specified performance requirements, performed by nationally recognized independent testing agency.
   4. Manufacturer's installation instructions.
   5. Specimen Warranty: Copy of warranty to be issued by coating manufacturer and certificate of underwriter's coverage of warranty.

1.05 QUALITY ASSURANCE

A. Moisture and alkalinity (pH) testing shall be performed by an independent testing agency employed and paid by Contractor.

B. Testing Agency Qualifications: Independent testing agency experienced in the types of testing specified.
   1. Submit evidence of experience consisting of at least 3 test reports of the type required, with project Owner's project contact information.

C. Contractor's Responsibility Relating to Independent Agency Testing:
   1. Provide access for and cooperate with testing agency.
   2. Confirm date of start of testing at least 10 days prior to actual start.
   3. Allow at least 4 business days on site for testing agency activities.
   4. Achieve and maintain specified ambient conditions.
   5. Notify Architect and BYU Construction PM when specified ambient conditions have been achieved and when testing will start.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, handle, and protect products in accordance with manufacturer’s instructions and recommendations.

B. Deliver materials in manufacturer’s packaging; include installation instructions.

C. Keep materials from freezing.

1.07 FIELD CONDITIONS

A. Maintain ambient temperature in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 65 degrees F or more than 85 degrees F.

B. Maintain relative humidity in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 10 percent and not more than 60 percent.

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PART 2 PRODUCTS

2.01 MATERIALS

A. Patching Compound: Floor covering manufacturer's recommended product, suitable for conditions, and compatible with adhesive and floor covering. In the absence of any recommendation from flooring manufacturer, provide a product with the following characteristics:
   1. Cementitious moisture-, mildew-, and alkali-resistant compound, compatible with floor, floor covering, and floor covering adhesive, and capable of being feathered to nothing at edges.
   2. Latex or polyvinyl acetate additions are permitted; gypsum content is prohibited.
   3. Compressive Strength: 3000 psi, minimum, after 28 days, when tested in accordance with ASTM C109/C109M or ASTM C472, whichever is appropriate.

PART 3 EXECUTION

3.01 CONCRETE SLAB PREPARATION

A. Follow recommendations of testing agency.

B. Perform following operations in the order indicated:
   1. Preliminary cleaning.
   2. Moisture vapor emission tests; 3 tests in the first 1000 square feet and one test in each additional 1000 square feet, unless otherwise indicated or required by flooring manufacturer.
   3. Internal relative humidity tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
   4. Alkalinity (pH) tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
   5. Specified remediation, if required.
   6. Patching, smoothing, and leveling, as required.
   7. Other preparation specified.
   8. Adhesive bond and compatibility test.
   9. Protection.

C. Remediations:
   1. Active Water Leaks or Continuing Moisture Migration to Surface of Slab: Correct this condition before doing any other remediation; re-test after correction.
   2. Excessive Moisture Emission or Relative Humidity: If an adhesive that is resistant to the level of moisture present is available and acceptable to flooring manufacturer, use that adhesive for installation of the flooring; if not, apply remedial floor coating or remedial sheet membrane over entire suspect floor area.
   3. Excessive Alkalinity (pH): If remedial floor coating is necessary to address excessive moisture, no additional remediation is required; if not, if an adhesive that is resistant to the level present is available and acceptable to the flooring manufacturer, use that adhesive for installation of the flooring; otherwise, apply a skim coat of specified patching compound over entire suspect floor area.

3.02 REMOVAL OF EXISTING FLOOR COVERINGS

A. Comply with local, State, and federal regulations and recommendations of RFCI Recommended Work Practices for Removal of Resilient Floor Coverings, as applicable to floor covering being removed.

B. Dispose of removed materials in accordance with local, State, and federal regulations and as specified.

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3.03 PRELIMINARY CLEANING

A. Clean floors of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond.

B. Do not use solvents or other chemicals for cleaning.

3.04 MOISTURE VAPOR EMISSION TESTING

A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.

C. Test in accordance with ASTM F1869 and as follows.

D. Plastic sheet test and mat bond test may not be substituted for the specified ASTM test method, as those methods do not quantify the moisture content sufficiently.

E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if test values exceed 3 pounds per 1000 square feet per 24 hours.

F. Report: Report the information required by the test method.

3.05 INTERNAL RELATIVE HUMIDITY TESTING

A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.

C. Test in accordance with ASTM F2170 Procedure A and as follows.

D. Testing with electrical impedance or resistance apparatus may not be substituted for the specified ASTM test method, as the values determined are not comparable to the ASTM test values and do not quantify the moisture content sufficiently.

E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if any test value exceeds 75 percent relative humidity.

F. Report: Report the information required by the test method.

3.06 ALKALINITY TESTING

A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

B. The following procedure is the equivalent of that described in ASTM F710, repeated here for the Contractor's convenience.

C. Use a wide range alkalinity (pH) test paper, its associated chart, and distilled or deionized water.

D. Place several drops of water on a clean surface of concrete, forming a puddle approximately 1 inch in diameter. Allow the puddle to set for approximately 60 seconds, then dip the alkalinity (pH) test paper into the water, remove it, and compare immediately to chart to determine alkalinity (pH) reading.

E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if alkalinity (pH) test value is over 10.

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3.07 PREPARATION

A. See individual floor covering section(s) for additional requirements.

B. Comply with recommendations of testing agency.

C. Comply with requirements and recommendations of floor covering manufacturer.

D. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with patching compound.

E. Do not fill expansion joints, isolation joints, or other moving joints.

3.08 ADHESIVE BOND AND COMPATIBILITY TESTING

A. Comply with requirements and recommendations of floor covering manufacturer.

3.09 PROTECTION

A. Cover prepared floors with building paper or other durable covering.

END OF SECTION

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SECTION 092116

GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL **UPDATED 2/21, 10/21**

1.01 SECTION INCLUDES **SEE CHANGES IN BOLD**

A. Performance criteria for gypsum board assemblies.
B. Metal stud wall framing.
C. Metal channel ceiling framing.
D. Acoustic insulation.
E. Gypsum sheathing.
F. Cementitious backing board.
G. Gypsum wallboard.
H. Joint treatment and accessories.
I. Acoustic (sound-dampening) wall and ceiling board.

1.02 RELATED REQUIREMENTS

A. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions.
B. Section 072100 - Thermal Insulation: Acoustic insulation.
C. Section 072500 - Weather Barriers: Water-resistive barrier over sheathing.
D. Section 078400 - Firestopping: Top-of-wall assemblies at fire rated walls.
E. Section 093000 - Tiling: Tile backing board.

1.03 REFERENCE STANDARDS

A. AISI S100-12 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2012.
B. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2010 (Reaffirmed 2016).
C. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 1999 (Reaffirmed 2016).
D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
F. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members; 2015.
G. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.
H. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014.
I. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
J. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2017.
K. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2016.

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L. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2015.

M. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2016.

N. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2014a.

O. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2013.

P. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel; 2013.

Q. ASTM C1280 - Standard Specification for Application of Exterior Gypsum Panel Products for Use as Sheathing; 2013a.

R. ASTM C1288 - Standard Specification for Discrete Non-Asbestos Fiber-Cement Interior Substrate Sheets; 2014.

S. ASTM C1325 - Specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units; 2017.

T. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014a.

U. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels; 2015.

V. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2016.

W. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).

X. GA-216 - Application and Finishing of Gypsum Board; 2016.

Y. GA-226 - Application of Gypsum Board to Form Curved Surfaces; Gypsum Association; 2016.

Z. GA-600 - Fire Resistance Design Manual; 2015.

AA. UL (FRD) - Fire Resistance Directory; current edition.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate special details associated with fireproofing and acoustic seals.

C. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.

D. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

E. Submit structural calculations and details stamped by a structural engineer licensed in the state of Utah showing the design of the members and their attachment to each other and to the building structure. THE STRUCTURAL DESIGN MUST BE REVIEWED AND APPROVED BY THE STRUCTURAL ENGINEER OF RECORD.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum 3 years of experience.

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PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840 and GA-216.
   1. See PART 3 for finishing requirements.

B. Interior Partitions: Provide completed assemblies with the following characteristics:
   1. Acoustic Attenuation: STC as indicated calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

C. Shaft Walls at HVAC Shafts: Provide completed assemblies with the following characteristics:
   1. Air Pressure Within Shaft: Sustained loads of 5 lb./sq ft with maximum mid-span deflection of L/240.
   2. Acoustic Attenuation: STC of 35-39 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

D. Fire Rated Assemblies: Provide completed assemblies with the following characteristics:
   1. Fire Rated Partitions: UL listed assembly No. _____; ___ hour rating.
   2. Fire Rated Ceilings and Soffits: One (1) hour fire rating.
   3. Fire Rated Structural Column Framing: UL listed assembly No. _____; ___ hour rating.
   4. Fire Rated Structural Beam Framing: UL listed assembly No. _____; ___ hour rating.
   5. Fire Rated Shaft Walls: UL listed assembly No. _____; ___ hour rating.
   6. Fire Rated Area Separation Walls: UL listed assembly No. _____; 1 hour rating.
   7. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL (FRD).

2.02 METAL FRAMING MATERIALS

A. Manufacturers - Metal Framing, Connectors, and Accessories:
   1. Clarkwestern Dietrich Building Systems LLC; ____: www.clarkdietrich.com
   2. Jaimes Industries; ____: www.jaimesind.com
   3. Marino; ____: www.marinoware.com
   4. Phillips Manufacturing Co; ____: www.phillipsmfg.com
   5. **CEMCO Steel; www.cemcosteel.com** **Updated 2/21**

B. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/360 at 5 psf.
   1. Studs: "C" shaped with flat or formed webs with knurled faces. (1 5/8" x 3 5/8" wide Typical at interior walls - 1 5/8" x 6" studs typical at exterior walls)
   2. Runners: U shaped, sized to match studs.
   3. Ceiling Channels: C-shaped.
   4. Furring: Hat-shaped sections, minimum depth of 7/8 inch.
   5. Resilient Furring Channels: 1/2 inch depth, for attachment to substrate through both legs; both legs expanded metal mesh.
      a. Products:
         1) Same manufacturer as other framing materials.

C. Shaft Wall Studs and Accessories: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 and specified performance requirements.
   1. Products:
      a. Same manufacturer as other framing materials.

D. Area Separation Wall Studs and Accessories: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with specified performance requirements.

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E. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.

F. Partition Head To Structure Connections: Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short and fastened as indicated on drawings.

G. Non-Loadbearing Framing Accessories:
   1. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
   2. Partial Height Wall Framing Support: Provides stud reinforcement and anchored connection to floor.
      a. Materials: ASTM A36/A36M formed sheet steel support member with factory-welded ASTM A1003/A1003M steel plate base.
   3. Framing Connectors: ASTM A653/A653M G90 galvanized steel clips; secures cold rolled channel to wall studs for lateral bracing.

2.03 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:
   1. American Gypsum Company; ____: www.americangypsum.com
   2. CertainTeed Corporation; ____: www.certainteed.com
   3. Georgia-Pacific Gypsum; Dense Shield Tile Baker: www.gpgypsum.com.
   4. USG Corporation; ____: www.usg.com
   5. Substitutions: See Section 016000 - Product Requirements.

B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
   1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
   2. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
   3. Thickness:
      a. Vertical Surfaces: 5/8 inch.
      b. Ceilings: 5/8 inch.
      c. _____: 1/4 inch.
      d. Multi-Layer Assemblies: Thicknesses as indicated on drawings.
   4. Paper-Faced Products:
      a. American Gypsum Company; FireBloc Type X Gypsum Wallboard.
      b. Continental Building Products; Firecheck Type X.
      c. Georgia-Pacific Gypsum; ToughRock Fireguard X.
      d. National Gypsum Company; Gold Bond BRAND Fire-Shield Gypsum Board.

C. Abuse Resistant Wallboard:
   1. Application: High-traffic areas indicated.
   2. Surface Abrasion: Level 2, minimum, when tested in accordance with ASTM C1629/C1629M.
   3. Indentation: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
   4. Soft Body Impact: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
   5. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
   6. Paper-Faced Type: Gypsum wallboard as defined in ASTM C1396/C1396M.
   7. Type: Fire resistance rated Type X, UL or WH listed.
   8. Thickness: 5/8 inch.
   9. Edges: Tapered.
   10. Paper-Faced Products:
      a. American Gypsum Company; M-Bloc AR Type X.
      b. CertainTeed Corporation; Extreme Abuse Resistant Drywall with M2Tech.
      c. Continental Building Products; Protecta AR 100 Type X with Mold Defense.

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d. Georgia-Pacific Gypsum; ToughRock Fireguard X Mold Guard Abuse-Resistant.
e. National Gypsum Company; Gold Bond Hi-Abuse XP Gypsum Board.

11. Products:
a. American Gypsum Company; M-Bloc AR Type X.
b. Continental Building Products; Protecta AR 100 Type X with Mold Defense.
c. Continental Building Products; Rapid Deco Level 5 Type X with Protecta.
d. Georgia-Pacific Gypsum; ToughRock Fireguard X Mold Guard Abuse-Resistant.
e. National Gypsum Company; Gold Bond Hi-Abuse XP Gypsum Board.

D. Impact Resistant Wallboard:
1. Application: High-traffic areas indicated.
2. Surface Abrasion: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.
3. Indentation: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
4. Soft Body Impact: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.
5. Hard Body Impact: Level 2, minimum, when tested in accordance with ASTM C1629/C1629M.
6. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
7. Paper-Faced Type: Gypsum wallboard as defined in ASTM C1396/C1396M.
8. Type: Fire resistance rated Type X, UL or WH listed.
9. Thickness: 5/8 inch.
10. Edges: Tapered.
11. Products:
a. American Gypsum Company; M-Bloc IR Type X.
b. Continental Building Products; Protecta HIR 300 Type X with Mold Defense.
c. National Gypsum Company; Gold Bond HI-Impact XP Gypsum Board.
d. Substitutions: See Section 016000 - Product Requirements.

E. Backing Board For Wet Areas: One of the following products:
1. Application: Surfaces behind tile in wet areas including tub and shower surrounds and shower ceilings.
2. Application: Horizontal surfaces behind tile in wet areas including countertops.
3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
4. ANSI Cement-Based Board: Non-gypsum-based; aggregated Portland cement panels with glass fiber mesh embedded in front and back surfaces complying with ANSI A118.9 or ASTM C1325.
a. **Thickness: 5/8 inch.** **Update 10/21**
b. Products:
1) National Gypsum Company; PermaBase Cement Board: www.nationalgypsum.com
2) USG Corporation: www.usg.com
5. ASTM Cement-Based Board: Non-gypsum-based, cementitious board complying with ASTM C1288.
a. **Thickness: 5/8 inch.** **Update 10/21**
b. Products:
1) James Hardie Building Products, Inc; HardiBacker: www.jameshardie.com
2) USG Durock Cement Board.
3) Substitutions: See Section 016000 - Product Requirements.
6. **Glass Mat Faced Board: Coated glass mat water-resistant gypsum backing panel as defined in** ASTM C1178/C1178M**.** **Update 10/21**
a. **Regular Type: Thickness 5/8 inch. (16 mm).**
b. **Fire-Resistance-Rated Type: Type X core, thickness 5/8 inch. (16 mm).**
c. **Products:**
1) **CertainTeed Corporation; Diamondback Tile Backer: www.certainteed.com**

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2) **CertainTeed Corporation; Diamondback Type X Tile Backer: www.certainteed.com**
3) **Georgia-Pacific Gypsum; DensShield Tile Backer: www.gpgypsum.com**
4) **Georgia-Pacific Gypum; DensShield Fireguard Tile Backer; www.gpgypsum.com**

_____

5) **Substitutions: See Section 016000 - Product Requirements.**

F. Exterior Sheathing Board: Sizes to minimize joints in place; ends square cut.
1. Application: Exterior sheathing, unless otherwise indicated.
2. Glass Mat Faced Sheathing: Glass mat faced gypsum substrate as defined in ASTM C1177/C1177M.
3. Paper-Faced Sheathing: Gypsum sheathing board as defined in ASTM C1396/C1396M, moisture resistant type with water repellent paper faces.
4. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
5. **Core Type: Regular and Type X, as indicated.** **Update 10/21**
6. Type X Thickness: 5/8 inch.
7. **Regular Board Thickness: 5/8 inch.** **Update 10/21**
8. Edges: Square.
9. **Glass Mat Faced Products:** **Update 10/21**
   a. **American Gypsum Company; M-Glass Exterior Sheathing Type X. www.americangypsum.com.**
   b. **American Gypsum Company; M-Glass 5/8" Exterior Sheathing: www.americangypsum.com**
   c. **CertainTeed Corporation; GlasRoc 5/8" Exterior Sheathing: www.certainteed.com**
   d. **CertainTeed Corporation; GlasRoc Type X Exterior Sheathing: www.certainteed.com**
   e. **Georgia-Pacific Gypsum; DensGlass Sheathing.**
   f. **Georgia-Pacific Gypsum; DensGlass Fireguard Sheathing.**
   g. **USG Corporation; USG Securock Brand Ultralight Glass-Mat Sheathing: www.usg.com**
   h. **USG Corporation; USG Securock Brand Ultralight Glass-Mat Sheathing Firecode X: www.usg.com**
   i. **Substitutions: See Section 016000 - Product Requirements.**
10. Paper-Faced Products:
    a. American Gypsum Company; Exterior Gypsum Sheathing.
    b. CertainTeed Corporation; Type X Sheathing Treated Core.
    c. Substitutions: See Section 016000 - Product Requirements.

2.04 ACCESSORIES

A. **Acoustic Insulation: As specified in Section 072100.** **Updated 10/21**

B. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.

C. Water-Resistive Barrier: As specified in Section 072500.

D. Beads, Joint Accessories, and Other Trim: ASTM C1047, rigid plastic, galvanized steel, or rolled zinc, unless noted otherwise.
1. Rigid Corner Beads: Low profile, for 90 degree outside corners.
2. Expansion Joints:

E. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
1. Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.

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2. Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
3. Ready-mixed vinyl-based joint compound.
4. Powder-type vinyl-based joint compound.
5. Chemical hardening type compound.
6. Thinsets and mastics for backerboard installations.

F. High Build Drywall Surfacer: Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish.
1. Products:
a. CertainTeed Corporation; Level V Wall and Ceiling Primer/Surfacer with M2Tech: www.certainteed.com

G. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inch in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion resistant.

H. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion resistant.

I. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

3.02 SHAFT WALL INSTALLATION

A. Shaft Wall Framing: Install in accordance with manufacturer's installation instructions.
1. Fasten runners to structure with short leg to finished side, using appropriate power-driven fasteners at not more than 24 inches on center.
2. Install studs at spacing required to meet performance requirements.

B. Shaft Wall Liner: Cut panels to accurate dimension and install sequentially between special friction studs.

3.03 FRAMING INSTALLATION

A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.

B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
1. Level ceiling system to a tolerance of 1/1200.
2. Laterally brace entire suspension system.
3. Install bracing as required at exterior locations to resist wind uplift.

C. Studs: Space studs at 16 inches on center.
1. Extend partition framing to structure where indicated and to ceiling in other locations..
2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
3. Partitions Terminating at Structure: Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs with continuous bridging.
4. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.

D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.

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E. Standard Wall Furring: Install at concrete walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 16 inches on center.
   1. Orientation: Vertical.
   2. Spacing: As indicated.

F. Acoustic Furring: Install resilient channels at maximum 24 inches on center. Locate joints over framing members.

G. Furring for Fire Ratings: Install as required for fire resistance ratings indicated.

H. Blocking: Install mechanically fastened steel sheet blocking for support of:
   1. Framed openings.
   2. Wall mounted cabinets.
   3. Plumbing fixtures.
   4. Toilet partitions.
   5. Toilet accessories.
   6. Wall mounted door hardware.

3.04 ACOUSTIC ACCESSORIES INSTALLATION

A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.

B. Acoustic Sealant: Install in accordance with manufacturer's instructions.
   1. Place one bead continuously on substrate before installation of perimeter framing members.
   2. Place continuous bead at perimeter of each layer of gypsum board.
   3. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.

3.05 BOARD INSTALLATION

A. **Comply with ASTM C840, GA-216, and manufacturer's instructions. Install interior gypsum board horizontally, especially in Corridors and Highly Visible Locations.**

B. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.

C. Exposed Gypsum Board in Interior Wet Areas: Seal joints, cut edges, and holes with water-resistant sealant.

D. **Exterior Sheathing: Comply with** ASTM C1280**. Install sheathing vertically, with edges butted tight and ends occurring over firm bearing. Updated 10/21**
   1. Paper-Faced Sheathing: Immediately after installation, protect from weather by application of water-resistive barrier.

E. Cementitious Backing Board: Install over steel framing members and plywood substrate where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.

F. Installation on Metal Framing: Use screws for attachment of gypsum board.

G. Curved Surfaces: Apply gypsum board to curved substrates in accordance with GA-226.

3.06 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
   1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
   2. At exterior soffits, not more than 30 feet apart in both directions.

B. Corner Beads: Install at external corners, using longest practical lengths.

C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

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D. Exterior Soffit Vents: Install according to manufacturer's written instructions and in locations indicated on drawings. Provide vent area specified.

E. Exposed finished raw edges are not allowed.

F. All metal fittings to be bedded and finished to designated finish level.

3.07 JOINT TREATMENT

A. Glass Mat Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, bedded and finished with chemical hardening type joint compound.

B. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.

C. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
   1. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated.
   2. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
   3. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
   4. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.

D. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
   1. Feather coats of joint compound so that camber is maximum 1/32 inch.
   2. Taping, filling, and sanding is not required at surfaces behind adhesive applied ceramic tile and fixed cabinetry.

E. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

3.08 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

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SECTION 095100
ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES UPDATED OCTOBER 2022

A. Suspended metal grid ceiling system.

B. Acoustical units.

C. Supplementary acoustical insulation above ceiling.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

A. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2013a.

B. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2013.

C. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2016.

D. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2014.

E. UL (FRD) - Fire Resistance Directory; current edition.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Do not install acoustical units until after interior wet work is dry.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on suspension system components.

C. Samples: Submit two samples 4x4 inch in size illustrating material and finish of acoustical units.

D. Samples: Submit two samples each, 12 inches long, of suspension system main runner.

E. Manufacturer's Installation Instructions: Indicate special procedures. Include information relative to compliance with seismic requirements contained in the International Building Code (IBC).

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.
   2. Extra Acoustical Units: Quantity equal to 1 percent of total installed, not less than 100 sf.

1.06 QUALITY ASSURANCE

A. Fire-Resistive Assemblies: Complete assembly listed and classified by 1 for the fire resistance indicated.

B. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

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1.07 FIELD CONDITIONS

A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acoustic Tiles/Panels:
   1. Armstrong World Industries, Inc: www.armstrong.com.
   2. USG: www.usg.com.

B. Suspension Systems:
   1. Same as for acoustical units.
   2. Armstrong World Industries, Inc; Prelude XL: www.armstrong.com.
   3. USG; DONN DX/DL: www.usg.com.

2.02 ACOUSTICAL UNITS

A. Acoustical Units - General: ASTM E1264, Class A.
   1. Units for Installation in Fire-Rated Suspension System: Listed and classified for the fire-resistive assembly as part of suspension system.
   2. VOC Content: Certified as Low Emission by one of the following:

B. **Acoustical Panels Type ACT-1:** **Updated Oct 2022**
   1. **Size: 24 by 24 inches.**
   2. **Panel Edge: Square .**
   3. **Surface Pattern: Perforated.**
   4. **Surface Color: White.**
   5. **Suspension System: Exposed grid.**
   6. **Products:**
      a. **USG Radar 22421.**
      b. **Armstrong Fine Fissured 1713.**

C. **Acoustical Panels Type ACT-2:**
   1. **Size: 24 by 24 inches,**
   2. **Panel Edge: Tegular.**
   3. **Surface Pattern: Perforated.**
   4. **Surface Color: White.**
   5. **Suspension System: Exposed grid.**
   6. **Products:**
      a. **USG Frost 484.**
      b. **Armstrong Ultima High NRC 1941A.**

D. **Acoustical Panels Type ACT-3:**
   1. **Size: 24 by 24 inches.**
   2. **Panel Edge: Tegular.**
   3. **Surface Pattern: Perforated.**
   4. **Surface Color: White.**
   5. **Suspension System: Exposed grid.**
   6. **Products:**
      a. **USG Sandrift 808.**

2.03 SUSPENSION SYSTEM(S)

A. Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.

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B. Exposed Suspension System: Formed steel, commercial quality cold rolled; heavy-duty.
   1. Profile: Tee; 15/16 inch wide face.
   2. Construction: Double web.
   3. Finish: White Painted.

C. Fire-Rated Exposed Steel Suspension System: Formed steel, commercial quality cold rolled; light-duty.
   1. Profile: Tee; 15/16 inch wide face.
   2. Construction: Double web.
   3. Fire Rating: Listed and classified for use in a 1 hour fire-resistive assembly.
   4. Finish: White painted.

2.04 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

B. Perimeter Moldings: Same material and finish as grid.
   1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.

C. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that layout of hangers **and compression struts** will not interfere with other work.

3.02 INSTALLATION - SUSPENSION SYSTEM

A. Install suspension system in accordance with manufacturer's instructions and as supplemented in this section. The installed system must comply with the International Building Code including the seismic requirements of the code and ASTM 580.

B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

C. Locate system on room axis according to the reflected ceiling plan. Any changes to the ceiling layout must be approved by the owner and architect.

D. Install after major above-ceiling work is complete. Coordinate the location of hangers **and compression struts** with other work. The suspension system must attach to structure and not to the work of any other trades. **Updated Oct 2022**

E. Provide hanger clips during steel deck erection. Provide additional hangers and inserts as required.

F. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

G. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

H. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability. Refer to manufacture engineering requirements for limitations.

I. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently. Fixtures and equipment exceeding 56 pounds shall be supported to the structure by hangers approved by the ceiling manufacturer.

J. Do not eccentrically load system or induce rotation of runners.

K. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.

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1. Use longest practical lengths.
2. Overlap and rivet corners.

L. Install USG ACM-7 seismic clips or Armstrong BERC seismic clips in accordance with manufacture recommendations on all perimeter material less than 2". Install seismic clips strategically on wall side versus soffit site when grid terminates in perimeter molding at a soffit line.

M. Each grid member that comes into the perimeter shall be supported by suspension wire connected to structure within 8" of the perimeter. The angle of the wire shall be less than 1 in 6. See ASTM 580/580M.

N. Perimeter moldings shall be attached to studs or backing unless approved otherwise by owner and architect.

O. Partition walls that connect to the ceiling grid below shall also be braced to the structure above using stud kickers @ 8'-0" o.c..

P. Leave all ceiling grid work open and accessible as required for inspection by the BYU Construction PM before proceeding to place the ceiling tile in the grid.

3.03 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Fit border trim neatly against abutting surfaces.

D. Install units after above-ceiling work is complete.

E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

F. Cutting Acoustical Units:
1. Cut to fit irregular grid and perimeter edge trim.
2. Make field cut edges of same profile as factory edges.

G. Where round obstructions occur, provide preformed closures to match perimeter molding.

H. Install hold-down clips on each panel to retain panels tight to grid system; comply with fire rating requirements.

I. Install hold-down clips on panels within 20 ft of an exterior door.

3.04 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION

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SECTION 096813

TILE CARPETING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preparation for Not-in- Contract Carpet and base installation. The carpet and base will be furnished and installed by the owner.

1.02 REFERENCE STANDARDS

A. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.

1.03 FIELD CONDITIONS

A. Store materials in area of installation for minimum period of 24 hours prior to installation.

PART 3 EXECUTION

2.01 EXAMINATION

A. Verify that sub-floor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive carpet tile and wall base.

C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to sub-floor surfaces.

D. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for flooring installation by testing for moisture and pH.
   1. Test in accordance with ASTM F710.
   2. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.

E. Verify that required floor-mounted utilities are in correct location.

2.02 PREPARATION

A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.

B. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.

C. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.

D. Vacuum clean substrate.

2.03 CLEANING

A. Remove excess adhesive without damage, from floor, base, and wall surfaces.

B. Clean and vacuum carpet surfaces.

END OF SECTION

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SECTION 099123

INTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints, stains, and varnishes.

C. Materials for backpriming woodwork.

D. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
   1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
   2. Elevator pit ladders.
   3. Surfaces inside cabinets.
   4. Prime surfaces to receive wall coverings.
   5. Mechanical and Electrical:
      a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
      b. In finished areas, paint shop-primed items.
      c. Paint interior surfaces of air ducts and convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
      d. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.

E. Do Not Paint or Finish the Following Items:
   1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes except prime surfaces to receive wall coverings.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
   5. Stainless steel, anodized aluminum, bronze, terne coated stainless steel, and lead items.
   6. Marble, granite, slate, and other natural stones.
   7. Floors, unless specifically indicated.
   8. Ceramic and other tiles.
   9. Brick, architectural concrete, cast stone, integrally colored plaster and stucco.
   10. Glass.
   11. Concrete masonry units in utility, mechanical, and electrical spaces.
   12. Acoustical materials.
   13. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

A. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 055000 - Metal Fabrications: Shop-primed items.

C. Section 055100 - Metal Stairs: Shop-primed items.

D. Section 099113 - Exterior Painting.

E. Section 099600 - High-Performance Coatings.

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1.03 DEFINITIONS

A. Conform to ASTM D16 for interpretation of terms used in this section.

1.04 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2016.

C. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating; 2005 (Reapproved 2012).

D. ASTM D4259 - Standard Practice for Abrading Concrete; 1988 (Reapproved 2012).

E. ASTM D4260 - Standard Practice for Liquid and Gelled Acid Etching of Concrete; 2005 (Reapproved 2012).

F. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials; 2015.

G. CARB (SCM) - Suggested Control Measure for Architectural Coatings; California Air Resources Board; 2007.

H. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition, www.paintinfo.com.

I. SCAQMD 1113 - South Coast Air Quality Management District Rule No.1113; current edition.

J. SSPC V1 (PM1) - Good Painting Practice: Painting Manual, Volume 1; Fourth Edition.

K. SSPC V2 (PM2) - Systems and Specifications: Steel Structures Painting Manual, Volume 2; Fourth Edition.

L. SSPC-SP 1 - Solvent Cleaning; 2015.

M. SSPC-SP 2 - Hand Tool Cleaning; 1982 (Ed. 2004).

N. SSPC-SP 3 - Power Tool Cleaning; 1982 (Ed. 2004).

O. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

P. SSPC-SP 13 - Surface Preparation of Concrete; (Reaffirmed 2015); 2003.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide complete list of products to be used, with the following information for each:
   1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
   2. MPI product number (e.g. MPI #47).
   3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
   4. Manufacturer's installation instructions.
   5. If proposal of substitutions is allowed under submittal procedures, explanation of substitutions proposed.

C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
   1. Where sheen is specified, submit samples in only that sheen.
   2. Where sheen is not specified, discuss sheen options with Architect and owner before preparing samples, to eliminate sheens definitely not required.
   3. Allow 30 days for approval process, after receipt of complete samples by Architect.

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4. Paint color submittals will not be considered until color submittals for major materials not to be painted, such as masonry, have been approved.

D. Certification: By manufacturer that paints and finishes comply with VOC limits specified.

E. Manufacturer's Instructions: Indicate special surface preparation procedures.

F. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 016000 - Product Requirements, for additional provisions.
2. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
3. Label each container with color in addition to the manufacturer's label.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 5 years' experience. Individuals applicating products with experience in performing the type of work specified with 5 years' experience or working under direct on-site supervision of an individual meeting this requirement.

1.07 MOCK-UP

A. See Section 014000 - Quality Requirements, for general requirements for mock-up.

B. Locate where directed by Architect.

C. Mock-up may remain as part of the work.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Container Label with date purchased indicated.

D. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.09 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply materials when relative humidity exceeds 85 percent; at temperatures less than 5 degrees F above the dew point; or to damp or wet surfaces.

D. Minimum Application Temperatures for Paints: 50 degrees F for interiors unless required otherwise by manufacturer's instructions.

E. Minimum Application Temperature for Varnish Finishes: 65 degrees F for interior, unless required otherwise by manufacturer's instructions.

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F. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
   1. In the event that a single manufacturer cannot provide specified products, minor exceptions will be permitted provided approval by Architect and owner is obtained using the specified procedures for substitutions.
   2. Substitution of other products by the same manufacturer is preferred over substitution of products by a different manufacturer.

B. Paints:
   1. PPG Paints: www.ppgpaints.com
   2. Sherwin-Williams Company: www.sherwin-williams.com
   3. Benjamin Moore: www.benjaminmoore.com.
   4. Manufacturers as listed below for the paint systems and substrates.

C. Transparent Finishes:
   1. PPG Paints Deft Interior Clears/Polyurethanes: www.ppgpaints.com
   2. Sherwin-Williams Company: www.sherwin-williams.com
   3. [Benjamin Moore: www.benjaminmoore.com].

D. Stains:
   1. PPG Paints Deft Interior Stains: www.ppgpaints.com
   2. Sherwin-Williams Company: www.sherwin-williams.com
   3. [Benjamin Moore: www.benjaminmoore.com].

E. Primer Sealers: Same manufacturer as top coats.

F. Substitutions: See Section 016000 - Product Requirements.

2.02 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.
   1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
   3. Supply each paint material in quantity required to complete entire project's work from a single production run.
   4. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

B. Volatile Organic Compound (VOC) Content:
   1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
      a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
      b. SCAQMD 1113 Rule.
      c. CARB (SCM).
      d. Ozone Transport Commission (OTC) Model Rule, Architectural, Industrial, and Maintenance Coatings; www.otcair.org; specifically:
         1) Opaque, Flat: 50 g/L, maximum.

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2) Opaque, Non flat: 150 g/L, maximum.
3) Opaque, High Gloss: 250 g/L, maximum.
4) Varnishes: 350 g/L, maximum.

e. Architectural coatings VOC limits of Utah.

2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

C. Flammability: Comply with applicable code for surface burning characteristics.

D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect and owner from the manufacturer's full line.

E. Colors: As indicated on drawings.
1. Allow for minimum of four colors for each system, unless otherwise indicated, without additional cost to Owner.
2. Extend colors to surface edges; colors may change at any edge as directed by Architect.
3. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.
4. In utility areas, finish equipment, piping, conduit, and exposed duct work in colors according to the color coding scheme indicated.

2.03 PAINT SYSTEMS - INTERIOR

A. Interior gypsum board surfaces to be Painted, Unless Otherwise Indicated: Including gypsum board.

B. Paint I-OP-GB - Interior gypsum board surfaces to be painted, Unless Otherwise Indicated. Normal spaces not requiring special systems for specific spaces and uses included below.
1. Primer: One coat, BM N534 UltraSpec
a. Finish coats: Two coats, BM 550 Regal Select Interior Pearl
2. Option 2: PPG
a. Primer: One coat, PPG 1000 High Hiding Interior Primer Sealer
b. Finish Coats: Two coats, PPG Diamond 350 Semi-Gloss
3. Option 3: Sherwin Williams
a. Primer: One coat, SW Contractors 152 Pro Primer White
b. Finish coats: Two coats, SW ProMar 200 Zero VOC Interior Latex Semi-Gloss Extra
c. Two top coats and one coat primer.

C. Special use area - Animal or Chemical Laboratory Rooms surfaces to be painted, Unless Otherwise Indicated.
1. Special use areas include all painted surfaces such as gypsum board, ceilings, doors, door frames, railings, handrails, guardrails, and balustrades in Animal or Chemical Laboratory Rooms.
2. Two top coats and one coat primer.
3. Top Coat(s): Interior Epoxy-Modified Latex.
a. Products:
1) PPG PSX 700 Gloss two coats with PPG Amerlock 400 primer coat.
2) PPG Aquapon WB 98-1 Series with PPG primer per manufacturer recommendations.

D. Ferrous metals except handrails, guardrails and metal stairways.
1. Products: Metal Doors and Frames:
a. Option 1: Primer: one coat BM HP04 ultra spec acrylic metal primer Finish Coats: BM P29 Ultra spec HP Acrylic DTM Semi-gloss.
b. Option 2: Rust oleum Primer Metalmax Finish Coats: Two coats Rust oleum Beyond S-38 Satin

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c. Option 3: Primer SW Pro Industrial Procryl Universal Primer. Two Finish Coats: SW 6509-62822 Multi surface acrylic enamel.

E. Dry Fall: Metals; exposed structure and overhead-mounted services in utilitarian spaces, including shop primed steel deck, structural steel, metal fabrications, galvanized ducts, galvanized conduit, and galvanized piping.
   1. Shop primer by others.
   2. One top coat _____.
   3. Top Coat: Latex Dry Fall.
      a. Products:
         1) PPG Paints Speedhide Super Tech Water Based Interior Dry-Fog, 6-723XI, Flat.
         2) Sherwin-Williams Waterborne Acrylic Dryfall, Flat.
   4. Primer: As recommended by top coat manufacturer for specific substrate.

F. Concrete Floors to be Painted.
   1. Two top coats and one coat primer.
   2. Top Coat(s): Latex Floor Paint, Gloss.
      a. Products:
         1) PPG Paints Break-Through Interior/Exterior Gloss Water-Borne Acrylic, V71-610 Series.
   3. Primer: As recommended by top coat manufacturer for specific substrate.

G. Transparent Finish on Wood.
   1. 1 top coat over sanding sealer over stain.
   2. Stain: Semi-Transparent Stain for Wood; MPI #90.
      a. Products:
   3. Top Coat(s): Clear Water Based Varnish.
      a. Products:
         1) PPG Paints Deft Interior Polyurethane WB Acrylic Satin, DFT 159.
         2) PPG Paints Deft Interior Polyurethane WB Acrylic Semi-Gloss, DFT 158
         3) Sherwin-Williams Wood Classics Waterborne Polyurethane Varnish, Satin.

H. Transparent Finish on Concrete Floors.
   1. Sealer: Water Based for Concrete Floors.
      a. Products:
         1) Spartan Straight Seal.

I. Wood, Opaque, Latex, 3 Coat:
   1. One coat of latex primer sealer as recommended by top coat paint manufacturer.
   2. Semi-gloss: Two coats of latex enamel; PPG Regency, BM Regal Select, PPG Diamond 350.

J. Concrete/Masonry, Opaque, Latex, 3 Coat:
   1. One coat of block filler. Follow top coat manufacturers recommendation.
   2. Two coats of latex enamel; ____.
      a. Option 1: BM Ultraspec 571 Low Lustre
      b. Option 2: PPG Regency Semi-Gloss
      c. Option 3: Sherwin-Williams ProMar 200 Water based Acrylic, Semi-Gloss

K. Guardrails, Handrails and metal stairways, Galvanized Metals, Unprimed, 3 Coat:
   1. One coat of PPG Amerlock 400 Epoxy primer.
   2. Two coats; PPG Pitthane Ultra Semi-Gloss.

2.04 PRIMERS

A. Primers: Provide the primer recommended by manufacturer of top coats.

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2.05 ACCESSORY MATERIALS

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin application of paints and finishes until substrates have been properly prepared.

B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

E. Test shop-applied primer for compatibility with subsequent cover materials.

F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
   1. Gypsum Wallboard: 12 percent.
   2. Plaster and Stucco: 12 percent.
   3. Masonry, Concrete, and Concrete Masonry Units : 12 percent.
   4. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
   5. Concrete Floors and Traffic Surfaces: 8 percent.

3.02 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or repair existing paints or finishes that exhibit surface defects.

D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

E. Seal surfaces that might cause bleed through or staining of topcoat.

F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

G. Concrete:
   1. Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
   2. Clean surfaces with pressurized water. Use pressure range of 1500 to 4000 psi at 6 to 12 inches. Allow to dry.
   3. Clean concrete according to ASTM D4258. Allow to dry.
   4. Prepare surface as recommended by top coat manufacturer and according to SSPC-SP 13.

H. Masonry:
   1. Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
   2. Prepare surface as recommended by top coat manufacturer.

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3. Clean surfaces with pressurized water. Use pressure range of 600 to 1500 psi at 6 to 12 inches. Allow to dry.

I. Concrete Floors and Traffic Surfaces: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.

J. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.

K. Plaster: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.

L. Insulated Coverings: Remove dirt, grease, and oil from canvas and cotton.

M. Aluminum: Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.

N. Copper: Remove contamination by steam, high pressure water, or solvent washing.

O. Galvanized Surfaces:
1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
2. Prepare surface according to SSPC-SP 2.

P. Ferrous Metal:
1. Solvent clean according to SSPC-SP 1.
2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
3. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

Q. Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

R. Wood Surfaces to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.

S. Glue-Laminated Beams: Prior to finishing, wash surfaces with solvent, remove grease and dirt.

T. Wood Doors to be Field-Finished: Seal wood door top and bottom edge surfaces with clear sealer.

U. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.03 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

C. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

E. Apply each coat to uniform appearance in thicknesses specified by manufacturer.

F. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.

G. Sand wood and metal surfaces lightly between coats to achieve required finish.

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H. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

I. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

J. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for general requirements for field inspection.

B. Owner will provide field inspection.

3.05 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.06 PROTECTION

A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

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SECTION 123600
COUNTERTOPS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Countertops for architectural cabinet work.

B. Countertops for manufactured casework.

C. Wall-hung counters and vanity tops.

D. Sinks molded into countertops.

E. Epoxy resin sinks.

1.02 RELATED REQUIREMENTS

A. Section 064100 - Architectural Wood Casework.

B. Section 123553.19 - Wood Laboratory Casework: Laboratory countertops.

C. Section 224000 - Plumbing Fixtures: Sinks.

1.03 REFERENCE STANDARDS

A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.

C. AWI (QCP) - Quality Certification Program; current edition at www.awiqcp.org.

D. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014, with Errata (2016).

E. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.1; 2016, with Errata (2017).

F. IAPMO Z124 - Plastic Plumbing Fixtures; 2017.

G. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; 2013.

H. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

I. PS 1 - Structural Plywood; 2009.

J. SEFA 2 - Installations; 2010.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Specimen warranty.

C. Shop Drawings: Complete details of materials and installation; combine with shop drawings of cabinets and casework specified in other sections.

D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, minimum size 6 inches square, representing actual product, color, and patterns.

F. Test Reports: Chemical resistance testing, showing compliance with specified requirements.

G. Certificate: Submit labels and certificates required by quality assurance and quality control programs.

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H. Installation Instructions: Manufacturer's installation instructions and recommendations.

I. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.

B. Quality Certification:
   1. Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section: www.awiqcp.org/
   2. Provide labels or certificates indicating that the installed work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
   3. Provide designated labels on shop drawings as required by certification program.
   4. Provide designated labels on installed products as required by certification program.
   5. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 FIELD CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 COUNTERTOPS

A. Plastic Laminate Countertops: High-pressure decorative laminate (HPDL) sheet bonded to substrate.
   1. Laminate Sheet, Type ___: NEMA LD 3, Grade HGS, 0.048 inch nominal thickness.
      a. Manufacturers:
         1) Formica Corporation; Web Address: www.formica.com/
         2) Panolam Industries International, Inc; Nevamar Standard HPL: www.panolam.com/
         3) Wilsonart; Web Address: www.wilsonart.com/
         4) Substitutions: See Section 016000 - Product Requirements.
      b. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
      c. NSF approved for food contact.
      d. Wear Resistance: In addition to specified grade, comply with NEMA LD 3 High Wear Grade requirements for wear resistance.
      e. Laminate Core Color: Same as decorative surface.
      f. Finish: Matte or suede, gloss rating of 5 to 20.
   2. Exposed Edge Treatment: Square, substrate built up to minimum 1-1/4 inch thick; covered with matching laminate.
   3. Back and End Splashes: Same material, same construction.
   4. Fabricate in accordance with manufacturer's standard requirements.

B. Chemical-Resistant Plastic Laminate Countertops: Chemical-resistant high-pressure decorative laminate (HPDL) sheet bonded to substrate.
   1. Laminate Sheet: NEMA LD 3 Grade HGL, 0.039 inch nominal thickness.

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a. Manufacturers:
1) Formica Corporation; _____: www.formica.com/
2) Panolam Industries International, Inc; Pionite ChemGuard: www.panolam.com/
3) Wilsonart; _____: www.wilsonart.com/
4) Substitutions: See Section 016000 - Product Requirements.
b. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
c. NSF approved for food contact.
d. Wear Resistance: In addition to specified grade, comply with NEMA LD 3 High Wear Grade requirements for wear resistance.
e. Finish: Matte or suede, gloss rating of 5 to 20.
f. Surface Color and Pattern: As selected by Architect from manufacturer's full line.

2. Exposed Edge Treatment: Square, substrate built up to minimum 1-1/4 inch thick; covered with matching laminate.
3. Back and End Splashes: Same material, same construction; minimum 4 inches high.
4. Fabricate in accordance with manufacturer's standard requirements.

C. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
1. Flat Sheet Thickness: 3/4 inch, minimum.
2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
a. Manufacturers:
1) Dupont; Corian: www.corian.com/
2) Formica Corporation; Solid Surface: www.formica.com/
3) Samsung Staron Solid Surfaces. www.staron.com
4) Substitutions: See Section 016000 - Product Requirements.
b. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
c. NSF approved for food contact.
d. Sinks and Bowls: Integral castings; minimum 3/4 inch wall thickness; comply with IAPMO Z124.
e. Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20.
f. Color and Pattern: As selected by Architect from manufacturer's full line.

3. Other Components Thickness: 1/2 inch, minimum.
4. Exposed Edge Treatment: Built up to minimum 1-1/4 inch thick; radiused edge; use marine edge at sinks.
5. Back and End Splashes: Same sheet material, square top; minimum 4 inches high.
6. Skirts: As indicated on drawings.

D. Stainless Steel Countertops: ASTM A666, Type 304, stainless steel sheet; 16 gage, 0.0625 inch nominal sheet thickness.
1. Manufacturers:
a. Advance Tabco , www.advancetabco.com.
b. Onepointe Solutions, www.onepointesolutions.com.
c. Stainless Supply, www.stainlesssupply.com
d. E3 Fabrication, www.e3fabrication.com
e. Salt Lake City Stainless Steel, www.saltlakecitystainlesssteel.com
f. Stainless Steel Specialists, www.stainlesssteelspecialists.com
g. Substitutions: See Section 016000 - Product Requirements.

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2. Finish: 4B satin brushed finish.
3. Exposed Edge Shape: Bullnose with return; 5/8 inch radius, return to face of case; reinforced with hardwood or steel.
4. Back and End Splashes: Same material; welded 1/4 inch radius coved joint to countertop; square top edge with 1 inch wide top surface and minimum 1/2 inch turndown.
5. Splash Dimensions: 4 inch high by 1 inch thick, unless otherwise indicated.
6. Sinks: Same material, same thickness; flush welded to counter; bottom sloped to outlet; radiused interior corners; drain outlet located in back corner.
7. Troughs: Same material; bottom sloped to outlet.

2.02 MATERIALS

A. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch thick; join lengths using metal splines.

B. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.

2.03 FABRICATION

A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
   1. Join lengths of tops using best method recommended by manufacturer.
   2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
   3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.

B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
   1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
   2. Height: 4 inches, unless otherwise indicated.

C. Solid Surfacing: Fabricate tops and wall panels up to 144 inches long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.
   1. Integral sinks: Shop-mount securely to countertop with adhesives, using flush configuration, as per manufacturer's instructions, and as detailed on drawings.

D. Stainless Steel: Fabricate tops up to 144 inches long in one piece including nosings and back and end splashes; accurately fitted mechanical field joints in lengths over that dimension are permitted.
   1. Weld joints; grind smooth and polish to match.
   2. Provide stainless steel hat channel stiffeners, welded or soldered to underside, where indicated on drawings.
   3. Provide wall clips for support of back/end splash turndowns.
   4. Sound Deadening: Apply water resistant, fire resistant sound deadening mastic to entire bottom surface.
   5. Integral sinks: Fabricate with corners rounded and coved, double-walls for sink compartment partitions, and drainboards. Factory-punch holes for fittings, and weld sinks to countertops.

E. Wall-Mounted Counters: Provide skirts, aprons, brackets, and braces as indicated on drawings, finished to match.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

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C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Install laboratory worksurface countertops in compliance with requirements of SEFA 2.

B. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.

C. Attach plastic laminate countertops using screws with minimum penetration into substrate board of 5/8 inch.

D. Attach stainless steel countertops using stainless steel fasteners and clips.

E. Seal joint between back/end splashes and vertical surfaces.

3.04 TOLERANCES

A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.

B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.

C. Field Joints: 1/8 inch wide, maximum.

3.05 CLEANING

A. Clean countertops surfaces thoroughly.

3.06 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

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SECTION 233700
AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Diffusers.

B. Registers/grilles.

1.02 RELATED REQUIREMENTS

A. Section 099123 - Interior Painting: Painting of ducts visible behind outlets and inlets.

1.03 REFERENCE STANDARDS

A. AHRI 880 (I-P) - Performance Rating of Air Terminals; 2011 with Addendum 1.

B. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; 2015.

C. AMCA 511 - Certified Ratings Program for Air Control Devices; 2010.

D. AMCA 550 - Test Method for High Velocity Wind Driven Rain Resistant Louvers; 2015.

E. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Inlets; 2006 (R2011).

F. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

G. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.

H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.

I. ISO 14644-1 - Cleanrooms and associated controlled environments - Part 1: Classification of air cleanliness by particle concentration; 2015.

J. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

K. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.

L. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2018.

M. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

N. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Rev. 2009).

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission.

C. Project Record Documents: Record actual locations of air outlets and inlets.

1.05 QUALITY ASSURANCE

A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.

B. Test and rate louver performance in accordance with AMCA 500-L.

C. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

D. Coordinate with Owner's commissioning representative, on first install, to confirm compliance of specification requirements.

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SECTION 233600
AIR TERMINAL UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air terminal units.
   1. Single-duct, variable-volume units.

B. Hot water reheat coil.

1.02 RELATED REQUIREMENTS

A. Section 230513 - Common Motor Requirements for HVAC Equipment.

B. Section 230548 - Vibration and Seismic Controls for HVAC Piping and Equipment.

C. Section 230913 - Instruments and Control Elements: Thermostats and actuators.

D. Section 230923 - Direct-Digital Control System for HVAC.

E. Section 230993 - Sequence of Operations for HVAC Controls.

F. Section 232113 - Hydronic Piping: Connections to heating coils.

G. Section 232114 - Hydronic Specialties: Connections to heating coils.

H. Section 233100 - HVAC Ducts and Casings.

I. Section 233300 - Air Duct Accessories.

J. Section 233700 - Air Outlets and Inlets.

K. Section 238200 - Convection Heating and Cooling Units: Air coils.

L. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

A. AHRI 410 - Forced-Circulation Air-Cooling and Air-Heating Coils; 2001 (R2011).

B. AHRI 880 (I-P) - Performance Rating of Air Terminals; 2011 with Addendum 1.

C. AHRI 885 - Procedure for Estimating Occupied Space Sound Levels in the Application of Air Terminals and Air Outlets; 2008 with Addendum 1.

D. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size; 2017.

E. ASHRAE Std 62.1 - Ventilation for Acceptable Indoor Air Quality; 2016.

F. ASHRAE Std 130 - Methods of Testing Air Terminal Units; 2016.

G. ASTM A492 - Standard Specification for Stainless Steel Rope Wire; 1995 (Reapproved 2013).

H. ASTM A603 - Standard Specification for Zinc-Coated Steel Structural Wire Rope; 1998 (Reapproved 2014).

I. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material); 2016.

J. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.

K. ASTM E488/E488M - Standard Test Methods for Strength of Anchors in Concrete Elements; 2015.

L. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

M. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

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SECTION 233300
AIR DUCT ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air turning vanes.

B. Duct access doors.

C. High efficiency take-offs with hand dampers.

D. Hand dampers.

E. Duct test holes.

F. Flexible duct connections.

G. Variable control dampers.

H. Miscellaneous products:
   1. Duct opening closure film.

1.02 RELATED REQUIREMENTS

B. Section 220548 - Vibration and Seismic Controls for Plumbing Piping and Equipment.

C. Section 233100 - HVAC Ducts and Casings.

D. Section 233600 - Air Terminal Units: Pressure regulating damper assemblies.

E. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.

C. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2017.

D. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Rev. 2009).

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide for shop fabricated assemblies including volume control dampers, duct access doors, and hardware used. Include electrical characteristics and connection requirements.

C. Project Record Drawings: Record actual locations of access doors.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Products Requiring Electrical Connection: Listed and classified by testing firm acceptable to the Authority Having Jurisdiction as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect dampers from damage to operating linkages and blades. Store in clean, dry location.

PART 2 PRODUCTS

2.01 AIR TURNING DEVICES

A. Manufacturers:
   1. Carlisle HVAC Products; Model DYN-O-RAIL, DYN-O-RAIL JR.
   2. Elgen Manufacturing, Inc; Model EVR-1

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SECTION 233100

HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal ductwork.

B. Nonmetal ductwork.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete.

B. Section 078400 - Firestopping.

C. Section 099113 - Exterior Painting: Weld priming, weather resistant, paint or coating.

D. Section 099123 - Interior Painting: Weld priming, paint or coating.

E. Section 114000 - Foodservice Equipment: Supply of kitchen range hoods for placement by this Section.

F. Section 230130.51 - HVAC Air Duct Cleaning: Cleaning ducts after completion of installation.

G. Section 230593 - Testing, Adjusting, and Balancing for HVAC.

H. Section 230713 - Duct Insulation: External insulation and duct liner.

I. Section 233300 - Air Duct Accessories.

J. Section 233600 - Air Terminal Units.

K. Section 233700 - Air Outlets and Inlets.

1.03 REFERENCE STANDARDS

A. ASHRAE (FUND) - ASHRAE Handbook - Fundamentals; 2017.

B. ASHRAE Std 126 - Method of Testing HVAC Air Ducts; 2016.

C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

D. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2016.

E. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes; 2017.

F. ASTM A480/A480M - Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip; 2017.

G. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

H. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.

I. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2016.

J. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2015.

K. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

L. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.

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SECTION 232114
HYDRONIC SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Strainers.

B. Air vents.

C. Pressure-temperature test plugs.

D. Balancing valves.

1.02 RELATED REQUIREMENTS

A. Section 232113 - Hydronic Piping.

B. Section 232500 - HVAC Water Treatment: Pipe cleaning.

1.03 REFERENCE STANDARDS

A. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; 2015.

B. ASME B16.5 - Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24 Metric/Inch Standard; 2017.

C. ASME B16.11 - Forged Fittings, Socket-welding and Threaded; 2016 (Errata 2017).

D. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels; 2017.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Conduct a preinstallation meeting prior to the start of the work of this section; require attendance by all affected installers.

B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product data for manufactured products and assemblies required for this project. Include component sizes, rough-in requirements, service sizes, and finishes. Include product description and model.

C. Certificates: Inspection certificates for pressure vessels from authority having jurisdiction.

D. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.

E. Maintenance Data: Include installation instructions, assembly views, lubrication instructions, and replacement parts list.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

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SECTION 232113
HYDRONIC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hydronic system requirements.
B. Heating water piping, above grade.
C. Equipment drains and overflows.
D. Pipe hangers and supports.
E. Unions, flanges, mechanical couplings, and dielectric connections.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.
B. Section 083100 - Access Doors and Panels.
C. Section 099123 - Interior Painting.
D. Section 220516 - Expansion Fittings and Loops for Plumbing Piping.
E. Section 220548 - Vibration and Seismic Controls for Plumbing Piping and Equipment.
F. Section 220553 - Identification for Plumbing Piping and Equipment.
G. Section 220719 - Plumbing Piping Insulation.
H. Section 230516 - Expansion Fittings and Loops for HVAC Piping.
I. Section 230523 - General-Duty Valves for HVAC Piping.
J. Section 230548 - Vibration and Seismic Controls for HVAC Piping and Equipment.
K. Section 230553 - Identification for HVAC Piping and Equipment.
L. Section 230719 - HVAC Piping Insulation.
M. Section 232114 - Hydronic Specialties.
N. Section 232500 - HVAC Water Treatment: Pipe cleaning.

1.03 REFERENCE STANDARDS

A. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing and Fusing Operators; 2017.
B. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2016.
C. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2012.
D. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.
E. ASME B31.9 - Building Services Piping; 2014.
F. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
G. ASTM A106/A106M - Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service; 2015.
H. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
I. ASTM A183 - Standard Specification for Carbon Steel Track Bolts and Nuts; 2014.

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SECTION 230800
COMMISSIONING OF HVAC

PART 1 GENERAL

1.01 SUMMARY

A. See Section 019113 - General Commissioning Requirements for overall objectives; comply with the requirements of Section 019113.

B. This section covers the Contractor's responsibilities for commissioning; each subcontractor or installer responsible for the installation of a particular system or equipment item to be commissioned is responsible for the commissioning activities relating to that system or equipment item.

C. The Commissioning Authority (CxA) will be employed by the owner and directs and coordinates all commissioning activities and provides Prefunctional Checklists and Functional Test Procedures for Contractor's use.

D. The entire HVAC system is to be commissioned, including commissioning activities for the following specific items:
   1. Control system.
   2. Major and minor equipment items.
   3. Piping systems and equipment.
   4. Ductwork and accessories.
   5. Terminal units.
   6. Other equipment and systems explicitly identified elsewhere in Contract Documents as requiring commissioning.

E. The Prefunctional Checklist and Functional Test requirements specified in this section are in addition to, not a substitute for, inspection or testing specified in other sections.

1.02 RELATED REQUIREMENTS

A. Section 017800 - Closeout Submittals: Scope and procedures for operation and maintenance manuals and project record documents.

B. Section 017900 - Demonstration and Training: Scope and procedures for Owner personnel training.

C. Section 019113 - General Commissioning Requirements: Commissioning requirements that apply to all types of work.

D. Section 230923 - Direct-Digital Control System for HVAC.

E. Section 230913 - Instruments and Control Elements.

F. Section 230993 - Sequence of Operations for HVAC Controls.

G. Section 230593 - Testing, Adjusting, and Balancing for HVAC.

1.03 REFERENCE STANDARDS

A. ASHRAE Guideline 1.1 - The HVAC&R Technical Requirements for the Commissioning Process; 2007 (Errata 2012).

1.04 SUBMITTALS

A. Updated Submittals: Keep the Commissioning Authority informed of all changes to control system documentation made during programming and setup; revise and resubmit when substantial changes are made.

B. Prefunctional Checklists and Functional Test Procedures for Control System: Detailed written plan indicating the procedures to be followed to test, checkout and adjust the control system prior to full system Functional Testing; include at least the following for each type of equipment controlled:

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SECTION 230719
HVAC PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Flexible removable and reusable blanket insulation.

B. Jackets and accessories.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.

B. Section 099123 - Interior Painting: Painting insulation jacket.

C. Section 232113 - Hydronic Piping: Placement of hangers and hanger inserts.

1.03 REFERENCE STANDARDS

A. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007 (Reapproved 2013).

B. ASTM C449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement; 2007 (Reapproved 2013).

C. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2017.

D. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation; 2013.

E. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2016.

F. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2017.

G. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation; 2016a.

H. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013.

I. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2016.

J. ASTM C585 - Standard Practice for Inner and Outer Diameters of Thermal Insulation for Nominal Sizes of Pipe and Tubing; 2010 (Reapproved 2016).

K. ASTM C591 - Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation; 2017.

L. ASTM C610 - Standard Specification for Molded Expanded Perlite Block and Pipe Thermal Insulation; 2016.

M. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2013).

N. ASTM C1410 - Standard Specification for Cellular Melamine Thermal and Sound-Absorbing Insulation; 2014.

O. ASTM C1695 - Standard Specification for Fabrication of Flexible Removable and Reusable Blanket Insulation for Hot Service; 2010 (Reapproved 2015).

P. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension; 2016.

Q. ASTM D570 - Standard Test Method for Water Absorption of Plastics; 1998 (Reapproved 2010).

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SECTION 230713

DUCT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Duct insulation.

B. Duct liner.

C. Insulation jackets.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.

B. Section 099113 - Exterior Painting: Painting insulation jackets.

C. Section 099123 - Interior Painting: Painting insulation jackets.

D. Section 220553 - Identification for Plumbing Piping and Equipment.

E. Section 230553 - Identification for HVAC Piping and Equipment.

F. Section 233100 - HVAC Ducts and Casings: Glass fiber ducts.

1.03 REFERENCE STANDARDS

A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.

C. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2013.

D. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2017.

E. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2016.

F. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013.

G. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014.

H. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2013).

I. ASTM C916 - Standard Specification for Adhesives for Duct Thermal Insulation; 2014.

J. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material); 2016.

K. ASTM C1290 - Standard Specification for Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts; 2016.

L. ASTM C1410 - Standard Specification for Cellular Melamine Thermal and Sound-Absorbing Insulation; 2014.

M. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.

N. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.

O. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.

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SECTION 230593

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL **UPDATED FULL SECTION**

1.01 GENERAL CONDITIONS **FEBRUARY 2023**

A. Mechanical Contractor shall be responsible to verify if a Commissioning Agent is retained by Owner for the current project. If no Commissioning Agent is hired, then it shall be the responsibility of the Mechanical Contractor to provide commissioning services as per specification section 230800.

B. The Testing, Adjusting, and Balancing (TAB) Contractor is responsible for all work in this section in coordination with BYU Construction Project Manager.

C. Work of this section shall be subject to the requirements of the General Conditions of this contract, the General Mechanical Requirements, General Electrical Requirements and other sections where this work shares a responsibility.

D. Startup of mechanical systems shall be the responsibility of the Mechanical Contractor and his subcontractors with the participation of the Electrical Contractor related to electrical work and the General Contractor related to general construction items.

E. Testing and balancing shall be the responsibility of the Mechanical Contractor under the direction of the General Contractor with the full participation of all the mechanical and electrical trades employed on the project and shall include the participation of an independent testing and balance contractor to coordinate all elements of the TAB work and to perform special technical services outlined herein.

F. TAB Contractor shall coordinate all work with BYU Construction Project Manager. BYU Construction Project Manager shall coordinate work with BYU Commissioning representatives, BYU Air Conditioning Shop representatives, BYU Mechanical Shop representatives, and Owner contracted Digital Controls Supplier and Programmer.

1.02 SECTION INCLUDES

A. Testing, Adjustment, and Balancing of:
   1. Air conditioning equipment including air distribution devices, supply ducts, air handling units, condensing units, fans, coils, and related equipment.
   2. Hydronic systems including pumps, water distributions systems, chillers, boilers, heat exchangers, coils and related equipment.

B. System Commissioning - Extent of Work:
   1. The work required by this section includes, but is not necessarily limited to the following:
      a. The pre-startup inspection of all systems and subsequent correction of any incorrect items. (PFAT)
      b. The initial first run inspections. (FAT)
      c. System operations inspections.
   2. The intent of this work is to provide for proper installation, startup, service and operation of the mechanical systems in preparation for system balance.
   3. Repair, replacement or adjustment of each item shall be performed by the installing contractor.
   4. Involves all new construction and those elements of existing construction which are affected by this project.

C. Testing and Balancing - Extent of Work:
   1. This work incorporates a confirming checkout of construction work, an individual component activation and an overall system activation into one work program which shall serve as the transition period from Contractor's job to Owner's facility.
   2. The TAB Contractor shall be skilled in the operation and manipulation of systems and in the direction of parties involved in the work.

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SECTION 230553

IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates.

B. Tags.

C. Pipe markers.

1.02 RELATED REQUIREMENTS

A. Section 099123 - Interior Painting: Identification painting.

1.03 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2015.

B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2017.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.

C. Product Data: Provide manufacturers catalog literature for each product required.

D. Manufacturer's Installation Instructions: Indicate special procedures, and installation.

E. Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

A. Scheduled Equipment: Nameplates.

B. Air Terminal Units: Adhesive label or legible hand-written permanent marker.

C. Automatic Control Sensors, Relays, Actuators: Adhesive label or legible hand-written permanent marker at closest junction box.

D. Control Panels: Nameplates.

E. Dampers: Adhesive label or legible hand-written permanent marker at closest junction box.

F. Piping: Pipe markers.

G. Valves: Tags.

2.02 NAMEPLATES

A. Manufacturers:
   1. Advanced Graphic Engraving, LLC; _____
   2. Brimar Industries, Inc; _____: www.pipemarker.com
   3. Craftmark Pipe Markers; _____
   4. Kolbi Pipe Marker Co; _____
   5. Seton Identification Products, a Tricor Direct Company; _____
   6. Substitutions: See Section 016000 - Product Requirements.

B. Letter Color: White.

C. Letter Height: 1/4 inch.

D. Background Color: Black.

E. Plastic: Comply with ASTM D709.

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SECTION 230548

VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Match specification section 220548 for requirements for seismic control requirements.

B. Match specification section 220548 for requirements for seismic restraints for suspended components and equipment.

1.02 RELATED REQUIREMENTS

A. Section 014533 - Code-Required Special Inspections.

B. Section 033000 - Cast-in-Place Concrete.

C. Section 220548 - Vibration and Seismic Controls for Plumbing Piping and Equipment.

1.03 DEFINITIONS

A. HVAC Component: Where referenced in this section in regards to seismic controls, applies to any portion of the HVAC system subject to seismic evaluation in accordance with applicable codes, including distributed systems (e.g., ductwork, piping).

B. Seismic Restraint: Structural members or assemblies of members or manufactured elements specifically designed and applied for transmitting seismic forces between components and the seismic force-resisting system of the structure.

1.04 REFERENCE STANDARDS

A. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; 2010, with 2013 Supplements and Errata.

B. ASCE 19 - Structural Applications of Steel Cables for Buildings; 2016.

C. ASHRAE (HVACA) - ASHRAE Handbook - HVAC Applications; 2015.

D. ICC (IBC) - International Building Code (current adopted version)

E. ICC-ES AC156 - Acceptance Criteria for Seismic Certification by Shake-Table Testing of Nonstructural Components; 2010, with Editorial Revision (2015).

F. MFMA-4 - Metal Framing Standards Publication; 2004.

G. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; 2017.

H. SMACNA (SRM) - Seismic Restraint Manual Guidelines for Mechanical Systems; Sheet Metal and Air Conditioning Contractors' National Association; 2008.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for products, including materials, fabrication details, dimensions, and finishes.

C. Seismic Design Data:

1. Compile information on project-specific characteristics of actual installed HVAC components necessary for determining seismic design forces required to design appropriate seismic controls.
    a. Component operating weight and center of gravity.
    b. Component elevation in the building in relation to the roof elevation (z/h).
    c. Component importance factor (Ip).
    d. For distributed systems, component materials and connection methods.

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SECTION 230529

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. See specification section 220529 for requirements for this section.

END OF SECTION

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SECTION 230523

GENERAL-DUTY VALVES FOR HVAC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Applications.
B. General requirements.
C. Ball valves.
D. Check valves.
E. Flow control valves.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.
B. Section 083100 - Access Doors and Panels.
C. Section 230548 - Vibration and Seismic Controls for HVAC Piping and Equipment.
D. Section 230553 - Identification for HVAC Piping and Equipment.
E. Section 230716 - HVAC Equipment Insulation.
F. Section 230719 - HVAC Piping Insulation.
G. Section 232113 - Hydronic Piping.
H. Section 232213 - Steam and Steam Condensate Piping.

1.03 ABBREVIATIONS AND ACRONYMS

A. CWP: Cold working pressure.
B. EPDM: Ethylene propylene copolymer rubber.
C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
D. NRS: Nonrising stem.
E. OS&Y: Outside screw and yoke.
F. PTFE: Polytetrafluoroethylene.
G. RS: Rising stem.
H. SWP: Steam working pressure.
I. TFE: Tetrafluoroethylene.
J. WOG: Water, oil, and gas.

1.04 REFERENCE STANDARDS

A. API STD 594 - Check Valves: Flanged, Lug Wafer, and Butt-Welding; 2017.
B. ASME B1.20.1 - Pipe Threads, General Purpose (Inch); 2013.
C. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; 2015.
D. ASME B16.5 - Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24 Metric/Inch Standard; 2017.
E. ASME B16.10 - Face-to-Face and End-to-End Dimensions of Valves; 2017.
F. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2012.
G. ASME B16.34 - Valves - Flanged, Threaded and Welding End; 2017.

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SECTION 230517

SLEEVES AND SLEEVE SEALS FOR HVAC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe sleeves.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.

B. Section 099113 - Exterior Painting: Preparation and painting of exterior piping systems.

C. Section 099123 - Interior Painting: Preparation and painting of interior piping systems.

D. Section 220523 - General-Duty Valves for Plumbing Piping.

E. Section 220553 - Identification for Plumbing Piping and Equipment: Piping identification.

F. Section 220716 - Plumbing Equipment Insulation.

G. Section 220719 - Plumbing Piping Insulation.

H. Section 230523 - General-Duty Valves for HVAC Piping.

I. Section 230553 - Identification for HVAC Piping and Equipment: Piping identification.

J. Section 230716 - HVAC Equipment Insulation.

K. Section 230719 - HVAC Piping Insulation.

1.03 REFERENCE STANDARDS

A. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type); 2016.

B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified this section.
   1. Minimum three years' experience.
   2. Approved by manufacturer.

C. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store sleeve and sleeve seals in shipping containers, with labeling in place.

B. Provide temporary protective coating on cast iron and steel sleeves if shipped loose.

1.07 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

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SECTION 230100

MECHANICAL OPERATION AND MAINTENANCE MANUALS

PART 1 GENERAL **THE 230000 HAS BEEN COMPLETELY UPDATED**

1.01 SECTION INCLUDES **FEBRUARY 2023**

A. Operation and Maintenance Data.

1.02 RELATED REQUIREMENTS

A. Section 013000 - Administrative Requirements: Submittal procedures, project meetings, progress schedules and documentation, reports, coordination.

B. Section 017800 - Closeout Submittals: Project record documents, operation and maintenance (O&M) data, warranties and bonds.

1.03 SUMMARY

A. Furnish one set of bound operation and maintenance manuals and two thumb drives with electronic copies of maintenance manuals in pdf format.

1.04 PURPOSE

A. The Operation and Maintenance Manual is prepared to provide a ready reference to all important pieces of mechanical and electrical equipment installed on the project including completed start-up documentation. It is also to provide the necessary operating and maintenance data for use by service personnel. It is also to provide information required for checking equipment performance or for planning of physical plant expansion or redesign.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 ASSEMBLY OF DURABLE OPERATION AND MAINTENANCE MANUALS

A. Assemble operation and maintenance data into durable manual(s) for Owner's personnel use, with data arranged in divisions as outlined below.

B. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 4 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings. The number of binders, however, shall be based upon not filling them beyond 2 1/2 inch thickness.

C. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

D. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.

E. Tables of Contents: List every division separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.

1. Master Table of Contents shall be (Include, in Project Operation and Maintenance Manual, only divisions used in project. Modify Table of Contents for each project manual.):
    a. Plumbing Equipment
        1) 1131 - Plumbing Air System
        2) 1132 - Water Softener
        3) 1133 - Plumbing Pressure System
        4) 1135 - Water Heater
        5) 1136 - Plumbing Pump
        6) 1138 - Plumbing Delivery System

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SECTION 220548

VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Seismic control requirements.
   1. Includes requirements for seismic qualification of equipment not specified in this section.

B. Seismic restraints for suspended components and equipment.

1.02 RELATED REQUIREMENTS

A. Section 014533 - Code-Required Special Inspections: Statement of Special Inspections; additional requirements for code-required special inspections.

B. Section 033000 - Cast-in-Place Concrete.

C. Section 055000 - Metal Fabrications: Materials and requirements for fabricated metal supports.

D. Section 220529 - Hangers and Supports for Plumbing Piping and Equipment.

E. Section 230548 - Vibration and Seismic Controls for HVAC Piping and Equipment.

1.03 DEFINITIONS

A. Plumbing Component: Where referenced in this section in regards to seismic controls, applies to any portion of the plumbing system subject to seismic evaluation in accordance with applicable codes, including distributed systems (e.g., piping).

B. Seismic Restraint: Structural members or assemblies of members or manufactured elements specifically designed and applied for transmitting seismic forces between components and the seismic force-resisting system of the structure.

1.04 REFERENCE STANDARDS

A. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; 2010, with 2013 Supplements and Errata.

B. ASCE 19 - Structural Applications of Steel Cables for Buildings; 2016.

C. ASHRAE (HVACA) - ASHRAE Handbook - HVAC Applications; 2015.

D. ICC (IBC) - International Building Code; 2015.

E. ICC-ES AC156 - Acceptance Criteria for Seismic Certification by Shake-Table Testing of Nonstructural Components; 2010, with Editorial Revision (2015).

F. MFMA-4 - Metal Framing Standards Publication; 2004.

G. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; 2017.

H. SMACNA (SRM) - Seismic Restraint Manual Guidelines for Mechanical Systems; Sheet Metal and Air Conditioning Contractors' National Association; 2008.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate selection and arrangement of vibration isolation and/or seismic control components with the actual equipment to be installed.
   2. Coordinate the work with other trades to provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.

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SECTION 220529

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Support and attachment components for equipment, piping, and other plumbing work.

B. Retrofit piping cover system.

1.02 RELATED REQUIREMENTS

A. Section 055000 - Metal Fabrications: Materials and requirements for fabricated metal supports.

1.03 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.

C. ASTM A181/A181M - Standard Specification for Carbon Steel Forgings, for General - Purpose Piping; 2014.

D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

E. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999 (Reapproved 2014).

F. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2015.

G. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2014.

H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.

I. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.

J. MFMA-4 - Metal Framing Standards Publication; 2004.

K. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.

L. NFPA 101 - Life Safety Code; 2015.

M. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
2. Coordinate the work with other trades to provide additional framing and materials required for installation.
3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

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SECTION 211300

FIRE-SUPPRESSION SPRINKLER SYSTEMS

PART 1 GENERAL UPDATED MAY 2023

1.01 SECTION INCLUDES

A. Wet-pipe sprinkler system.

B. System design, installation, and certification.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.

B. Section 083477 - Smoke and Fire Protective Curtain Assemblies: Smoke and fire curtains to be released by activation of sprinkler system.

C. Section 210500 - Common Work Results for Fire Suppression: Pipe and fittings.

D. Section 210523 - General-Duty Valves for Water-Based Fire-Suppression Piping.

E. Section 210548 - Vibration and Seismic Controls for Fire Suppression Piping and Equipment.

F. Section 210553 - Identification for Fire Suppression Piping and Equipment.

G. Section 211200 - Fire-Suppression Standpipes.

H. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

I. Section 284600 - Fire Detection and Alarm.

1.03 REFERENCE STANDARDS

A. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements; 2015.

B. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements; 2015.

C. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2015.

D. ITS (DIR) - Directory of Listed Products; current edition.

E. NFPA 13 - Standard for the Installation of Sprinkler Systems; 2016.

F. NFPA 13R - Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies; 2016.

G. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Conduct a preinstallation meeting prior to the start of the work of this section; require attendance by all affected installers. First install scope shall be determined at this meeting.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on sprinklers, valves, and specialties, including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

C. Shop Drawings:

1. Submit preliminary layout of finished ceiling areas indicating only sprinkler locations coordinated with ceiling installation.
2. Indicate hydraulic calculations, detailed pipe layout, hangers and supports, seismic bracing, sprinklers, components and accessories. Indicate system controls.

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SECTION 210553

IDENTIFICATION FOR FIRE SUPPRESSION PIPING AND EQUIPMENT

PART 1 GENERAL **THIS SECTION UPDATED COMPLETELY OCTOBER 2020**

1.01 SECTION INCLUDES

A. Nameplates.

B. Tags.

C. Laminated Fire Sprinkler Zone Plans

1.02 REFERENCE STANDARDS

A. NFPA 13

B. ASME A13.1 - Scheme for the Identification of Piping Systems; 2015.

C. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2017.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.

C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number. Shall be in laminated design drawings hung at each control valve.

D. Product Data: Provide manufacturers catalog literature for each product required.

E. Manufacturer's Installation Instructions: Indicate special procedures, and installation instructions.

F. Project Record Documents: Record actual locations of tagged valves to be submitted to owner.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

A. Automatic Controls: Nameplates.

B. Instrumentation: Nameplates.

C. Pumps: Nameplates.

D. Small-sized Equipment: Nameplates.

E. Floor Control Valves: Nameplates and Laminated Fire Sprinkler Zone Plans

2.02 NAMEPLATES

A. Description: Laminated three-layer plastic with engraved letters.
   1. Letter Color: Red.
   2. Letter Height: 1/2 inch.
   3. Background Color: White.
   4. Thickness: 1/16" - 1/8" inch.
   5. Plastic: Conform to ASTM D709.

2.03 LAMINATED FIRE SPRINKLER ZONE PLANS

A. Description: 11"x17" laminated fire sprinkler zone plan at each control valve indicating portion of system controlled by each valve. Hang plans from valve.

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SECTION 210500

COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 GENERAL THIS SECTION UPDATED COMPLETE OCTOBER 2020

1.01 SECTION INCLUDES

A. Above ground piping.
B. Escutcheons.
C. Pipe, fittings, sleeves, escutcheons, seals, and connections for sprinkler systems.
D. Expansion joints.
E. Expansion loops.
F. Pipe hangers and supports.
G. Pipe sleeves.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.
B. Section 099113 - Exterior Painting: Preparation and painting of exterior fire protection piping systems.
C. Section 099123 - Interior Painting: Preparation and painting of interior fire protection piping systems.
D. Section 210523 - General-Duty Valves for Water-Based Fire-Suppression Piping.
E. Section 210553 - Identification for Fire Suppression Piping and Equipment: Piping identification.
F. Section 211200 - Fire-Suppression Standpipes: Standpipe design.
G. Section 211300 - Fire-Suppression Sprinkler Systems: Sprinkler systems design.
H. Section 220553 - Identification for Plumbing Piping and Equipment: Piping identification.

1.03 REFERENCE STANDARDS

A. ASME A112.18.1 - Plumbing Supply Fittings; 2012.
B. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Procedures; Welders; Braziers; and Welding, Brazing and Fusing Operators; 2017.
C. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; 2015.
D. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2016.
E. ASME B16.4 - Gray Iron Threaded Fittings: Classes 125 and 250; 2016.
F. ASME B16.5 - Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24 Metric/Inch Standard; 2017.
G. ASME B16.9 - Factory-Made Wrought Buttwelding Fittings; 2012.
H. ASME B16.11 - Forged Fittings, Socket-welding and Threaded; 2016 (Errata 2017).
I. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2012.
J. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.
K. ASME B16.25 - Buttwelding Ends; 2012.
L. ASME B36.10M - Welded and Seamless Wrought Steel Pipe; 2015.
M. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999 (Reapproved 2014).

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SECTION 260505

SELECTIVE DEMOLITION FOR ELECTRICAL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical demolition.

1.02 RELATED REQUIREMENTS

A. Section 017000 - Execution and Closeout Requirements: Additional requirements for alterations work.

B. Section 028400 - Polychlorinate Biphenyl (PCB) Remediation: Removal of equipment and materials containing substances regulated under the Federal Toxic Substances Control Act (TSCA), including but not limited to those containing PCBs and mercury.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual sections.

B. Any existing equipment or materials to remain or be reused, shall meet current individual sections.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify field measurements and circuiting arrangements are as indicated.

B. Verify that abandoned wiring and equipment serve only abandoned facilities.

C. Demolition drawings are based on casual field observation and existing record documents.

D. Report discrepancies to Owner and Owner's Construction Project Coordinator, before disturbing existing installation.

E. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

A. Disconnect electrical systems in walls, floors, and ceilings to be removed.

B. Coordinate utility service outages with Owner and utility provider.

C. Provide temporary wiring and connections to maintain existing systems in service during construction.

D. When work must be performed on energized equipment or circuits, use personnel experienced in such operations, with appropriate safety equipment and practices.

E. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.

1. Obtain permission from Owner at least 72 hours before partially or completely disabling system, unless otherwise indicated.
2. Make temporary connections to maintain service in areas adjacent to work area as indicated.

F. Existing Fire Alarm System: Maintain existing system in service until new system is accepted. Disable system only to make switchovers and connections. Minimize outage duration.

1. Coordinate with Owner at least 72 hours before partially or completely disabling system.

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2. Make temporary connections to maintain service in areas adjacent to work area. In areas where fire alarm system is inoperable, provide fire watch per Division 28.
3. For occupied buildings, provide a Fire Watch, per Section 284600, for all areas where the fire alarm detection and/or annunciation devices have been removed.

G. Existing Telephone/Data System: Maintain existing system in service until new system is complete and ready for service. Disable system only upon the approval of the Owner's Office of Information Technology (OIT), to make switchovers and connections. Minimize outage duration.
1. Coordinate with Owner at least 72 hours before partially or completely disabling system.
2. Notify Owner's Office of Information Technology (OIT) at least 24 hours before partially or completely disabling system.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Contractor to perform work for removal of equipment and materials containing toxic substances, regulated under the Federal Toxic Substances Control Act (TSCA), in accordance with Section 028400 and applicable federal, state, and local regulations. Return equipment and materials to Owner's Chemical Management Building, for disposal by the Owner. Applicable equipment and materials include, but are not limited to:
1. PCB-containing electrical equipment, including transformers, capacitors, and switches.
2. PCB- and DEHP-containing lighting ballasts.
3. Mercury-containing lamps and tubes, including fluorescent lamps, high intensity discharge (HID), arc lamps, ultra-violet, high pressure sodium, mercury vapor, ignitron tubes, neon, and incandescent.

B. Remove, relocate, and extend existing installations to accommodate new construction.

C. Remove abandoned wiring to source of supply.

D. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

E. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.

F. Disconnect and remove abandoned panelboards and distribution equipment.

G. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.

H. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories, complete. Remove ballasts and lamps from light fixtures being abandoned. Place ballasts and lamps in Owner furnished barrels. Ballasts and lamps to be disposed of by the Owner.

I. Repair adjacent construction and finishes damaged during demolition and extension work.

J. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.

K. Protect existing electrical equipment and installations indicated to remain. If damaged or disturbed in the course of the Work, remove damaged portions and install new products of equal capacity, quality, and functionality.

L. Accessible Work: Remove exposed electrical equipment and installations, indicated to be demolished, in their entirety.

M. Abandoned Work: Cap raceways and patch surface to match existing finish.

N. Remove demolished material from Project site.

O. Remove, store, clean, reinstall, reconnect, and make operational components indicated for relocation.

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P. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

Q. In areas where the electrical panel feeds loads in areas not affected by this project, do not turn off circuit breakers until the entire circuit have been verified to not affect areas outside this project.

3.04 CLEANING AND REPAIR

A. See Section 017419 - Construction Waste Management and Disposal for additional requirements.

B. Clean and repair existing materials and equipment that remain or that are to be reused.

C. Panelboards: Clean interior and exposed surfaces. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

D. Luminaires: Remove existing luminaires for cleaning. Use mild detergent to clean all exterior and interior surfaces; rinse with clean water and wipe dry.

END OF SECTION

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SECTION 260519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL **UPDATED MAY 2023**

1.01 SECTION INCLUDES **SEE CHANGES IN BOLD**

A. Single conductor building wire.
B. Nonmetallic-sheathed cable.
C. Underground feeder and branch-circuit cable.
D. Metal-clad cable.
E. Power and control tray cable.
F. Manufactured wiring systems.
G. Aluminum cable terminations.
H. Wiring connectors.
I. Electrical tape.
J. Heat shrink tubing.
K. Oxide inhibiting compound.
L. Wire pulling lubricant.
M. Cable ties.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.
B. Section 260505 - Selective Demolition for Electrical: Disconnection, removal, and/or extension of existing electrical conductors and cables.
C. Section 260513 - Medium-Voltage Cables: Cables and terminations for systems 601 V through 35,000 V.
D. Section 260519.13 - Under carpet Electrical Power Cables: Flat conductor cable and fittings for under carpet power distribution.
E. Section 260526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.
F. Section 260536 - Cable Trays for Electrical Systems: Additional installation requirements for cables installed in cable tray systems.
G. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
H. **Section 262300 - Low-Voltage Switchgear.** **H,L, & J Updated May 2023**
I. **Section 262413 - Switchboards.**
J. **Section 262416 - Panelboards.**
K. Section 284600 - Fire Detection and Alarm: Fire alarm system conductors and cables.
L. Section 312316 - Excavation.
M. Section 312316.13 - Trenching: Excavating, bedding, and backfilling.
N. Section 312323 - Fill: Bedding and backfilling.

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1.03 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013.

B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011 (Reapproved 2017).

C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010 (Reapproved 2014).

D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2014).

E. ASTM B800 - Standard Specification for 8000 Series Aluminum Alloy Wire for Electrical Purposes - Annealed and Intermediate Tempers; 2005 (Reapproved 2015).

F. ASTM B801 - Standard Specification for Concentric-Lay-Stranded Conductors of 8000 Series Aluminum Alloy Wire for Subsequent Covering of Insulation; 2016.

G. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2017.

H. ASTM D4388 - Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes; 2013.

I. FS A-A-59544 - Cable and Wire, Electrical (Power, Fixed Installation); Federal Specification; Revision A, 2008.

J. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

K. NECA 104 - Recommended Practice for Installing Aluminum Building Wire and Cable; 2012.

L. NECA 120 - Standard for Installing Armored Cable (AC) and Metal-Clad Cable (MC); 2012.

M. NECA 121 - Standard for Installing Nonmetallic-Sheathed Cable (Type NM-B) and Underground Feeder and Branch-Circuit Cable (Type UF); 2007.

N. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; 2009.

O. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.

P. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

Q. UL 4 - Armored Cable; Current Edition, Including All Revisions.

R. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.

S. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.

T. UL 183 - Manufactured Wiring Systems; Current Edition, Including All Revisions.

U. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.

V. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.

W. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.

X. UL 493 - Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables; Current Edition, Including All Revisions.

Y. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.

Z. UL 719 - Nonmetallic-Sheathed Cables; Current Edition, Including All Revisions.

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AA. UL 1277 - Electrical Power and Control Tray Cables with Optional Optical-Fiber Members; Current Edition, Including All Revisions.

AB. UL 1569 - Metal-Clad Cables; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
   2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
   3. Notify Architect and Owner's Construction Project Coordinator, of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.

C. Sustainable Design Documentation: Submit manufacturer's product data on conductor and cable showing compliance with specified lead content requirements.

D. Manufactured Wiring System Shop Drawings: Provide plan views indicating proposed system layout with components identified; indicate branch circuit connections.

E. Design Data: Indicate voltage drop and ampacity calculations for aluminum conductors substituted for copper conductors. Include proposed modifications to raceways, boxes, wiring gutters, enclosures, etc. to accommodate substituted conductors.

F. Field Quality Control Test Reports.

G. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

H. Project Record Documents:
   1. Underground circuits: Record actual installed circuiting arrangements for all underground/under slab circuits. Provide actual size and length of conductors installed.
      a. Provide actual size and length of conductors installed.
      b. Show all junction box locations. Provide dimensions from building, and other permanent structures.
   2. Building circuits: For conduit sizes 1-1/4" and larger, record actual installed circuiting arrangements for all circuits.
      a. Provide actual size and length of conductors installed.
      b. Show all junction box locations. Include boxes, above ceilings, below elevated floors and other hard to access areas.

I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.
   2. Extra Manufactured Wiring Systems Cable Assemblies: One of each configuration, 6 feet length.

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1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.08 FIELD CONDITIONS

A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.

B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.
   1. Exceptions:
      a. Use manufactured wiring systems for branch circuits where concealed under raised floors.
         1) Exception: Provide single conductor building wire in raceway for circuit homeruns from distribution box to panelboard.
      b. Use power and control tray cable for installation in cable tray.

C. Nonmetallic-sheathed cable is permitted only as follows:
   1. Where not otherwise restricted, may be used:
      a. For branch circuit wiring in dry locations within one- and two-family dwellings and their attached or detached garages, and their storage buildings.
      b. For branch circuit wiring in dry locations within multifamily dwellings permitted to be of Types III, IV, and V construction.
      c. Use permitted by Owner's written approval.
   2. In addition to other applicable restrictions, may not be used:
      a. Where exposed to view.
      b. Where exposed to damage.

D. Metal-clad (MC) cable is permitted only as follows:
   1. Where not otherwise restricted, may be used:
      a. When approved by Owner.
      b. Where concealed above accessible ceilings for final connections from junction boxes to luminaires. **Daisy-chaining of light fixtures is not permitted. Updated 2/21**
         1) Maximum Length: 8 feet.
      c. **Areas approved for use with MC Cable: In office areas, conference rooms, labs and classrooms only. Updated 2/21**
      d. Where concealed in hollow stud walls, above accessible ceilings, and under raised floors for branch circuits up to 20 A.

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1) Exception: Provide single conductor building wire in raceway for circuit homerun from first outlet to panelboard.
2) Exception: When circuiting multiple rooms on a single circuit, provide single conductor building wire in raceway from circuit homerun panelboard, to each room's pull box.

2. Limitations for use with home run circuiting:
   a. **Metal-clad cable shall not be permitted for direct connection into panel boards. Provide single conductor building wire in raceway for circuit homerun from panel board to first outlet/pull box. Updated 2/21**
3. In addition to other applicable restrictions, may not be used:
   a. Unless approved by Owner.
   b. Where exposed to view.
   c. Where exposed to damage.
   d. For damp, wet, or corrosive locations
   e. For isolated ground circuits.
   f. For patient care areas of health care facilities requiring redundant grounding.
   g. **For Concert and Recital Halls.**
   h. **For mechanical areas, workshops, restrooms, corridors, electrical and data rooms.**
   i. **For exterior areas. Updated 2/21**

E. Manufactured wiring systems are permitted only as follows:
1. Where not otherwise restricted, may be used:
   a. For branch circuits where concealed under carpet flooring and for manufactured furniture systems.
      1) Exception: Provide single conductor building wire in raceway for circuit homerun from distribution box to panelboard.
      2) Exception: Not permitted for lighting or receptacle circuits, unless listed for manufacturer furniture systems.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

A. Provide products that comply with requirements of NFPA 70.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Provide new conductors and cables manufactured not more than one year prior to installation.

D. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

E. Comply with NEMA WC 70.

F. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

G. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.

H. Conductors for Grounding and Bonding: Also comply with Section 260526.

I. Conductors and Cables Installed in Cable Tray: Listed and labeled as suitable for cable tray use.

J. Conductors and Cables Installed Where Exposed to Direct Rays of Sun: Listed and labeled as sunlight resistant.

K. Conductors and Cables Installed Exposed in Spaces Used for Environmental Air (only where specifically permitted): Plenum rated, listed and labeled as suitable for use in return air plenums.

L. Conductor Material:

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1. Provide copper or aluminum conductors. Conductor sizes indicated are based on copper unless specifically indicated as aluminum. Conductors designated with the abbreviation "AL" indicate aluminum.
    a. Permitted use of aluminum conductors for copper is permitted, only for the following:
        1) Services: Aluminum conductors size 1/0 AWG and larger.
        2) Feeders: Aluminum conductors size 1/0 AWG and larger.
    b. Where aluminum conductors are substituted for copper, comply with the following:
        1) Size aluminum conductors to provide, when compared to copper sizes indicated, equivalent or greater ampacity and equivalent or less voltage drop.
        2) Increase size of raceways, boxes, wiring gutters, enclosures, etc. as required to accommodate aluminum conductors.
        3) Provide copper equipment grounding conductor sized according to NFPA 70.
        4) Equip electrical distribution equipment with compression lugs for terminating aluminum conductors. No split bolts or chair lugs, permitted.
2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
3. Tinned Copper Conductors: Comply with ASTM B33.
4. Aluminum Conductors (only where specifically indicated or permitted for substitution): AA-8000 series aluminum alloy conductors recognized by ASTM B800 and compact stranded in accordance with ASTM B801 unless otherwise indicated.

M. Minimum Conductor Size:
1. Branch Circuits: 12 AWG.
    a. Exceptions:
        1) 20 A, 120 V circuits longer than 75 feet: 10 AWG, for voltage drop.
        2) 20 A, 120 V circuits longer than 150 feet: 8 AWG, for voltage drop.
        3) 20 A, 277 V circuits longer than 150 feet: 10 AWG, for voltage drop.
2. Control Circuits: 14 AWG.

N. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

O. Conductor Color Coding:
1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
2. Color Coding Method: Integrally colored insulation.
    a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.
    b. Color Coding for Power Conductors 600 V and Less: Comply with Section 260553.

2.03 SINGLE CONDUCTOR BUILDING WIRE

A. Manufacturers:
1. Copper Building Wire:
    a. Cerro Wire LLC: www.cerrowire.com
    b. Encore Wire Corporation: www.encorewire.com
    c. General Cable Technologies Corporationwww.generalcable.com
    d. Southwire Company: www.southwire.com
    e. Windy City Wire; www.smartwire.com.
    f. Substitutions: See Section 016000 - Product Requirements.
2. Aluminum Building Wire (only where specifically indicated or permitted for substitution):

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a. Encore Wire Corporation: www.encorewire.com
b. Southwire Company: www.southwire.com
c. Stabiloy, a brand of General Cable Technologies Corporation: www.stabiloy.com
d. Windy City Wire; www.smartwire.com, 801-633-0651.
e. Substitutions: See Section 016000 - Product Requirements.

B. Description: Single conductor insulated wire.

C. Conductor Stranding:
1. Feeders and Branch Circuits:
a. Size 10 AWG and Smaller: Stranded.
b. Size 8 AWG and Larger: Stranded.
2. Control Circuits: Stranded.

D. Insulation Voltage Rating: 600 V.

E. Insulation:
1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.
a. Size 4 AWG and Larger: Type XHHW-2.
b. Installed Underground: Type XHHW-2.
c. Fixture Wiring Within Luminaires: Type TFFN/TFN for luminaires with labeled maximum temperature of 90 degrees C; Approved suitable type for luminaires with labeled maximum temperature greater than 90 degrees C.
2. Aluminum Building Wire (only where specifically indicated or permitted for substitution): Type XHHW-2.

2.04 NONMETALLIC-SHEATHED CABLE

A. Manufacturers:
1. Cerro Wire LLC: www.cerrowire.com
2. Encore Wire Corporation: www.encorewire.com
3. Southwire Company: www.southwire.com
4. Substitutions: See Section 016000 - Product Requirements.

B. Description: NFPA 70, Type NM multiple-conductor cable listed and labeled as complying with UL 719, Type NM-B.

C. Conductor Stranding:
1. Size 10 AWG and Smaller: Solid.
2. Size 8 AWG and Larger: Stranded.

D. Insulation Voltage Rating: 600 V.

2.05 METAL-CLAD CABLE

A. Manufacturers:
1. AFC Cable Systems Inc: www.afcweb.com
2. Encore Wire Corporation: www.encorewire.com
3. Southwire Company: www.southwire.com
4. Substitutions: See Section 016000 - Product Requirements.

B. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.

C. Conductor Stranding:
1. Size 10 AWG and Smaller: Stranded.
2. Size 8 AWG and Larger: Stranded.

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D. Insulation Voltage Rating: 600 V.

E. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.

F. Provide oversized neutral conductors where indicated or required.

G. Provide dedicated neutral conductor for each phase conductor where indicated or required.

H. Grounding: Full-size integral equipment grounding conductor.
   1. Provide additional isolated/insulated grounding conductor where indicated or required.

I. Armor: Steel, interlocked tape.

J. Provide PVC jacket applied over cable armor where indicated or required for environment of installed location.

K. Where used with 0-10v dc dimming, provide dimming cables within metal sheath.

2.06 POWER AND CONTROL TRAY CABLE

A. Manufacturers:
   1. Encore Wire Corporation: www.encorewire.com
   2. General Cable Technologies Corporation: www.generalcable.com
   3. Okonite: www.okonite.com
   4. Southwire Company: www.southwire.com
   5. Substitutions: See Section 016000 - Product Requirements.

B. Description: NFPA 70, Type TC cable listed and labeled as complying with UL 1277.

C. Where exposed run cable is indicated between cable tray and utilization equipment in qualifying industrial establishments as determined by authorities having jurisdiction, provide tray cable marked as Type TC-ER in accordance with NFPA 70.

D. Conductor Stranding: Stranded.

E. Insulation Voltage Rating: 600 V.

F. Insulation: Type XHHW or XHHW-2.

G. Grounding: Full-size integral equipment grounding conductor.

H. Jacket: PVC or Chlorinated Polyethylene (CPE).

2.07 MANUFACTURED WIRING SYSTEMS

A. Manufacturers:
   1. Steelcase.

B. Description: Manufactured wiring assemblies complying with NFPA 70 Article 604, and listed and labeled as complying with UL 183.

C. Provide components necessary to transition between manufactured wiring system and other wiring methods.

D. Branch Circuit Cables:
   1. Conductor Stranding (Size 10 AWG and Smaller): Stranded.
   2. Insulation Voltage Rating: 600 V.
   3. Insulation: Type THHN.
   4. Provide dedicated neutral conductor for each phase conductor.
   5. Grounding: Full-size integral equipment grounding conductor.
      a. Provide additional isolated/insulated grounding conductor where indicated or required.
   6. Armor: Steel, interlocked tape.

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E. Connectors: Keyed and color-coded to prevent interconnection of different voltages.

F. Fixture Leads: Type TFN insulation.

2.08 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

B. Connectors for Grounding and Bonding: Comply with Section 260526.

C. Wiring Connectors for Splices and Taps:
   1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
   2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.
   3. Connection for Aluminum Conductors: Use **compression** terminals for all connections.

D. Wiring Connectors for Terminations:
   1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
   2. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
   3. **Copper Conductors Size 8 AWG or Larger: Use mechanical or compression connectors where connection to equipment is required. Updated May 2023**
   4. Aluminum Conductors: Use **compression** terminals for all connections.
   5. Stranded Conductors Size 10 AWG and Smaller: Use crimped terminals for connections to terminal screws.
   6. Conductors for Control Circuits: Use crimped terminals for all connections.

E. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.

F. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.

G. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
   1. Manufacturers:
      a. 3M: www.3m.com
      b. Ideal Industries, Inc: www.idealindustries.com
      c. NSI Industries LLC: www.nsiindustries.com

H. Push-in Wire Connectors are not permitted on project.

I. Mechanical Connectors: Provide bolted type or set-screw type.
   1. Manufacturers:
      a. Burndy LLC: www.burndy.com
      b. Ilsco: www.ilsco.com
      c. Thomas & Betts Corporation: www.tnb.com
      d. Substitutions: See Section 016000 - Product Requirements.

J. Compression Connectors: Provide circumferential type or hex type crimp configuration.
   1. Manufacturers:
      a. Burndy LLC: www.burndy.com
      b. Ilsco: www.ilsco.com

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c. Thomas & Betts Corporation: www.tnb.com
d. Substitutions: See Section 016000 - Product Requirements.

K. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.
1. Manufacturers:
a. Burndy LLC: www.burndy.com
b. Ilsco: www.ilsco.com
c. Thomas & Betts Corporation: www.tnb.com
d. Substitutions: See Section 016000 - Product Requirements.

2.09 WIRING ACCESSORIES

A. Electrical Tape:
1. Manufacturers:
a. 3M: www.3m.com
b. Plymouth Rubber Europa: www.plymouthrubber.com
c. Substitutions: See Section 016000 - Product Requirements.
2. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F.
a. Substitutions: See Section 016000 - Product Requirements.
3. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.
a. Substitutions: See Section 016000 - Product Requirements.
4. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil; suitable for continuous temperature environment up to 194 degrees F and short-term 266 degrees F overload service.
a. Substitutions: See Section 016000 - Product Requirements.
5. Electrical Filler Tape: Rubber-based insulating moldable putty, minimum thickness of 125 mil; suitable for continuous temperature environment up to 176 degrees F.
6. Varnished Cambric Electrical Tape: Cotton cambric fabric tape, with or without adhesive, oil-primed and coated with high-grade insulating varnish; minimum thickness of 7 mil; suitable for continuous temperature environment up to 221 degrees F.
a. Substitutions: See Section 016000 - Product Requirements.
7. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil.
a. Substitutions: See Section 016000 - Product Requirements.

B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.
1. Manufacturers:
a. 3M: www.3m.com
b. Burndy LLC: www.burndy.com
c. Thomas & Betts Corporation: www.tnb.com
d. Substitutions: See Section 016000 - Product Requirements.

C. Oxide Inhibiting Compound: Listed; suitable for use with the conductors or cables to be installed.
1. Manufacturers:

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a. Burndy LLC: www.burndy.com
b. Ideal Industries, Inc: www.idealindustries.com
c. Ilsco: www.ilsco.com

D. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.
1. Manufacturers:
a. 3M: www.3m.com
b. American Polywater Corporation: www.polywater.com
c. Ideal Industries, Inc: www.idealindustries.com
d. Substitutions: See Section 016000 - Product Requirements.

E. Cable Ties: Material and tensile strength rating suitable for application.
1. Manufacturers:
a. Burndy LLC: www.burndy.com

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that work likely to damage wire and cable has been completed.

C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.

D. Verify that field measurements are as indicated.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

B. Pull conduit proofing pulling mandrel through all conduits, 3" or larger. See Section 260533.13 for mandrel pulling requirements.

3.03 INSTALLATION

A. Circuiting Requirements:
1. Unless dimensioned, circuit routing indicated is diagrammatic.
2. When circuit destination is indicated without specific routing, determine exact routing required.
3. Arrange circuiting to minimize splices.
4. Include circuit lengths required to install connected devices within 10 ft of location indicated.
5. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
6. Maintain separation of wiring for emergency systems in accordance with NFPA 70.
7. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are indicated as separate, combining them together in a single raceway is permitted, under the following conditions:
a. Provide no more than six current-carrying conductors in a single raceway. Dedicated neutral conductors are considered current-carrying conductors.
b. Increase size of conductors as required to account for ampacity derating.
c. Size raceways, boxes, etc. to accommodate conductors.

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8. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.
9. Provide oversized neutral/grounded conductors where indicated and as specified below.
    a. Provide 200 percent rated neutral for feeders fed from K-rated transformers.
    b. Provide 200 percent rated neutral for feeders serving panelboards with 200 percent rated neutral bus.

B. Install products in accordance with manufacturer's instructions.

C. Perform work in accordance with NECA 1 (general workmanship).

D. Aluminum conductors:
1. Install aluminum conductors in accordance with NECA 104.

E. Install nonmetallic-sheathed cable (Type NM-B) in accordance with NECA 121.

F. Install metal-clad cable (Type MC) in accordance with NECA 120.

G. Installation in Raceway:
1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
2. Pull all conductors and cables together into raceway at same time.
3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.

H. Exposed Cable Installation (only where specifically permitted):
1. Route cables parallel or perpendicular to building structural members and surfaces.
2. Protect cables from physical damage.

I. Installation in Cable Tray: Also comply with Section 260536.

J. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.

K. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
1. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conductors and cables to lay on ceiling tiles.
2. Installation in Vertical Raceways: Provide supports where vertical rise exceeds permissible limits.

L. Terminate cables using suitable fittings.
1. Metal-Clad Cable (Type MC):
    a. Use listed fittings.
    b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.
    c. Use red insulating inserts in all terminated cable ends, per manufacturer's recommendations.

M. Install conductors with a minimum of 12 inches of slack at each outlet.

N. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

O. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

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P. Make wiring connections using specified wiring connectors.
   1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
   2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
   3. Do not remove conductor strands to facilitate insertion into connector.
   4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
   5. Connections for Aluminum Conductors: Fill connectors with oxide inhibiting compound where not pre-filled by manufacturer.
   6. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
   7. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

Q. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
   1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
      a. For taped connections, first apply adequate amount of rubber splicing electrical tape or electrical filler tape, followed by outer covering of vinyl insulating electrical tape.
      b. For taped connections likely to require re-entering, including motor leads, first apply varnished cambric electrical tape, followed by adequate amount of rubber splicing electrical tape, followed by outer covering of vinyl insulating electrical tape.
   2. Damp Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
      a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.
      b. For taped connections, follow same procedure as for dry locations but apply outer covering of moisture sealing electrical tape.
   3. Wet Locations: Use heat shrink tubing.

R. Insulate ends of spare conductors using vinyl insulating electrical tape.

S. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.

T. Identify conductors and cables in accordance with Section 260553.

U. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.

V. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is only required for services and feeders. The resistance test for parallel conductors listed as optional is not required.

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1. Disconnect surge protective devices (SPDs) prior to performing any high potential testing. Replace SPDs damaged by performing high potential testing with SPDs connected.

D. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION

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SECTION 260529

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Support and attachment components for equipment, conduit, cable, boxes, and other electrical work.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Concrete equipment pads.

B. Section 055000 - Metal Fabrications: Materials and requirements for fabricated metal supports.

C. Section 260533.13 - Conduit for Electrical Systems: Additional support and attachment requirements for conduits.

D. Section 260536 - Cable Trays for Electrical Systems: Additional support and attachment requirements for cable tray.

E. Section 260533.16 - Boxes for Electrical Systems: Additional support and attachment requirements for boxes.

F. Section 260548 - Vibration and Seismic Controls for Electrical Systems.

G. Section 262513 - Low-Voltage Busways: Additional support and attachment requirements for busway.

H. Section 265100 - Interior Lighting: Additional support and attachment requirements for interior luminaires.

I. Section 265113 - Luminaires, Ballasts, and Drivers: Additional support and attachment requirements for luminaires.

J. Section 265600 - Exterior Lighting: Additional support and attachment requirements for exterior luminaires.

1.03 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.

C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2015.

D. MFMA-4 - Metal Framing Standards Publication; 2004.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 5B - Strut-Type Channel Raceways and Fittings; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
2. Coordinate the work with other trades to provide additional framing and materials required for installation.
3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.

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4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
5. Notify Architect and Owner's Construction Project Coordinator, of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:
1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 033000.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems, non-penetrating rooftop supports, and post-installed concrete and masonry anchors.

C. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.

D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.06 QUALITY ASSURANCE

A. Comply with NFPA 70.

B. Comply with applicable building code.

C. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

D. Installer Qualifications for Powder-Actuated Fasteners (when specified): Certified by fastener system manufacturer with current operator's license.

E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
1. Comply with the following. Where requirements differ, comply with most stringent.
   a. NFPA 70.
   b. Requirements of authorities having jurisdiction.
2. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
3. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
4. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported _____. Include consideration for vibration, equipment operation, and shock loads where applicable.
5. Do not use products for applications other than as permitted by NFPA 70 and product listing.
6. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.

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7. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
    a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
    b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
    c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
    d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Materials for Metal Fabricated Supports: Comply with Section 055000.

C. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
1. Conduit Straps: One-hole or two-hole type; steel.
2. Conduit Clamps: Bolted type unless otherwise indicated.
3. Use of cable/conduit clips (batwings) are not an approved method for conduit supports.

D. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.

E. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
1. Comply with MFMA-4.
2. Channel (Strut) Used as Raceway (only where specifically indicated): Listed and labeled as complying with UL 5B.
3. Channel Material:
    a. Indoor Dry Locations: Use galvanized steel.
    b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
4. Minimum Channel Thickness: Steel sheet, 12 gage, 0.1046 inch.
5. Minimum Channel Dimensions: 1-5/8 inch width by 13/16 inch height.
6. Minimum Channel Length 24 inches.
7. Manufacturers:
    a. Cooper B-Line, a division of Eaton Corporation; _____: www.cooperindustries.com
    b. Thomas & Betts Corporation; _____: www.tnb.com
    c. Unistrut, a brand of Atkore International Inc; _____: www.unistrut.com
    d. nVent/Caddy.

F. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
1. Minimum Size, Unless Otherwise Indicated or Required:
    a. Equipment Supports: Hanger rods per equipment manufacturers recommendations or per the recommendations of a licensed structural engineer.
    b. Busway Supports: Hanger rods per equipment manufacturers recommendations or per the recommendations of a licensed structural engineer.
    c. Single Conduit up to 1 inch (27 mm) trade size: 1/4 inch diameter.
    d. Single Conduit larger than 1 inch (27 mm) trade size: 3/8 inch diameter.
    e. Trapeze Support for Multiple Conduits: 3/8 inch diameter.
    f. Outlet Boxes: 1/4 inch diameter.
    g. Luminaires: 1/4 inch diameter.

G. Non-Penetrating Rooftop Supports for Low-Slope Roofs: Steel pedestals with thermoplastic or rubber bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified.
1. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
2. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.

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3. Mounting Height: Provide minimum clearance of 2" inches under supported component to top of roofing.
4. Manufacturers:
   a. Cooper B-Line, a division of Eaton Corporation; _____: www.cooperindustries.com
   b. Erico International Corporation; _____: www.erico.com
   c. Unistrut, a brand of Atkore International Inc: www.unistrut.com

H. Anchors and Fasteners:
1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
4. Hollow Masonry: Use toggle bolts.
5. Hollow Stud Walls: Use toggle bolts.
6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
7. Sheet Metal: Use sheet metal screws.
8. Wood: Use wood screws.
9. Plastic and lead anchors are permitted.
10. Powder-actuated fasteners are permitted.
    a. Use only threaded studs; do not use pins.
11. Hammer-driven anchors and fasteners are permitted..
    a. Nails are permitted for attachment of nonmetallic boxes to wood frame construction (when specified).
    b. Staples are permitted for attachment of nonmetallic-sheathed cable to wood frame construction (when specified).
12. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
    a. Comply with MFMA-4.
    b. Channel Material: Use galvanized steel.
    c. Minimum Channel Thickness: Steel sheet, 12 gage, 0.1046 inch minimum base metal thickness.
    d. Manufacturer: Same as manufacturer of metal channel (strut) framing system.
13. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.
14. Manufacturers - Mechanical Anchors:
    a. Hilti, Inc; _____: www.us.hilti.com
    b. ITW Red Head, a division of Illinois Tool Works, Inc; _____: www.itwredhead.com
    c. Powers Fasteners, Inc; _____: www.powers.com
    d. Simpson Strong-Tie Company Inc; _____: www.strongtie.com
    e. Substitutions: See Section 016000 - Product Requirements.
15. Manufacturers - Powder-Actuated Fastening Systems:
    a. Hilti, Inc; _____: www.us.hilti.com
    b. ITW Ramset, a division of Illinois Tool Works, Inc; _____: www.ramset.com
    c. Powers Fasteners, Inc; _____: www.powers.com
    d. Simpson Strong-Tie Company Inc; _____: www.strongtie.com

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive support and attachment components.

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C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.

E. Unless specifically indicated or approved by Architect, do not provide support from metal roof deck.

F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

G. Provide required vibration isolation and/or seismic controls in accordance with Section 260548.

H. Field-Welding (where approved by Architect): Comply with Section 055000.

I. Equipment Support and Attachment:
   1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
   2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
   3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
   4. Unless otherwise indicated, mount floor-mounted equipment on properly sized 4 inch high concrete pad constructed in accordance with Section 033000.
   5. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

J. Conduit Support and Attachment: Also comply with Section 260533.13.

K. Cable Tray Support and Attachment: Also comply with Section 260536.

L. Box Support and Attachment: Also comply with Section 260533.16.

M. Busway Support and Attachment: Also comply with Section 262513.

N. Interior Luminaire Support and Attachment: Also comply with Section 265100.

O. Exterior Luminaire Support and Attachment: Also comply with Section 265600.

P. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.

Q. Secure fasteners according to manufacturer's recommended torque settings.

R. Remove temporary supports.

S. Identify independent electrical component support wires above accessible ceilings (only where specifically indicated or permitted) with color distinguishable from ceiling support wires in accordance with NFPA 70.

T. Multiple Raceway trapeze-type support structure minimum width shall be 24 inches, unless specified otherwise. For shorter widths, obtain permission from the Owners engineer, prior to installation. Sized support structure so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

3.03 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

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B. Inspect support and attachment components for damage and defects.

C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

D. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION

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SECTION 260533.16

BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.

B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.

C. Boxes and enclosures for integrated power, data, and audio/video.

D. Boxes for hazardous (classified) locations.

E. Floor boxes.

F. Underground boxes/enclosures.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete.

B. Section 078400 - Firestopping.

C. Section 083100 - Access Doors and Panels: Panels for maintaining access to concealed boxes.

D. Section 260526 - Grounding and Bonding for Electrical Systems.

E. Section 260529 - Hangers and Supports for Electrical Systems.

F. Section 260533.13 - Conduit for Electrical Systems:
   1. Conduit bodies and other fittings.
   2. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.

G. Section 260533.23 - Surface Raceways for Electrical Systems:
   1. Accessory boxes designed specifically for surface raceway systems.

H. Section 260539 - Underfloor Raceways for Electrical Systems:

I. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

J. Section 260916 - Electrical Controls and Relays.

K. Section 262725 - Wiring Devices:
   1. Wall plates.
   2. Floor box service fittings.
   3. Poke-through assemblies.
   4. Access floor boxes.
   5. Additional requirements for locating boxes for wiring devices.

L. Section 262813 - Fuses: Spare fuse cabinets.

M. Section 271005 - Structured Cabling for Voice and Data - Inside-Plant: Additional requirements for communications systems boxes.

N. Section 337119 - Electrical Underground Ducts, Ductbanks, and Manholes: Concrete manholes for electrical systems.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.

C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.

D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013.

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E. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports; 2013.

F. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. SCTE 77 - Specification for Underground Enclosure Integrity; 2013.

I. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

J. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

K. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.

L. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

M. UL 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers; Current Edition, Including All Revisions.

N. UL 1203 - Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
   2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
   4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
   5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
   6. Coordinate the work with other trades to preserve insulation integrity.
   7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
   8. Notify Architect and Owner's Construction Project Coordinator, of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures, boxes for hazardous (classified) locations, floor boxes, and underground boxes/enclosures.
   1. Underground Boxes/Enclosures: Include reports for load testing in accordance with SCTE 77 certified by a professional engineer or an independent testing agency upon request.

C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

D. Project Record Documents: Record actual locations for outlet and device boxes, junction boxes, pull boxes, cabinets and enclosures, floor boxes, and underground boxes/enclosures.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.

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2. Keys for Lockable Enclosures: Two of each different key.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 BOXES

A. General Requirements:
   1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
   2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
   3. Provide products listed, classified, and labeled as suitable for the purpose intended.
   4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
   5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
   1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
   2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
   3. Use cast iron boxes or cast aluminum boxes where exposed galvanized steel rigid metal conduit or exposed intermediate metal conduit (IMC) is used.
   4. Use suitable concrete type boxes where flush-mounted in concrete.
   5. Use suitable masonry type boxes where flush-mounted in masonry walls.
   6. Use raised covers suitable for the type of wall construction and device configuration where required.
   7. Use shallow boxes where required by the type of wall construction.
   8. Do not use "through-wall" boxes designed for access from both sides of wall.
   9. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
   10. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
   11. Nonmetallic Boxes: Comply with NEMA OS 2, and list and label as complying with UL 514C.
   12. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required. For light fixtures 50 pounds and heavier, provide boxes rated at 150% of fixture weight.
   13. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
   14. Minimum Box Size, Unless Otherwise Indicated:
      a. Wiring Devices (Other Than Communications Systems Outlets): 4 inch square by 2-1/8 inch deep (100 by 54 mm) trade size.
      b. Communications Systems Outlets: Comply with Section 271005.
      c. Ceiling Outlets: 4 inch octagonal or square by 2-1/8 inch deep (100 by 54 mm) trade size.
   15. Wall Plates: Comply with Section 262725.
   16. Manufacturers:

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a. Cooper Crouse-Hinds, a division of Eaton Corporation; _____: www.cooperindustries.com
b. Hubbell Incorporated; Bell Products; _____: www.hubbell-rtb.com
c. Hubbell Incorporated; RACO Products; _____: www.hubbell-rtb.com
d. O-Z/Gedney, a brand of Emerson Industrial Automation; _____: www.emersonindustrial.com
e. Thomas & Betts Corporation; _____: www.tnb.com
f. Bowers.
g. Substitutions: See Section 016000 - Product Requirements.

C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
2. NEMA 250 Environment Type, Unless Otherwise Indicated:
a. Indoor Clean, Dry Locations: Type 1, painted steel.
b. Outdoor Locations: Type 4, painted steel.
3. Junction and Pull Boxes Larger Than 100 cubic inches:
a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
b. Boxes 6 square feet and Larger: Provide hinged-cover enclosures, unless otherwise indicated.
4. Cabinets and Hinged-Cover Enclosures, Other Than Junction and Pull Boxes:
a. Provide lockable hinged covers, all locks keyed alike unless otherwise indicated.
b. Back Panels: Painted steel, removable.
c. Terminal Blocks: For low voltage controls, provide voltage/current ratings and terminal quantity suitable for purpose indicated, with 25 percent spare terminal capacity. Terminal blocks not permitted for Class 1 wiring. Class 1 wiring to utilize wirenut termination methods.
5. Finish for Painted Steel Enclosures: Manufacturer's standard grey unless otherwise indicated.
6. Manufacturers:
a. Cooper B-Line, a division of Eaton Corporation; _____: www.cooperindustries.com
b. Hoffman, a brand of Pentair Technical Products; _____: www.hoffmanonline.com
c. Hubbell Incorporated; Wiegmann Products; _____: www.hubbell-wiegmann.com

D. Boxes and Enclosures for Integrated Power, Data, and Audio/Video: Size and configuration as indicated or as required with partitions to separate services; field-connected gangable boxes may not be used.
1. See Section 271005.

E. Boxes for Hazardous (Classified) Locations: Listed and labeled as complying with UL 1203 for the classification of the installed location.
1. Manufacturers:
a. Appleton, a brand of Emerson Industrial Automation; _____: www.emersonindustrial.com
b. Cooper Crouse-Hinds, a division of Eaton Corporation; _____: www.cooperindustries.com
c. Hubbell Incorporated; Killark Products; _____: www.hubbell-killark.com
d. Substitutions: See Section 016000 - Product Requirements.

F. Floor Boxes:
1. Description: Floor boxes compatible with floor box service fittings provided in accordance with Section 262725; with partitions to separate multiple services; furnished with all components, adapters, and trims required for complete installation.
2. Metallic Floor Boxes: Fully adjustable (with integral means for leveling adjustment prior to and after concrete pour).
3. Manufacturer: Same as manufacturer of floor box service fittings.

G. Underground Boxes/Enclosures:

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1. See Section 337119 for underground boxes and enclosures.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive boxes.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Provide separate boxes for emergency power and normal power systems.

E. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.

F. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.

G. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.

H. Box Locations:
   1. Locate boxes to be accessible. Provide access panels in accordance with Section 083100 as required where approved by the Architect.
   2. Unless dimensioned, box locations indicated are approximate.
   3. Locate boxes as required for devices installed under other sections or by others.
      a. Switches, Receptacles, and Other Wiring Devices: Comply with Section 262725.
      b. Communications Systems Outlets: Comply with Section 271005.
   4. Locate boxes so that wall plates do not span different building finishes.
   5. Locate boxes so that wall plates do not cross masonry joints.
   6. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
   7. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches horizontal separation unless otherwise indicated.
   8. Acoustic-Rated Walls: Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches horizontal separation.
   9. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.
      a. Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches separation where wall is constructed with individual noncommunicating stud cavities or protect both boxes with listed putty pads.
      b. Do not install flush-mounted boxes with area larger than 16 square inches or such that the total aggregate area of openings exceeds 100 square inches for any 100 square feet of wall area.
   10. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 260533.13.
   11. Locate junction and pull boxes in the following areas, unless otherwise indicated or approved by the Architect:
      a. Concealed above accessible suspended ceilings.
      b. Within joists in areas with no ceiling.

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c. Electrical rooms.
d. Mechanical equipment rooms.

I. Box Supports:
1. Secure and support boxes in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.
2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
3. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.
4. Use far-side support to secure flush-mounted boxes supported from single stud in hollow stud walls. Repair or replace supports for boxes that permit excessive movement.

J. Install boxes plumb and level.

K. Flush-Mounted Boxes:
1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.

L. Floor-Mounted Cabinets: Mount on properly sized 3 inch high concrete pad constructed in accordance with Section 033000.

M. Install boxes as required to preserve insulation integrity.

N. Metallic Floor Boxes: Install box level at the proper elevation to be flush with finished floor.

O. Nonmetallic Floor Boxes: Cut box flush with finished floor after concrete pour.

P. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

Q. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.

R. Close unused box openings.

S. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.

T. Provide grounding and bonding in accordance with Section 260526.

U. Identify boxes in accordance with Section 260553.

3.03 CLEANING

A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.04 PROTECTION

A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION

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SECTION 260533.23

SURFACE RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface raceway systems.

B. Wireways.

1.02 RELATED REQUIREMENTS

A. Section 260526 - Grounding and Bonding for Electrical Systems.

B. Section 260529 - Hangers and Supports for Electrical Systems.
   1. Includes metal channel (strut) used as raceway for lighting systems.

C. Section 260533.13 - Conduit for Electrical Systems.

D. Section 260533.16 - Boxes for Electrical Systems.

E. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

F. Section 262723 - Indoor Service Poles.

G. Section 262725 - Wiring Devices: Receptacles.

H. Section 271005 - Structured Cabling for Voice and Data - Inside-Plant: Voice and data jacks.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

D. NEMA PRP 5 - Installation Guidelines for Surface Nonmetallic Raceway; 2015.

E. UL 5 - Surface Metal Raceways and Fittings; Current Edition, Including All Revisions.

F. UL 5A - Nonmetallic Surface Raceways and Fittings; Current Edition, Including All Revisions.

G. UL 111 - Outline of Investigation for Multioutlet Assemblies; Current Edition, Including All Revisions.

H. UL 870 - Wireways, Auxiliary Gutters, and Associated Fittings; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the placement of raceways with millwork, furniture, equipment, etc. installed under other sections or by others.
   2. Coordinate rough-in locations of outlet boxes provided under Section 260533.16 and conduit provided under Section 260533.13 as required for installation of raceways provided under this section.
   3. Verify minimum sizes of raceways with the actual conductors and components to be installed.
   4. Notify Architect and Owner's Construction Project Coordinator, of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install raceways until final surface finishes and painting are complete.
   2. Do not begin installation of conductors and cables until installation of raceways is complete between outlet, junction and splicing points.

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1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets including dimensions, knockout sizes and locations, materials, fabrication details, finishes, service condition requirements, and accessories.
   1. Surface Raceway Systems: Include information on fill capacities for conductors and cables.

C. Shop Drawings:
   1. Pre-wired Surface Raceway Systems: Provide plan and elevation views including dimensioned locations of wiring devices and circuiting arrangements.
   2. Wireways: Provide dimensioned plan and elevation views including adjacent equipment with all required clearances indicated.

D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 RACEWAY REQUIREMENTS

A. Provide all components, fittings, supports, and accessories required for a complete raceway system.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Do not use raceways for applications other than as permitted by NFPA 70 and product listing.

2.02 SURFACE RACEWAY SYSTEMS

A. Manufacturers:
   1. Hubbell Incorporated; _____: www.hubbell.com
   2. Wiremold, a brand of Legrand North America, Inc; _____: www.legrand.us
   3. Panduit.

B. Surface Metal Raceways: Listed and labeled as complying with UL 5.
   1. Wiremold, #4000 or #4000DS series.
   2. Wiremold, #700 series.
   3. Panduit. Equivalent to Wiremold, as specified above.

C. Surface Nonmetallic Raceways: Listed and labeled as complying with UL 5A.
   1. Wiremold, #800 or #2300 series, data use only.
   2. Wiremold, #40N2 series.
   3. Panduit. Equivalent to Wiremold, as specified above.

D. Metal Channel (Strut) Used as Raceway: Comply with Section 260529.
   1. For use with lighting systems only.

E. Type _____ - Surface Raceway System:

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1. Raceway Type: single or two channel, metal or non-metal.
    a. For areas with power and data, provide two channel raceway systems.
    b. For areas with either power or data, provide single channel systems.
2. Size: As indicated on the drawings.
3. Length: As indicated on the drawings.
4. Color: Gray, white or Ivory. Final color to be selected by architect.
5. Accessory Device Boxes: Suitable for the devices to be installed; color to match raceway.
6. Integrated Device Provisions:
    a. Receptacles:
        1) Comply with Section 262725.
        2) Configuration: As indicated on the drawings.
        3) Color: As specified in Section 262725.
        4) Spacing: As indicated on the drawings.
    b. Communications Outlets:
        1) Voice and Data Jacks: As specified in Section 271005.
        2) Spacing: As indicated on the drawings.

2.03 WIREWAYS

A. Manufacturers:
    1. Cooper B-Line, a division of Cooper Industries: www.cooperindustries.com.
    2. Hoffman, a brand of Pentair Technical Products; _____: www.hoffmanonline.com
    3. Schneider Electric; Square D Products: www.schneider-electric.us.
    4. Circle AW.

B. Description: Lay-in wireways (gutter) and wiring troughs with removable covers; listed and labeled as complying with UL 870. Surface mounted only.

C. Wireway Type, Unless Otherwise Indicated:
    1. Indoor Clean, Dry Locations: NEMA 250, Type 1, painted steel with screw-cover.
    2. Outdoor Locations: NEMA 250, Type 3R, painted steel with screw-cover; include provision for padlocking. All fasteners shall be stainless steel.

D. Finish for Painted Steel Wireways: Manufacturer's standard grey unless otherwise indicated.

E. Minimum Wireway Size: 4 by 4 inches unless otherwise indicated.

F. Where wireway size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

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

2.04 SOURCE QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Factory test each production unit for pre-wired surface raceway systems to verify proper wiring.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that outlet boxes and conduit terminations are installed in proper locations and are properly sized in accordance with NFPA 70 to accommodate raceways.

C. Verify that mounting surfaces are ready to receive raceways and that final surface finishes are complete, including painting.

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D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install raceways complete, prior to installation of conductors and devices.

C. Perform work in accordance with NECA 1 (general workmanship).

D. Surface Nonmetallic Raceways: Install in accordance with NEMA PRP 5.

E. Install raceways plumb and level.

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

G. Arrange wireways and associated raceway connections to comply with NFPA 70, including but not limited to requirements for deflected conductors and wireways used as pull boxes. Increase size of wireway where necessary.

H. Secure and support raceways in accordance with Section 260529 at intervals complying with NFPA 70 and manufacturer's requirements.

I. Close unused raceway openings, unless identified for an owner installed device.

J. Install temporary seals to prevent foreign materials from entering raceways.

K. Provide grounding and bonding in accordance with Section 260526.

L. Identify raceways in accordance with Section 260553.

M. Provide all accessories required for a complete surface raceway system.

N. Where data devices are identified on the contract drawings, and where applicable, provide a Decora cover plate.

3.03 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Inspect raceways for damage and defects.

C. Surface Raceway Systems with Integrated Devices: Test each wiring device to verify operation and proper polarity.

D. Correct wiring deficiencies and replace damaged or defective raceways.

3.04 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.05 PROTECTION

A. Protect installed raceways from subsequent construction operations.

END OF SECTION

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SECTION 260583

WIRING CONNECTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical connections to equipment.

1.02 RELATED REQUIREMENTS

A. Section 083323 - Overhead Coiling Doors: Electrical connections to powered coiling doors.

B. Section 260519 - Low-Voltage Electrical Power Conductors and Cables.

C. Section 260533.13 - Conduit for Electrical Systems.

D. Section 260533.16 - Boxes for Electrical Systems.

E. Section 260553 - Identification for Electrical Systems.

F. Section 262725 - Wiring Devices.

G. Section 262816.16 - Enclosed Switches.

H. Section 262913 - Enclosed Controllers.

1.03 REFERENCE STANDARDS

A. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (R2015).

B. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2016.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
   2. Determine connection locations and requirements.

B. Sequencing:
   1. Install rough-in of electrical connections before installation of equipment is required.
   2. Make electrical connections before required start-up of equipment.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide wiring device manufacturer’s catalog information showing dimensions, configurations, and construction.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed, classified, and labeled as suitable for the purpose intended.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

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PART 2 PRODUCTS

2.01 MATERIALS

A. Cords and Caps: NEMA WD 6; match receptacle configuration at outlet provided for equipment.
   1. Colors: Conform to NEMA WD 1. Comply with Section 260553 - Identification for Electrical Systems, for device and cable/conductor colors.
   2. Cord Construction: NFPA 70, Type SJO, multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
   3. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.
   4. Provide receptacles from same manufacturers as Wiring Devices - Section 26 2726.

B. Disconnect Switches: As specified in Section 262816.16 and in individual equipment sections.

C. Wiring Devices: As specified in Section 262725.

D. Flexible Conduit: As specified in Section 260533.13.

E. Wire and Cable: As specified in Section 260519.

F. Boxes: As specified in Section 260533.16.

2.02 EQUIPMENT CONNECTIONS

A. See construction drawings for equipment device requirements.

B. Strain Relief/Support Grip Connections:
   1. Provide strain relief for all suspended cables with over 10 in feet drop.
   2. Provide strain relief for all wiring devices, suspended from the ceiling**.** Provide strain relief at both the ceiling and device box connections.
   3. Provide flexible conduit connection to all vibrating equipment.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.02 ELECTRICAL CONNECTIONS

A. Make electrical connections in accordance with equipment manufacturer's instructions.

B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.

C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.

D. Provide receptacle outlet to accommodate connection with attachment plug.

E. Provide cord and cap where field-supplied attachment plug is required.

F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.

G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.

H. Install terminal block jumpers to complete equipment wiring requirements.

I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

J. Coolers and Freezers: Cut and seal conduit openings in freezer and cooler walls, floor, and ceilings.

END OF SECTION

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SECTION 260923

LIGHTING CONTROL DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Occupancy Sensors.

B. Dimming Occupancy Sensors.

C. Time switches.

D. In-wall interval timers.

E. Outdoor lighting controls.

F. Lighting contactors.

G. Control accessories.

1.02 RELATED REQUIREMENTS

A. Section 260526 - Grounding and Bonding for Electrical Systems.

B. Section 260529 - Hangers and Supports for Electrical Systems.

C. Section 260533.16 - Boxes for Electrical Systems.

D. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

E. Section 260573 - Power System Studies.

F. Section 260923 - Modular Lighting Control Systems

G. Section 262725 - Wiring Devices: Devices for manual control of lighting, including wall switches.
   1. Includes finish requirements for wall controls specified in this section.
   2. Includes accessory receptacles, switches, dimmers and wall plates, to match lighting controls specified in this section.

H. Section 262813 - Fuses.

I. Section 262913 - Enclosed Controllers : General purpose contactors.

J. Section 265100 - Interior Lighting.

K. Section 265113 - Luminaires, Ballasts, and Drivers.

L. Section 265561 - Theatrical Lighting: Controls for stage lighting units.

M. Section 265600 - Exterior Lighting.

1.03 REFERENCE STANDARDS

A. 47 CFR 15 - Radio Frequency Devices; current edition.

B. ANSI C136.10 - American National Standard for Roadway and Area Lighting Equipment - Locking-Type Photocontrol Devices and Mating Receptacles - Physical and Electrical Interchangeability and Testing; 2010.

C. ANSI C136.24 - American National Standard for Roadway and Area Lighting Equipment - Nonlocking (Button) Type Photocontrols; 2004 (R2010).

D. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

E. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.

F. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

G. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts; 2015.

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H. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2000, with Errata (2008).

I. NEMA ICS 5 - Industrial Control and Systems: Control Circuit and Pilot Devices; 2017.

J. NEMA ICS 6 - Industrial Control and Systems: Enclosures; 1993 (Reaffirmed 2016).

K. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

L. UL 773 - Plug-in, Locking Type Photocontrols for Use with Area Lighting; Current Edition, Including All Revisions.

M. UL 773A - Nonindustrial Photoelectric Switches for Lighting Control; Current Edition, Including All Revisions.

N. UL 916 - Energy Management Equipment; Current Edition, Including All Revisions.

O. UL 917 - Clock-Operated Switches; Current Edition, Including All Revisions.

P. UL 1472 - Solid-State Dimming Controls; Current Edition, Including All Revisions.

Q. UL 60947-1 - Low-Voltage Switchgear and Controlgear - Part 1: General Rules; Current Edition, Including All Revisions.

R. UL 60947-4-1 - Low-Voltage Switchgear and Controlgear - Part 4-1: Contactors and Motor-starters - Electromechanical Contactors and Motor-starters; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the placement of lighting control devices with millwork, furniture, equipment, etc. installed under other sections or by others.
   2. Coordinate the placement of wall switch occupancy sensors with actual installed door swings.
   3. Coordinate the placement of occupancy sensors with millwork, furniture, equipment or other potential obstructions to motion detection coverage installed under other sections or by others.
   4. Coordinate the placement of photo sensors for daylighting controls with windows, skylights, and luminaires to achieve optimum operation. Coordinate placement with ductwork, piping, equipment, or other potential obstructions to light level measurement installed under other sections or by others.
   5. Notify Architect and Owner's Construction Project Coordinator, of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

B. Sequencing:
   1. Do not install lighting control devices until final surface finishes and painting are complete.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
   1. Occupancy Sensors: Include detailed motion detection coverage range diagrams.

C. Shop Drawings:
   1. Occupancy Sensors: Provide lighting plan indicating location, model number, and orientation of each occupancy sensor and associated system component.
   2. Daylighting Controls: Provide lighting plan indicating location, model number, and orientation of each photo sensor and associated system component.

D. Field Quality Control Reports.

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E. Manufacturer's Installation Instructions: Include application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

F. Operation and Maintenance Data: Include detailed information on device programming and setup.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.

H. Project Record Documents: Record actual installed locations and settings for lighting control devices.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND PROTECTION

A. Store products in a clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation.

1.08 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.09 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Provide five year manufacturer warranty for all occupancy sensors.

C. Provide five year manufacturer warranty for utility grade locking receptacle-mounted outdoor photo controls.

D. Provide two year manufacturer warranty for all daylighting controls.

PART 2 PRODUCTS

2.01 LIGHTING CONTROL DEVICES - GENERAL REQUIREMENTS

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless specifically indicated to be excluded, provide all required conduit, wiring, connectors, hardware, components, accessories, etc. as required for a complete operating system.

C. Products for Switching of Electronic Ballasts/Drivers: Tested and rated to be suitable for peak inrush currents specified in NEMA 410.

2.02 OCCUPANCY SENSORS

A. Manufacturers (non-dimming):
   1. Hubbell Incorporated: www.hubbell.com
   2. Sensor Switch Inc: www.sensorswitch.com
   3. WattStopper: www.wattstopper.com
   4. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.

B. All Occupancy Sensors:

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1. Description: Factory-assembled commercial specification grade devices for indoor use capable of sensing both major motion, such as walking, and minor motion, such as small desktop level movements, according to published coverage areas, for automatic control of load indicated.
2. Sensor Technology:
    a. Passive Infrared/Ultrasonic Dual Technology Occupancy Sensors: Designed to detect occupancy using a combination of both passive infrared and ultrasonic technologies.
    b. Passive Infrared/Acoustic Dual Technology Occupancy Sensors: Designed to detect occupancy using a combination of both passive infrared and audible sound sensing technologies.
3. Provide LED to visually indicate motion detection with separate color LEDs for each sensor type in dual technology units.
4. Operation: Unless otherwise indicated, occupancy sensor to turn load on when occupant presence is detected and to turn load off when no occupant presence is detected during an adjustable turn-off delay time interval.
5. Dual Technology Occupancy Sensors: Field configurable turn-on and hold-on activation with settings for activation by either or both sensing technologies.
6. Passive Infrared Lens Field of View: Field customizable by addition of factory masking material, adjustment of integral blinders, or similar means to block motion detection in selected areas.
7. Turn-Off Delay: Field adjustable, with time delay settings up to 30 minutes.
8. Sensitivity: Field adjustable.
9. Adaptive Technology: Field selectable; capable of self-adjusting sensitivity and time delay according to conditions.
10. Integral Photocell: For field selectable and adjustable inhibition of automatic turn-on of load when ambient lighting is above the selected level.
11. Compatibility (Non-Dimming Sensors): Suitable for controlling incandescent lighting, low-voltage lighting with electronic and magnetic transformers, fluorescent lighting with electronic and magnetic ballasts, and fractional motor loads, with no minimum load requirements.
12. Load Rating for Line Voltage Occupancy Sensors: As required to control the load indicated on drawings.
13. Isolated Relay for Low Voltage Occupancy Sensors: SPDT dry contacts, ratings as required for interface with system indicated. When specified on contract documents.
14. Where wired sensors are indicated, wireless sensors are not acceptable without prior approval of Architect.

C. Wall Switch Occupancy Sensors:
1. All Wall Switch Occupancy Sensors:
    a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated manual control capability, and no leakage current to load in off mode.
    b. Unless otherwise indicated or required to control the load indicated on drawings, provide line voltage units with self-contained relay.
    c. Where indicated, provide two-circuit units for control of two separate lighting loads, with separate manual controls and separately programmable operation for each load.
    d. Operation: Field selectable to operate either as occupancy sensor (automatic on/off) or as vacancy sensor (manual-on/automatic off).
    e. Manual-Off Override Control: When used to turn off load while in automatic-on mode, unit to revert back to automatic mode after no occupant presence is detected during the delayed-off time interval.
    f. Finish: Match finishes specified for wiring devices in Section 262725, unless otherwise indicated.
    g. Provide vandal resistant lenses for passive infrared (PIR) and dual technology wall switch occupancy sensors where indicated.

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2. Passive Infrared/Ultrasonic Dual Technology Wall Switch Occupancy Sensors: Capable of detecting motion within an area of 900 square feet.

D. Wall Dimmer Occupancy Sensors:
   1. General Requirements:
      a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated dimming control capability , and no leakage current to load in off mode.
      b. Operation: Field selectable to operate either as occupancy sensor (automatic on/off) or as vacancy sensor (manual-on/automatic off).
      c. Manual-Off Override Control Capability: When used to turn off load while in automatic-on mode, unit to revert back to automatic mode after no occupant presence is detected during the delayed-off time interval.
      d. Dimmer: Solid-state with continuous full-range even control following square law dimming curve, integral radio frequency interference filtering, power failure preset memory, air gap switch accessible without removing wall plate, and listed as complying with UL 1472; type and rating suitable for load controlled.
      e. Provide field adjustable dimming preset for occupied state.
      f. Provide fade-to-off operation to notify occupant of impending load turn-off.
      g. Finish: Match finishes specified for wiring devices in Section 262725, unless otherwise indicated.

E. Ceiling Mounted Occupancy Sensors:
   1. All Ceiling Mounted Occupancy Sensors:
      a. Description: Low profile occupancy sensors designed for ceiling installation.
      b. Unless otherwise indicated or required to control the load indicated on the drawings, provide line voltage units with self-contained relay, or low voltage units, for use with separate compatible accessory power packs.
      c. Finish: White unless otherwise indicated.
   2. Passive Infrared/Ultrasonic Dual Technology Wall Mounted Occupancy Sensors:
      a. Standard Range Sensors: Capable of detecting motion within an area of 450 square feet at a mounting height of 9 feet, with a field of view of 360 degrees.
         1) Products:
            (a) Wattstopper, DW-311.
   3. Passive Infrared/Ultrasonic Dual Technology Ceiling Mounted Occupancy Sensors:
      a. Standard Range Sensors: Capable of detecting motion within an area of 450 square feet at a mounting height of 9 feet, with a field of view of 360 degrees.
         1) Products:
            (a) Wattstopper, DT-355 series

F. Power Packs for Low Voltage Occupancy Sensors:
   1. Description: Plenum rated, self-contained low voltage class 2 transformer and relay compatible with specified low voltage occupancy sensors for switching of line voltage loads.
   2. Provide quantity and configuration of power and slave packs with all associated wiring and accessories as required to control the load indicated on drawings.
   3. Input Supply Voltage: Dual rated for 120/277 V ac.
   4. Load Rating: As required to control the load indicated on drawings.

G. Accessories:
   1. Provide heavy duty coated steel wire protective guards compatible with specified occupancy sensors where indicated.

2.03 TIME SWITCHES

A. Manufacturers:

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1. Tork, a division of NSI Industries LLC; _____: www.tork.com
    a. Product: #7200ZL series.

B. Electromechanical Time Switches:
1. Description: Factory-assembled controller with motor-operated timing dial mechanism and adjustable trippers for setting on/off operations, listed and labeled as complying with UL 917.
2. Program Capability:
    a. Astronomic Time Switches: With same schedule for each day of the week and skip-a-day feature to omit selected days with automatic adjustment for seasonal changes in sunrise and sunset times.
3. Schedule Capacity:
    a. 24-Hour Time Switches: Accommodating not less than 12 pairs of selected on/off operations per day.
    b. Astronomic Time Switches: Capable of turning load on at sunset and off at either sunrise or selected fixed time.
4. Provide spring reserve backup to maintain clock during power outage.
5. Manual override: Capable of overriding current schedule both permanently and temporarily until next scheduled event.
6. Input Supply Voltage: As indicated on the drawings.
7. Output Switch Configuration: As required to control the load indicated on drawings.
8. Output Switch Contact Ratings: As required to control the load indicated on drawings.
9. Provide lockable enclosure; environmental type per NEMA 250 as specified for the following installation locations:
    a. Indoor clean, dry locations: Type 1.
    b. Outdoor locations: Type 3R.
10. Provide flush-mounted unit where indicated, where mounted in public areas, or where mounted adjacent to flush-mounted equipment.

2.04 IN-WALL INTERVAL TIMERS

A. Manufacturers:
1. Intermatic, Inc; _____: www.intermatic.com
2. Tork, a division of NSI Industries LLC; _____: www.tork.com

B. Spring Wound In-Wall Interval Timers:
1. Description: Factory-assembled controller with mechanical spring wound timing mechanism requiring no electricity to operate; suitable for mounting in standard wall box; rotary control operator with matching wall plate factory marked with time interval units; listed and labeled as complying with UL 916 or UL 917.
2. Program Capability: Designed to turn load off at end of preset time interval.
3. Time Interval: User selectable from zero up to 2 hours.
4. Switch Configuration: SPST.
5. Contact Ratings: As required to control the load indicated on drawings.
6. Contact Ratings:

2.05 LIGHTING CONTACTORS

A. Manufacturers:
1. Rockwell Automation Inc; Allen-Bradley Products; _____: ab.rockwellautomation.com
2. Schneider Electric; Square D Products; _____: www.schneider-electric.us
3. Siemens Industry, Inc; _____: www.usa.siemens.com
4. Substitutions: See Section 016000 - Product Requirements.

B. Description: Magnetic lighting contactors complying with NEMA ICS 2, and listed and labeled as complying with UL 60947-1 and UL 60947-4-1; noncombination type unless otherwise indicated; ratings, configurations and features as indicated on the drawings.

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C. Short Circuit Current Rating:
   1. Provide contactors with listed short circuit current rating not less than the available fault current at the installed location as determined by short circuit study performed in accordance with Section 260573.

D. Enclosures:
   1. Comply with NEMA ICS 6.
   2. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
      a. Indoor Clean, Dry Locations: Type 1 or Type 12.
      b. Outdoor Locations: Type 3R or Type 4.
   3. Finish: Manufacturer's standard unless otherwise indicated.

2.06 CONTROL ACCESSORIES

A. Auxiliary Contacts:
   1. Comply with NEMA ICS 5.
   2. Provide number and type of contacts indicated or required to perform necessary functions, including holding (seal-in) circuit and interlocking, plus one normally open (NO) and one normally closed (NC) spare contact for each lighting contactor, minimum.

B. Pilot Devices:
   1. Comply with NEMA ICS 5; heavy-duty type.
   2. Nominal Size: 30 mm.
   3. Pushbuttons: Unless otherwise indicated, provide momentary, non-illuminated type with flush button operator; normally open or normally closed as indicated or as required.
   4. Selector Switches: Unless otherwise indicated, provide maintained, non-illuminated type with knob operator; number of switch positions as indicated or as required.
   5. Indicating Lights: Push-to-test type unless otherwise indicated.
   6. Provide LED lamp source for indicating lights and illuminated devices.

C. Control and Timing Relays:
   1. Comply with NEMA ICS 5.
   2. Provide number and type of relays indicated or required to perform necessary functions.
   3. Timing Relays: Electronic.
      a. Adjustable Timing Range: As indicated on drawings.

D. Fire-Rated Device Enclosures:
   1. Manufacturers:
      a. Fire Rated Product Specialties Corp; _____: www.frpsonline.com
      b. Substitutions: See Section 016000 - Product Requirements.
   2. Provide as required to preserve fire resistance rating of building elements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.

C. Verify that openings for outlet boxes are neatly cut and will be completely covered by devices or wall plates.

D. Verify that final surface finishes are complete, including painting.

E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to lighting control devices.

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F. Verify that the service voltage and ratings of lighting control devices are appropriate for the service voltage and load requirements at the location to be installed.

G. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

A. Install lighting control devices in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.

B. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of lighting control devices provided under this section.
   1. Mounting Heights: Unless otherwise indicated, as follows:
      a. Wall Switch Occupancy Sensors: 48 inches above finished floor.
   2. Orient outlet boxes for vertical installation of lighting control devices unless otherwise indicated.
   3. Locate wall switch occupancy sensor on strike side of door. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.

C. Install lighting control devices in accordance with manufacturer's instructions.

D. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

E. Install lighting control devices plumb and level, and held securely in place.

F. Where required and not furnished with lighting control device, provide wall plate in accordance with Section 262725.

G. Provide required supports in accordance with Section 260529.

H. Where applicable, install lighting control devices and associated wall plates to fit completely flush to mounting surface with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

I. Identify lighting control devices in accordance with Section 260553.

J. Occupancy Sensor Locations:
   1. Location Adjustments: Within the design intent, reasonably minor adjustments to locations may be made in order to optimize coverage and avoid conflicts or problems affecting coverage.
   2. Locate dual technology passive infrared/ultrasonic occupancy sensors a minimum of 4 feet from air supply ducts or other sources of heavy air flow and as per manufacturer's recommendations, in order to minimize false triggers.

K. Unless otherwise indicated, install power packs for lighting control devices above accessible ceiling or above access panel in inaccessible ceiling near the sensor location.

L. Where indicated, install separate compatible wall switches for manual control interface with lighting control devices or associated power packs.

M. Unless otherwise indicated, install switches on load side of power packs so that switch does not turn off power pack.

N. Where indicated or required, provide cabinet or enclosure in accordance with Section 260533.16 for mounting of lighting control device system components.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

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B. Inspect each lighting control device for damage and defects.

C. Test occupancy sensors to verify proper operation, including time delays and ambient light thresholds where applicable. Verify optimal coverage for entire room or area.

D. Test time switches to verify proper operation.

E. Correct wiring deficiencies and replace damaged or defective lighting control devices.

3.05 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

B. Adjust occupancy sensor settings to minimize undesired activations while optimizing energy savings, and to achieve desired function as indicated or as directed by Architect.

C. Adjust position of directional occupancy sensors and outdoor motion sensors to achieve optimal coverage as required.

D. Where indicated or as directed by Architect, install factory masking material or adjust integral blinders on dual technology occupancy sensor lenses to block undesired motion detection.

E. Adjust time switch settings to achieve desired operation schedule as indicated or as directed by Architect.

3.06 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

B. Clean inside of boxes and control enclosures, prior to installing devices, equipment, etc.

3.07 COMMISSIONING

A. See Section 019113 - General Commissioning Requirements for commissioning requirements.

3.08 CLOSEOUT ACTIVITIES

A. See Section 017800 - Closeout Submittals, for closeout submittals.

B. See Section 017900 - Demonstration and Training, for additional requirements.

C. Demonstration: Demonstrate proper operation of lighting control devices to Architect, and correct deficiencies or make adjustments as directed.

D. Training: Train Owner's personnel on operation, adjustment, programming, and maintenance of lighting control devices.

1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
2. Provide minimum of two hours of training.
3. Instructor: Qualified contractor familiar with the project and with sufficient knowledge of the installed lighting control devices.
4. Location: At project site.

END OF SECTION

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SECTION 260936

MODULAR LIGHTING CONTROL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Standalone lighting control systems and associated components:
   1. LED drivers.
   2. Power interfaces.
   3. Main units.
   4. Lighting control modules.
   5. Digital dimming drivers and switching modules.
   6. Control stations.
   7. Low-voltage control interfaces.
   8. Wired sensors.
   9. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

B. Section 260923 - Lighting Control Devices.

C. Section 262725 - Wiring Devices:
   1. Finish requirements for wall controls specified in this section.
   2. Accessory receptacles and wallplates, to match lighting controls specified in this section.

D. Section 265100 - Interior Lighting: Luminaires and associated components, for interface with lighting control system.

E. Section 265113 - Luminaires, Ballasts, and Drivers.

1.03 REFERENCE STANDARDS

A. 47 CFR 15 - Radio Frequency Devices; current edition.

B. ASTM D4674 - Standard Practice for Accelerated Testing for Color Stability of Plastics Exposed to Indoor Office Environments; 2002a (Reapproved 2010).

C. IEC 61000-4-2 - Electromagnetic Compatibility (EMC) - Part 4-2: Testing and Measurement Techniques - Electrostatic Discharge Immunity Test; 2008.

D. IEC 61000-4-5 - Electromagnetic Compatibility (EMC) - Part 4-5: Testing and Measurement Techniques - Surge Immunity Test; 2014.

E. IEC 61347-2-3 - Lamp Control Gear - Part 2-3: Particular Requirements for A.C. and/or D.C. Supplied Electronic Control Gear for Fluorescent Lamps; 2011, with Amendments, 2016.

F. IEEE 1789 - IEEE Recommended Practice for Modulating Current in High-Brightness LEDs for Mitigating Health Risks to Viewers; 2015.

G. IEEE C62.41.2 - Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits; 2002 (Cor 1, 2012).

H. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

I. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.

J. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts; 2015.

K. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (R2015).

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L. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

M. UL 94 - Tests for Flammability of Plastic Materials for Parts in Devices and Appliances; Current Edition, Including All Revisions.

N. UL 508 - Industrial Control Equipment; Underwriters Laboratories Inc; Current Edition, Including All Revisions.

O. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.

P. UL 1310 - Class 2 Power Units; Current Edition, Including All Revisions.

Q. UL 1472 - Solid-State Dimming Controls; Current Edition, Including All Revisions.

R. UL 1598C - Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits; Current Edition, Including All Revisions.

S. UL 2043 - Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces; Current Edition, Including All Revisions.

T. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the placement of sensors and wall controls with millwork, furniture, equipment, etc. installed under other sections or by others.
   2. Coordinate the placement of wall controls with actual installed door swings.
   3. Coordinate the placement of daylight sensors with windows, skylights, and luminaires to achieve optimum operation. Coordinate placement with ductwork, piping, equipment, or other potential obstructions to light level measurement installed under other sections or by others.
   4. Coordinate the work to provide luminaires and lamps compatible with the lighting controls to be installed.
   5. Notify Architect and Owner's Construction Project Coordinator, of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

B. Pre-Wire Meeting: Conduct on-site meeting with lighting control system manufacturer prior to commencing work as part of manufacturer's standard startup services. Manufacturer to review with installer:
   1. Low voltage wiring requirements.
   2. Separation of power and low voltage/data wiring.
   3. Wire labeling.
   4. Control locations.
   5. Load circuit wiring.
   6. Connections to other equipment.
   7. Installer responsibilities.

C. Sequencing:
   1. Do not install sensors and wall controls until final surface finishes and painting are complete.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Design Documents: Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under "LIGHTING CONTROL SYSTEM - GENERAL REQUIREMENTS", Lighting Control Manufacturer to provide plans indicating occupancy/vacancy and/or daylight sensor locations.

C. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.

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1. Occupancy/Vacancy Sensors: Include detailed basic motion detection coverage range diagrams.

D. Shop Drawings:
   1. Provide schematic system riser diagram indicating component interconnections. Include requirements for interface with other systems.

E. Manufacturer's Installation Instructions: Include application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

F. Project Record Documents: Record actual installed locations and settings for lighting control system components.

G. Operation and Maintenance Data: Include detailed information on lighting control system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.

H. Warranty: Submit sample of manufacturer's Warranty or Enhanced Warranty as specified in Part 1 under "WARRANTY". Submit documentation of final execution completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications:
   1. Company with not less than ten years of experience manufacturing lighting control systems of similar complexity to specified system.
   2. Qualified to supply specified products and to honor claims against product presented in accordance with warranty.

D. Maintenance Contractor Qualifications: Manufacturer's authorized service representative.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store products in a clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation.

1.08 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.
   1. System Requirements, Unless Otherwise Indicated:
      a. Ambient Temperature:
         1) Lighting Control System Components, Except Those Listed Below: Between 32 and 104 degrees F.
      b. Relative Humidity: Less than 90 percent, non-condensing.

1.09 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Manufacturer's Standard Warranty, With Manufacturer Start-Up:
   1. Manufacturer Lighting Control System Components, Except Ballasts/Drivers and Ballast Modules:
      a. First Two Years:
         1) 100 percent replacement parts coverage, 100 percent manufacturer labor coverage to troubleshoot and diagnose a lighting issue.
      b. Telephone Technical Support: Available 24 hours per day, 7 days per week, excluding manufacturer holidays.

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2. Ballasts/Drivers and Ballast Modules: Five years 100 percent parts coverage, no manufacturer labor coverage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers:
   1. Nextlight: Nexlight, Inc, www.nexlight.com.
   2. Wattstopper: Legrand/Wattstopper, www.legand.us/wattstopper.aspx
      a. Digital Light Management (DLM) Series

2.02 LIGHTING CONTROL SYSTEM - GENERAL REQUIREMENTS

A. Sensor Layout and Design:
   1. Lighting Control Manufacturer to take full responsibility for wired or wireless sensor layout and performance for sensors provided by Lighting Control Manufacturer.
   2. Lighting Control Manufacturer to analyze the reflected ceiling plans, via supplied electronic AutoCAD format, and design a detailed sensor layout that provides adequate occupancy sensor coverage and ensures occupancy and daylight sensor performance per agreed upon sequence of operations. Contractor to utilize the layouts for sensor placement.
   3. During startup, Lighting Control Manufacturer to direct Contractor regarding sensor relocation, as required, should conditions require a deviation from locations specified in the drawings.

B. Provide products listed, classified, and labeled by Underwriter's Laboratories Inc. (UL) as suitable for the purpose indicated.

C. Unless specifically indicated to be excluded, provide all required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, software, system programming, etc. as necessary for a complete operating system that provides the control intent indicated.

D. Design lighting control equipment for 10 year operational life while operating continually at any temperature in an ambient temperature range of 32 degrees F to 104 degrees F and 90 percent non-condensing relative humidity.

E. Device Finishes:
   1. Wall Controls: Match finishes specified for Wiring Devices in Section 262725, unless otherwise indicated.

2.03 MAIN UNITS

A. Provide main units with configuration and quantity of zones as indicated or as required to control the loads as indicated.

B. Engrave units with button, zone, and scene descriptions as indicated on the drawings.

C. Preset Lighting Control with Zone Override:
   1. Intensity for each zone indicated by means of one illuminated bar graph per zone.
   2. User-programmable zone and scene names.
   3. Time clock and programmer interface provides access to:
      a. Scene selections.
      b. Fade zone to a level.
      c. Fine-tuning of preset levels with scene raise/lower.
      d. Lock out scenes and zones.
      e. Fine-tuning of light levels with individual zone raise/lower.
      f. Enable/disable wall station.
   4. Fade time indicated by digital display for current scene while fading.
   5. Integral wide angle infrared receiver.
   6. For temporary local overrides, individual raise/lower buttons to allow zones to be adjusted without altering scene values stored in memory.

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7. Creates daylighting rows independent of control zones.
8. Capable of re-zoning without re-wiring using programming display on unit.

2.04 LIGHTING CONTROL MODULES

A. Provide lighting control modules as indicated or as required to control the loads as indicated.

B. General Requirements:
   1. Listed to UL 508 as industrial control equipment.
   2. Delivered and installed as a listed factory-assembled panel.
   3. Passively cooled via free-convection, unaided by fans or other means.
   4. Mounting: Surface.
   5. Connection without interface to wired:
      a. Occupancy sensors.
      b. Daylight sensors.
      c. IR receivers for personal control.
   6. LED status indicators confirm communication with occupancy sensors, daylight sensors, and IR receivers.

C. 0-10V Lighting Control Modules:
   1. Product(s):
      a. Nexlight:
      b. Wattstopper:
         1) LMRC-200 series.

D. On/Off Room Lighting Controller Modules:
   1. Product(s):
      a. Nexlight:
      b. Wattstopper:
         1) LMRC-100 series.

E. Digital Plug Load Controller Modules:
   1. Product(s):
      a. Nexlight:
      b. Wattstopper:
         1) LMPL-100/200 series.
   2. Low voltage dimming module; capable of controlling following light sources:
      a. 0-10V analog voltage signal.
         1) Provide Class 2 isolated 0-10 V output signal conforming to IEC 60929.
         2) Sink current per IEC 60929.
   3. Switching:
      a. Rated Life of Relay: Typical of 1,000,000 cycles at fully rated 16 A for all lighting loads.
      b. Load switched in manner that prevents arcing at mechanical contacts when power is applied to and removed from load circuits.
      c. Fully rated output continuous duty for inductive, capacitive, and resistive loads.

2.05 CONTROL STATIONS

A. Provide control stations with configuration as indicated or as required to control the loads as indicated.

B. Wired Control Stations:
   1. General Requirements:
      a. Power: Class 2 (low voltage).
      b. UL listed.
      c. Provide faceplates with mounting hardware.

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d. Borders, logos, and graduations to use laser engraving or silk-screened graphic process that chemically bonds graphics to faceplate, resistant to removal by scratching and cleaning.

2. Multi-Scene Wired Control:
   a. General Requirements:
      1) Allows control of any devices part of the lighting control system.
      2) Allows for easy reprogramming without replacing unit.
      3) Communications: Utilize wiring for low-voltage communications link.
      4) Engrave keypads with button, zone, and scene descriptions as indicated on the drawings.
      5) Status LEDs:
         (a) Upon button press, LEDs to immediately illuminate.
   b. Wired Keypads:
      1) Products:
         (a) Nexlight:
         (b) Wattstopper:
            (1) LMSW-100 series, wall switches.
      2) Mounting: Wallbox; provide wall plates with concealed mounting hardware.
      3) Design keypads to allow field-customization of button color, configuration, and engraving using field-changeable replacement kits.

C. Handheld Controls:
   1. Product(s):
      a. Nexlight, #Handheld Programmer.
      b. Wattstopper, #Wireless Handheld Configuration Tool.
   2. Quantity: As indicated on the drawings.
   3. Designed for use in conjunction with compatible infrared receiver and lighting control; compatibility dependent on that receiver, not transmitter.
   4. Learnable by other variable frequency remote controls.

2.06 PARTITION CONTROL SWITCHES

A. Wired Partition Switches::
   1. Products:
      a. Nexlight:
      b. Wattstopper:
         1) LMSW-100 series, wall switches.
   2. For reconfigurable lighting controls for operation when movable walls are opened and closed.

2.07 WIRED SENSORS

A. Wired Occupancy Sensors:
   1. General Requirements:
      a. Turns off or reduces lighting automatically after reasonable time delay when a room or area is vacated by the last person to occupy the space.
      b. Accommodates all conditions of space utilization and all irregular work hours and habits.
      c. Comply with UL 94.
      d. Power Failure Memory: Settings and learned parameters to be saved in non-volatile memory and not lost should power be interrupted and subsequently restored.
      e. Furnished with all necessary mounting hardware and instructions.
      f. Class 2 devices.
      g. Ceiling-Mounted Sensors: Indicate viewing directions on mounting bracket.
      h. Wall-Mounted Sensors: Provide swivel-mount base.
      i. Color: Grey.

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2. Wired Dual Technology Sensors:
    a. Passive Infrared: Utilize multiple segmented lens, with internal grooves to eliminate dust and residue build-up.
    b. Ultrasonic: Utilize an operating frequency of 32 kHz or 40 kHz, crystal-controlled to operate within plus/minus 0.005 percent tolerance.
    c. Ceiling-Mounted Sensors: Provide customizable mask to block off unwanted viewing areas.
    d. Products:
        1) Nexlight:
        2) Wattstopper:
            (a) LMDX-100 series, Digital Dual Technology Corner Mount Occupancy Sensor.
            (b) LMDC-100 series, Digital Dual Technology Ceiling Mount Occupancy Sensor.

B. Wired Daylight Sensors:
1. Digital Interior Daylight Sensor:
    a. Open-loop basis for daylight sensor control scheme.
    b. Stable output over temperature from 32 degrees F to 104 degrees F.
    c. Partially shielded for accurate detection of available daylight to prevent fixture lighting and horizontal light component from skewing sensor detection.
    d. Provide linear response from 0 to 500 footcandles.
2. Daylight Control Package:
    a. Product:
        1) Controller:
            (a) Product:
                (1) Nexlight:
                (2) Wattstopper, LMLS-500, Multi-zone, switching and dimming open loop Photosensor.

C. Partition Sensors:
1. Products:
    a. Nexlight:
    b. Wattstopper:
        1) LMPS-104 series.
2. Provide contact closure based on status of the partition wall (open/close) enabling automatic linking of controls.

2.08 SOURCE QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that ratings and configurations of system components are consistent with the indicated requirements.

C. Verify that mounting surfaces are ready to receive system components.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, except for mounting heights specified in those standards.

B. Install products in accordance with manufacturer's instructions.

C. Define each dimmer/relay load type, assign each load to a zone, and set control functions.

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D. Sensor Locations:
   1. Sensor locations indicated are diagrammatic. Within the design intent, reasonably minor adjustments to locations may be made in order to optimize coverage and avoid conflicts or problems affecting coverage, in accordance with manufacturer's recommendations.

E. Mount exterior daylight sensors to point due north with constant view of daylight.

F. Ensure that daylight sensor placement minimizes sensor view of electric light sources. Locate ceiling-mounted and luminaire-mounted daylight sensors to avoid direct view of luminaires.

G. LED Light Engine/Array Lead Length: Do not exceed 100 feet.

H. Identify system components in accordance with Section 260553.

3.03 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Manufacturer's Startup Services:
   1. Manufacturer's authorized Service Representative to conduct minimum of two site visits to ensure proper system installation and operation.
   2. Conduct Pre-Installation visit to review requirements with installer as specified in Part 1 under "Administrative Requirements".
   3. Conduct second site visit upon completion of lighting control system to perform system startup and verify proper operation:
      a. Verify connection of power wiring and load circuits.
      b. Verify connection and location of controls.
      c. Verify system operation control by control.
      d. Verify proper operation of manufacturer's interfacing equipment.
      e. Configure initial groupings of ballast for wall controls, daylight sensors and occupancy sensors.
      f. Provide initial rough calibration of sensors; fine-tuning of sensors is responsibility of Contractor unless provided by Lighting Control Manufacturer as part of Sensor Layout and Tuning service where specified in Part 2 under "LIGHTING CONTROL SYSTEM - GENERAL REQUIREMENTS".
      g. Train Owner's representative on system capabilities, operation, and maintenance, as specified in Part 3 under "Closeout Activities".
      h. Obtain sign-off on system functions.
   4. Correct defective work, adjust for proper operation, and retest until entire system complies with contract documents.

3.04 ADJUSTING

A. Sensor Fine-Tuning: Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under "LIGHTING CONTROL SYSTEM - GENERAL REQUIREMENTS", Lighting Control Manufacturer to provide up to two additional post-startup on-site service visits for fine-tuning of sensor calibration. Where Lighting Control Manufacturer Sensor Layout and Tuning service is not specified, Contractor to provide fine-tuning of sensor calibration.

3.05 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

B. Clean cabinets of all construction debris, dust and other such materials, prior to installation of lighting control equipment.

3.06 COMMISSIONING

A. See Section 019113 - General Commissioning Requirements, for electrical commissioning requirements.

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3.07 CLOSEOUT ACTIVITIES

A. See Section 017800 - Closeout Submittals, for closeout submittals.

B. See Section 017900 - Demonstration and Training, for additional requirements.

C. Submittal:
   1. Provide Owner with a system diagram, including locations of devices.
   2. Provide programming settings of system installed.

D. Demonstration:

E. Training:
   1. Include services of manufacturer's authorized Service Representative to perform on-site training of Owner's personnel on operation, adjustment, and maintenance of lighting control system as part of standard system start-up services.

3.08 PROTECTION

A. Protect installed products from subsequent construction operations.

3.09 MAINTENANCE

A. See Section 017000 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.

END OF SECTION

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SECTION 262725
WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall switches.

B. Receptacles.

C. Wall plates.

D. Poke-through assemblies.

1.02 RELATED REQUIREMENTS

A. Section 096900 - Access Flooring.

B. Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Manufactured wiring systems for use with access floor boxes with compatible pre-wired connectors.

C. Section 260526 - Grounding and Bonding for Electrical Systems.

D. Section 260533.16 - Boxes for Electrical Systems.

E. Section 260533.23 - Surface Raceways for Electrical Systems: Surface raceway systems, including multioutlet assemblies.

F. Section 260539 - Underfloor Raceways for Electrical Systems.

G. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

H. Section 260583 - Wiring Connections: Cords and plugs for equipment.

I. Section 260923 - Lighting Control Devices: Devices for automatic control of lighting, including occupancy sensors.

J. Section 260936 - Modular Lighting Control Systems: Lighting controls, to match accessory receptacles and wallplates specified in this section.

K. Section 262723 - Indoor Service Poles.

L. Section 262913 - Enclosed Controllers: Manual motor starters and horsepower rated motor-starting switches without overload protection.

M. Section 271005 - Structured Cabling for Voice and Data - Inside-Plant: Voice and data jacks.

1.03 REFERENCE STANDARDS

A. FS W-C-596 - Connector, Electrical, Power, General Specification for; Revision H, 2014.

B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush-mounted (General Specification); Revision G, 2014.

C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

D. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.

E. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (R2015).

F. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2016.

G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.

I. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.

J. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.

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K. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

L. UL 1310 - Class 2 Power Units; Current Edition, Including All Revisions.

M. UL 1449 - Standard for Surge Protective Devices; Current Edition, Including All Revisions.

N. UL 1472 - Solid-State Dimming Controls; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
   2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
   3. Coordinate the placement of outlet boxes for wall switches with actual installed door swings.
   4. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
   5. Coordinate the core drilling of holes for poke-through assemblies with the work covered under other sections.
   6. Notify Architect and Owner's project coordinator, of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

B. Sequencing:
   1. Do not install wiring devices until final surface finishes and painting are complete.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.
   1. Surge Protection Receptacles: Include surge current rating, voltage protection rating (VPR) for each protection mode, and diagnostics information.

C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

D. Operation and Maintenance Data:
   1. GFCI Receptacles: Include information on status indicators.
   2. Surge Protection Receptacles: Include information on status indicators.

E. Project Record Documents: Record actual installed locations of wiring devices.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.
   2. Screwdrivers for Tamper-Resistant Screws: Two for each type of screw.
   3. Extra Keys for Locking Switches: Two of each type.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Products: Listed, classified, and labeled as suitable for the purpose intended.

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

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1.07 DELIVERY, STORAGE, AND PROTECTION

A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

PART 2 PRODUCTS

2.01 WIRING DEVICE APPLICATIONS

A. Provide wiring devices suitable for intended use and with ratings adequate for load served.

B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.

C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.

D. Provide tamper resistant receptacles for receptacles installed in dwelling units and children areas.

E. Provide GFCI protection for receptacles installed within 6 feet of sinks.

F. Provide GFCI protection for receptacles installed in kitchens.

G. Provide GFCI protection for receptacles serving electric drinking fountains.

H. Unless noted otherwise, do not use combination switch/receptacle devices.

2.02 WIRING DEVICE FINISHES

A. Provide wiring device finishes as described below unless otherwise indicated.

B. Wiring Devices, Unless Otherwise Indicated: Gray with stainless steel wall plate.

C. Wiring Devices Installed in Finished Spaces: Gray with stainless steel wall plate.

D. Wiring Devices Installed in Unfinished Spaces: Gray with galvanized steel wall plate.

E. Wiring Devices Installed in Wet or Damp Locations: Gray with specified weatherproof cover.

F. Wiring Devices Installed in ceilings: White with stainless steel wall plate, except for surge protection receptacles.

G. Isolated Ground Convenience Receptacles: Orange with a stainless steel cover plate.

H. Surge Protection Receptacles: Blue with a stainless steel cover plate.

I. Wiring Devices Connected to Emergency Power: Red with wall plate as specified for wiring devices connected to normal power, but engraved "Emergency".

J. Clock Hanger Receptacles: Gray with stainless steel wall plate.

2.03 WALL SWITCHES

A. Manufacturers:
   1. Hubbell Incorporated; _____: www.hubbell.com
   2. Leviton Manufacturing Company, Inc; _____: www.leviton.com
   3. Pass & Seymour, a brand of Legrand North America, Inc; _____: www.legrand.us

B. Wall Switches - General Requirements: AC only, quiet operating, extra heavy duty industrial grade, switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screw actuated binding clamp for back and side wiring with separate ground terminal screw.

C. Standard Wall Switches: Industrial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.
   1. Products:
      a. Hubbell,

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b. Leviton,
c. Pass & Seymour,

D. Lighted Wall Switches: Industrial specification grade, 20 A, 120/277 V with clear illuminated standard toggle type switch actuator and maintained contacts; illuminated with load off; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.
1. Products:
a. Hubbell,
b. Leviton,
c. Pass & Seymour,

E. Pilot Light Wall Switches: Industrial specification grade, 20 A, 120/277 V with clear illuminated standard toggle type switch actuator and maintained contacts; illuminated with load on; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.
1. Products:
a. Hubbell,
b. Leviton,
c. Pass & Seymour,
d. _____.

F. Locking Wall Switches: Industrial specification grade, 20 A, 120/277 V with lever type keyed switch actuator and maintained contacts; switches keyed alike; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.
1. Products:
a. Hubbell,
b. Leviton,
c. Pass & Seymour,

G. Momentary Contact Wall Switches: Industrial specification grade, 20 A, 120/277 V with toggle type three position switch actuator and momentary contacts; single pole double throw, off with switch actuator in center position.
1. Products:
a. Hubbell,
b. Leviton,
c. Pass & Seymour,

H. Locking Momentary Contact Wall Switches: Industrial specification grade, 20 A, 120/277 V with lever type keyed three position switch actuator and momentary contacts; switches keyed alike; single pole double throw, off with switch actuator in center position.
1. Products:
a. Hubbell,
b. Leviton,
c. Pass & Seymour,

2.04 RECEPTACLES

A. Manufacturers:
1. Hubbell Incorporated; _____: www.hubbell.com
2. Leviton Manufacturing Company, Inc; _____: www.leviton.com
3. Pass & Seymour, a brand of Legrand North America, Inc; _____: www.legrand.us
4. Source Limitations: Where wall controls are furnished as part of lighting control system, provide accessory matching receptacles and wallplates by the same manufacturer in locations indicated.

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B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screw actuated binding clamp for back wiring with separate ground terminal screw.
   2. NEMA configurations specified are according to NEMA WD 6.
   3. Hospital Grade Receptacles: Listed as complying with UL 498 Supplement SD, with green dot hospital grade mark on device face.

C. Convenience Receptacles:
   1. Standard Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
      a. Products:
         1) Hubbell,
         2) Leviton,
         3) Pass & Seymour,
   2. Automatically Controlled Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; controlled receptacle marking on device face per NFPA 70; single or duplex as indicated on the drawings.
      a. Products:
         1) Hubbell,
         2) Leviton,
         3) Pass & Seymour,
   3. Isolated Ground Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, with ground contacts isolated from mounting strap; isolated ground triangle mark on device face; single or duplex as indicated on the drawings.
      a. Products:
         1) Hubbell,
         2) Leviton,
         3) Pass & Seymour,
   4. Weather Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.
      a. Products:
         1) Hubbell,
         2) Leviton,
         3) Pass & Seymour,
   5. Tamper Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type; single or duplex as indicated on the drawings.
      a. Products:
         1) Hubbell,
         2) Leviton,
         3) Pass & Seymour,
         4) _____.
   6. Tamper Resistant and Weather Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type and as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.
      a. Products:
         1) Hubbell,

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2) Leviton,
3) Pass & Seymour,

D. GFCI Receptacles:
1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
a. Provide test and reset buttons of same color as device.
2. Standard GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
a. Products:
1) Hubbell,
2) Leviton,
3) Pass & Seymour,
3. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.
a. Products:
1) Hubbell,
2) Leviton,
3) Pass & Seymour,
4) _____.
5) _____.
4. Tamper Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type.
a. Products:
1) Hubbell,
2) Leviton,
3) Pass & Seymour,
5. Tamper Resistant and Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type and as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.
a. Products:
1) Hubbell,
2) Leviton,
3) Pass & Seymour,

E. USB Charging Devices:
1. USB Charging Devices - General Requirements: Listed as complying with UL 1310.
a. Charging Capacity - Two-Port Devices: 2.1 A, minimum.
b. Charging Capacity - Four-Port Devices: 4.2 A, minimum.
2. USB Charging/Tamper Resistant Receptacle Combination Devices: Two-port (Type A) USB charging device and receptacle, commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type; rectangular decorator style.
a. Products:
1) Hubbell,
2) Leviton,
3) Pass & Seymour,
3. USB Charging Noncombination Devices: Four-port (Type A); rectangular decorator style.
a. Products:

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1) Hubbell,
2) Leviton,
3) Pass & Seymour,
4) _____.

F. Surge Protection Receptacles:
1. Surge Protection Receptacles - General Requirements: Listed and labeled as complying with UL 1449, Type 2 or 3.
a. Energy Dissipation: Not less than 240 J per mode.
b. Protected Modes: L-N, L-G, N-G.
c. UL 1449 Voltage Protection Rating (VPR): Not more than 700 V for L-N, L-G modes and 1200 V for N-G mode.
d. Diagnostics:
1) Visual Notification: Provide indicator light to report functional status of surge protection.
2. Standard Surge Protection Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
a. Products:
1) Hubbell,
2) Leviton,
3) Pass & Seymour,

G. Clock Hanger Receptacles: See Section 275313 for additional information.

2.05 WALL PLATES

A. Manufacturers:
1. Hubbell Incorporated; _____: www.hubbell-wiring.com
2. Leviton Manufacturing Company, Inc; _____: www.leviton.com
3. Pass & Seymour, a brand of Legrand North America, Inc; _____: www.legrand.us
4. Source Limitations: Where wall controls are furnished as part of lighting control system, provide accessory matching receptacles and wallplates by the same manufacturer in locations indicated.

B. Wall Plates: Comply with UL 514D.
1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
2. Size: Standard; _____.
3. Screws: Metal with slotted heads finished to match wall plate finish.

C. Stainless Steel Wall Plates: Brushed satin finish, 0.032 inch thick, Type 302/304 stainless steel.

D. Galvanized Steel Wall Plates: Rounded corners and edges, with corrosion resistant screws.

E. Weatherproof Covers for Damp Locations: Gasketed, cast aluminum, with self-closing hinged cover and corrosion-resistant screws; listed as suitable for use in wet locations with cover closed.

F. Weatherproof Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.

2.06 FLOOR BOX SERVICE FITTINGS

A. Manufacturers:
1. Hubbell Incorporated; _____: www.hubbell.com
2. Thomas & Betts Corporation; _____: www.tnb.com
3. Wiremold, a brand of Legrand North America, Inc; _____: www.legrand.us

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B. Description: Service fittings compatible with floor boxes provided under Section 260533.16 with components, adapters, and trims required for complete installation.

C. Above-Floor Service Fittings:
   1. Coverplate configuration as shown on the drawings.
   2. Single Service Pedestal Furniture Feed:
   3. Dual Service Pedestal Combination Outlets:
      a. Provide barrier to separate line and low voltage compartments.

D. Flush Floor Service Fittings:
   1. Single Service Flush Convenience Receptacles:
      a. Cover: Round.
      b. Configuration: One standard convenience duplex receptacle(s) with duplex flap opening(s).
   2. Single Service Flush Communications Outlets:
      a. Cover: Round.
      b. Configuration: As shown on the drawings.
      c. Voice and Data Jacks: As specified in Section 271005.
   3. Single Service Flush Furniture Feed:
      a. Cover: Round.
      b. Configuration: One 2-1/8 inch by 3/4 inch combination threaded opening(s).
   4. Dual Service Flush Combination Outlets:
      a. Cover: Round.
      b. Configuration:
         1) Power: One standard convenience duplex receptacle(s) with duplex flap opening(s).
         2) Voice and Data Jacks: As specified in Section 271005.
   5. Dual Service Flush Furniture Feed:
      a. Cover: Round.
      b. Configuration:
         1) Power: One 2-1/8 inch by 3/4 inch combination threaded opening(s).
         2) Communications: One 2-1/8 inch by 1 inch combination threaded opening(s).
   6. Accessories:
      a. Tile Rings: Finish to match covers; configuration as required to accommodate specified covers.
      b. Carpet Flanges: Finish to match covers; configuration as required to accommodate specified covers.

2.07 POKE-THROUGH ASSEMBLIES

A. Manufacturers:
   1. Hubbell Incorporated; _____: www.hubbell.com
   2. Thomas & Betts Corporation; _____: www.tnb.com
   3. Wiremold, a brand of Legrand North America, Inc; _____: www.legrand.us
   4. Substitutions: See Section 016000 - Product Requirements.

B. Description: Assembly comprising floor service fitting, poke-through component, fire stops and smoke barriers, and junction box for conduit termination; fire rating listed to match fire rating of floor and suitable for floor thickness where installed.

C. Above-Floor Service Fittings:
   1. Single Service Pedestal Convenience Receptacles:
      a. Configuration: One standard convenience duplex receptacle.
   2. Single Service Pedestal Communications Outlets:
      a. Configuration: One 1 inch bushed opening.
      b. Voice and Data Jacks: As specified in Section 271005.

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3. Single Service Pedestal Furniture Feed:
    a. Configuration: One 3/4 inch knockout.
4. Dual Service Pedestal Combination Outlets:
    a. Configuration:
        1) Power: One standard convenience duplex receptacle.
        2) Communications: One 1 inch bushed opening.
        3) Voice and Data Jacks: As specified in Section 271005.
    b. Provide barrier to separate line and low voltage compartments.

D. Flush Floor Service Fittings:
1. Single Service Flush Convenience Receptacles:
    a. Configuration: One standard convenience duplex receptacle(s) with duplex flap opening(s).
2. Single Service Flush Communications Outlets:
    a. Configuration: _____.
    b. Voice and Data Jacks: As specified in Section 271005.
3. Single Service Flush Furniture Feed:
    a. Configuration: One 2 inch by 1-1/4 inch combination threaded opening(s).
4. Dual Service Flush Combination Outlets:
    a. Cover: Hinged door(s).
    b. Configuration:
        1) Power: One standard convenience duplex receptacle(s).
        2) Communications: _____.
        3) Voice and Data Jacks: As specified in Section 271005.
5. Dual Service Flush Furniture Feed:
    a. Configuration:
        1) Power: One 3/4 inch threaded opening(s).
        2) Communications: One 1-1/4" threaded opening(s).
6. Accessories:
    a. Closure Plugs: Size and fire rating as required to seal unused core hole and maintain fire rating of floor.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.

C. Verify that wall openings are neatly cut and will be completely covered by wall plates.

D. Verify that final surface finishes are complete, including painting.

E. Verify that floor boxes are adjusted properly.

F. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

G. Verify that core drilled holes for poke-through assemblies are in proper locations.

H. Verify that openings in access floor are in proper locations.

I. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

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3.03 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.

B. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of wiring devices provided under this section.
   1. Mounting Heights: Unless otherwise indicated, as follows:
      a. Wall Switches: 48 inches above finished floor.
      b. Receptacles: 18 inches above finished floor or 6 inches above counter.
      c. All box height measurements are to the top of the box.
   2. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
   3. Where multiple receptacles or wall switches are installed at the same location and at the same mounting height, gang devices together under a common wall plate.
   4. Locate wall switches on strike side of door with edge of wall plate 8 inches from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.
   5. Locate receptacles for electric drinking fountains concealed behind drinking fountain according to manufacturer's instructions.

C. Install wiring devices in accordance with manufacturer's instructions.

D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

E. Where required, connect wiring devices using pigtails not less than 12 inches long. Do not connect more than one conductor to wiring device terminals.

F. Connect wiring devices by inserting conductors into back of device and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.

G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

H. For isolated ground receptacles, connect wiring device grounding terminal only to identified branch circuit isolated equipment grounding conductor. Do not connect grounding terminal to outlet box or normal branch circuit equipment grounding conductor.

I. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.

J. Where split-wired duplex receptacles are indicated, remove tabs connecting top and bottom receptacles.

K. Install wiring devices plumb and level with mounting yoke held rigidly in place.

L. Install wall switches with OFF position down.

M. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.

N. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

O. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

P. Identify wiring devices and circuiting, in accordance with Section 260553.

Q. Install poke-through closure plugs in each unused core holes to maintain fire rating of floor.

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3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Inspect each wiring device for damage and defects.

C. Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.

D. Test each receptacle to verify operation and proper polarity.

E. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.

F. Inspect each surge protection receptacle to verify surge protection is active.

G. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.05 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

3.06 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION

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SECTION 265013

LUMINAIRE SCHEDULE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Specific requirements for individual luminaire types.

1.02 RELATED REQUIREMENTS

A. Section 265100 - Interior Lighting: General requirements applicable to products specified in this section.

B. Section 265537 - Obstruction and Landing Lights: General requirements applicable to products specified in this section.

C. Section 265561 - Theatrical Lighting: General requirements applicable to products specified in this section.

D. Section 265600 - Exterior Lighting: General requirements applicable to products specified in this section.

1.03 REFERENCE STANDARDS

A. ANSI C136.10 - American National Standard for Roadway and Area Lighting Equipment - Locking-Type Photocontrol Devices and Mating Receptacles - Physical and Electrical Interchangeability and Testing; 2010.

B. IES RP-8 - Roadway Lighting; 2014.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

A. Furnish products as specified below.

B. LUTRON IVALO COLLECTION; SILVUS FAMILY----->

C. Recessed Troffer.

1. Products:
    a. Lithonia Lighting.
        1) 2BLTBA Series
    b. Phillips Lighting.
        1) FluxGrid Series
    c. Columbia Lighting
        1) LCAT Series
    d. Deco Lighting
        1) GO-LED Series
    e. Eaton
        1) 22/24CZ
    f. No substitutions permitted.
2. Housing: Steel, painted white.
3. Nominal Size: 1x4 ft, 2x2 ft and 2x4 ft.
4. LED light source: 4000K (80 CRI). 3500K (80 and 90 CRI), 4000K (90 CRI) and 5000K (80 and 90 CRI) may be used only upon approval by the Owner.
5. Light Output:
    a. Lithonia:
        1) The following lumen configurations are recommended by the owner:
            (a) 1 x 4 foot fixture: 20L, 30L, 40L, 48L and 60L.

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(b) 2 x 2 foot fixture: 20L, 33L and 40L.
(c) 2 x 4 foot fixture: 30L, 40L, 48L, 60L and 72L.

2) The following lumen configurations are not recommended due to additional cost and delay in shipping:
(a) No lumen packages not permitted at this time.

b. Phillips:
1) The following lumen configurations are recommended by the owner:
(a) 1 x 4 foot fixture: 38L, 45L and 41B.
(b) 2 x 2 foot fixture: 38L, 38B and 47L.
(c) 2 x 4 foot fixture: 42B, 43L, 48L, 5L and 74L.

2) The following lumen configurations are not recommended due to additional cost and delay in shipping:
(a) 30L (2 x 4 foot fixture) and 38L (2 x 4 foot fixture).

c. Deco:
1) The following lumen configurations are recommended by the owner:
(a) 2 x 2 foot fixture: 2340, 3250 and 4410.
(b) 2 x 4 foot fixture: 3500, 4280 and 5800

2) The following lumen configurations are not recommended due to additional cost and delay in shipping:
(a) No lumen packages not permitted at this time.

d. Eaton
1) The following lumen configurations are recommended by the owner:
(a) 1 x 4 foot fixture: 20, 25, 29, 35, 39, 44
(b) 2 x 2 foot fixture: 20, 24, 32, 39, 44
(c) 2 x 4 foot fixture: 30, 35, 40, 45, 50, 55, 60, 65

2) The following lumen configurations are not recommended due to additional cost and delay in shipping:
(a) No lumen packages not permitted at this time.

6. Diffuser: Diffuse and ribbed.
a. Lithonia: "ADP", Curved, linear prisms.
b. Philips: "D", Diffuse, Ribbed.
c. Columbia: "R", Rectangular, linear prisms.
d. Deco: "N" Architectural Narrow Lens
e. Eaton: "blank", Ribbed, frosted acrylic
7. Voltage: Universal 120-277 V.
8. LED drivers: Provide LED drivers as recommended by the manufacturer.
9. Dimming Options: Provide 0-10v dimming options for all fixtures. Other dimming options are not permitted, unless directed by the Owner.
10. Provide emergency power supply unit in luminaires designated with "EM" on the drawings.
a. Emergency battery packs are only permitted where no generator or inverter power is available.
11. Mounting: Lay-in, grid ceiling.

D. Flat Panel LED
1. Products:
a. Lithonia
1) EPANL Series
b. Komee
1) KMLP Series
c. Philips

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1) FXP Series
d. Metalux
1) FP Series
e. Deco
1) CFP Series
f. Sylvania
1) PanelF1A Series
g. RAB
1) EZPAN
h. No substitutions permitted.
2. Housing: Aluminum bezel with steel back plate.
3. Nominal Size: 1'x4', 2'x2', and 2'x4'
4. LED light source: 4000K (80 CRI)
5. Light Output:
a. Lithonia:
1) The following lumen configurations are recommended by the owner:
(a) 1 x 4 foot fixture: 1500L, 3000L, 4000L, 48000L, 6000L
(b) 2 x 2 foot fixture: 2000L, 3400L, 4000L, 4800L
(c) 2 x 4 foot fixture: 3000L, 4000L, 4800L, 5400L, 6000L, 6800L
2) The following lumen configurations are not recommended due to additional cost and delay in shipping:
(a) No lumen packages not permitted at this time.
b. Phillips.
1) The following lumen configurations are recommended by the owner:
(a) 2 x 2 foot fixture: 3800L
(b) 2 x 4 foot fixture: 4200L
2) The following lumen configurations are not recommended due to additional cost and delay in shipping:
(a) No lumen packages not permitted at this time.
c. Komee:
1) The following lumen configurations are recommended by the owner:
(a) 2 x 2 foot fixture: 4160L, 4800L
(b) 2 x 4 foot fixture: 6500L, 6700L
2) The following lumen configurations are not recommended due to additional cost and delay in shipping:
(a) No lumen packages not permitted at this time.
d. Metalux:
1) The following lumen configurations are recommended by the owner:
(a) 1 x 4 foot fixture: 3176L, 4389L
(b) 2 x 2 foot fixture: 2551L, 3560L, 4567L
(c) 2 x 4 foot fixture: 3608L, 4858L, 6611L
2) The following lumen configurations are not recommended due to additional cost and delay in shipping:
(a) No lumen packages not permitted at this time.
e. Deco
1) The following lumen configurations are recommended by the owner:
(a) 1 x 4 foot fixture: 30, 35
(b) 2 x 2 foot fixture: 30, 35
(c) 2 x 4 foot fixture: 30, 35

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2) The following lumen configurations are not recommended due to additional cost and delay in shipping:
(a) No lumen packages not permitted at this time.

f. Sylvania
1) The following lumen configurations are recommended by the owner:
(a) 1 x 4 foot fixture: 3300
(b) 2 x 2 foot fixture: 3500
(c) 2 x 4 foot fixture: 3300, 4200
2) The following lumen configurations are not recommended due to additional cost and delay in shipping:
(a) No lumen packages not permitted at this time.

g. RAB
1) The following lumen configurations are recommended by the owner:
(a) 2 x 2 foot fixture: 3000, 4135
(b) 2 x 4 foot fixture: 4286, 5902
2) The following lumen configurations are not recommended due to additional cost and delay in shipping:
(a) No lumen packages not permitted at this time.

6. Diffuser: Satin white lens
7. Voltage: Universal 120-277 V.
8. LED drivers: Provide LED drivers as recommended by the manufacturer.
9. Dimming Options: Provide 0-10V, 1% dimming options for all fixtures. Other dimming options are not permitted, unless directed by the Owner.
10. Provide emergency power supply unit in luminaires designated with "EM" on the drawings.
a. Emergency battery packs are only permitted where generator or inverter power is not available.
11. Provide with the following features/accessories:
a. Surface mount troffer kit
12. Mounting: Lay-in, grid ceiling.

E. Linear Suspended Pendant (rectangular 7" x 2" nominal, up/down light)
1. Products:
a. Litecontrol
1) SAE 104 Series
b. Lithonia Lighting
1) GRAD Series
c. Ledalite
1) 7406 Series
d. Corelite
1) J2 Series
e. Substitutes not permitted.
2. Housing: Steel, painted white.
3. Maximum Section Length in Row: 8 feet.
4. LED light source: 4000K color temperature.
5. Light Output:1300 Lumens/ft (nominal)
6. CRI: 80min.
7. Distribution: 20% Up, 80% Down
8. Voltage: Universal 120-277 V.
9. LED drivers: Provide LED drivers as recommended by the manufacturer.

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10. Dimming Options: Provide 0-10V (1%) dimming options for all fixtures. Other dimming options are not permitted, unless directed by the Owner.
11. Provide with the following features/accessories:
    a. Dust cover.
12. Mounting: Suspended.

F. Linear Suspended Pendant (Square 4" x 4" nominal, down light)
1. Products:
    a. Prudential
        1) P40 Series
    b. Pinnacle
        1) EDGE EX4 Series
    c. Substitutes not permitted.
2. Housing: Aluminum, painted white.
3. Maximum Section Length in Row: 8 feet.
4. LED light source: 4000K color temperature.
5. Light Output:394 Lumens/ft (nominal)
6. CRI: 80min.
7. Distribution: 100% down
8. Lens: Satine
9. Voltage: Universal 120-277 V.
10. LED drivers: Provide LED drivers as recommended by the manufacturer.
11. Dimming Options: Provide 0-10V (1%) dimming options for all fixtures. Other dimming options are not permitted, unless directed by the Owner.
12. Mounting: Suspended.

G. General purpose strip.
1. Products:
    a. Philips Lighting.
        1) Fluxtream Series.
    b. Lithonia.
        1) ZL1D Series.
    c. Metalux.
        1) 4SNLED Series.
    d. Deco Lighting
        1) DACH-LED Series.
    e. Substitutes not permitted.
2. Housing: Steel, painted white.
3. Nominal Length: 4 feet.
4. LED light source: 4000K.
5. Light Output:
    a. Phillips:
        1) The following lumen configurations are recommended by the owner:
            (a) 2 foot fixture: 20L and 30L.
            (b) 3 foot fixture: 30L.
            (c) 4 foot fixture: 30L, 40L 55L and 70L.
        2) The following lumen configurations are not recommended due to additional cost and delay in shipping:
            (a) No lumen packages not permitted at this time.
    b. Lithonia:
        1) The following lumen configurations are recommended by the owner:

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(a) 2 foot fixture: 2500LM and 3500LM.
(b) 4 foot fixture: 3000LM, 5000LM and 7000LM.

2) The following lumen configurations are not recommended due to additional cost and delay in shipping:
(a) No lumen packages not permitted at this time.

c. Metalux:
1) The following lumen configurations are recommended by the owner:
(a) 2 foot fixture: 20SL and 30SL.
(b) 4 foot fixture: 30SL, 41SL, and 50SL.
2) The following lumen configurations are not recommended due to additional cost and delay in shipping:
(a) No lumen packages not permitted at this time.

d. Deco:
1) The following lumen configurations are recommended by the owner:
(a) 2 foot fixture: 2350.
(b) 4 foot fixture: 2560, 4550, 5980.
2) The following lumen configurations are not recommended due to additional cost and delay in shipping:
(a) No lumen packages not permitted at this time.

e. Sylvania:
1) The following lumen configurations are recommended by the owner:
(a) 2 foot fixture: 1900.
(b) 4 foot fixture: 4000, 6200.
2) The following lumen configurations are not recommended due to additional cost and delay in shipping:
(a) No lumen packages not permitted at this time.

6. Reflector: None.
7. Lens: Frosted acrylic.
8. Voltage: Universal 120-277 V.
9. LED drivers: Provide LED drivers as recommended by the manufacturer.
10. Dimming Options: Provide 0-10v dimming options for all fixtures. Other dimming options are not permitted, unless directed by the Owner.
11. Provide emergency power supply unit in luminaires designated with "EM" on the drawings.
a. Emergency battery packs are only permitted where not generator or inverter power is available.
12. Provide with the following features/accessories:
a. Fusing: Fast blow type.
b. Wireguard(s), where installed in areas where fixture may be damaged.
13. Mounting: Surface, Ceiling or Suspended.

H. Vaper Tight Luminaire
1. Products:
a. Philips Lighting
1) V3W Series
b. Lithonia Lighting
1) VAP Series
c. Eaton
1) 4VT3
d. Substitutes not permitted.
2. Housing: Frosted polycarbonate with closed-cell gasket, wet location listed.

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3. Lens: Clear Polycarbonate.
4. Nominal Length: 4 feet.
5. LED light source: 4000K, 80 CRI.
6. Light Output:
   a. Lithonia
      1) 4000, 6000, 8000, 12000, and 15000 lumens
   b. Philips
      1) 3500, 4300, 5100, 7000, 8000, and 10000 lumens
   c. Eaton
      1) 4000, 6000 and 80000 lumens
   d. The following lumen configurations are not recommended due to additional cost and delay in shipping:
      1) No lumen packages not permitted at this time.
7. Reflector: None.
8. Voltage: Universal 120-277 V.
9. LED drivers: Provide LED drivers as recommended by the manufacturer.
10. Dimming Options: Provide 0-10v dimming options for all fixtures. Other dimming options are not permitted, unless directed by the Owner.
11. Mounting: Surface, Ceiling or Suspended._____.

I. Food Processing Troffers
1. Products:
   a. Kurtzon.
      1) FP Series.
   b. No substitutions permitted.
2. Listing: NSF2, IP66, ETL
3. Housing: Steel, painted white.
4. Nominal Size: 1x4 ft, 2x2 ft and 2x4 ft.
5. LED light source: 4000K (80 CRI). 3500K (80 and 90 CRI), 4000K (90 CRI) and 5000K (80 and 90 CRI) may be used only upon approval by the Owner.
6. Light Output:
   a. Kurtzon:
      1) The following lumen configurations are recommended by the owner:
         (a) 1 x 4 foot fixture: 20L, 30L, 40L, 48L and 60L.
         (b) 2 x 2 foot fixture: 20L, 33L and 40L.
         (c) 2 x 4 foot fixture: 30L, 40L, 48L, 60L and 72L.
      2) The following lumen configurations are not recommended due to additional cost and delay in shipping:
         (a) No lumen packages not permitted at this time.
7. Door: Steel, flush, white. Bottom access. Gasketed.
8. Lens: P12 prismatic pattern inverted, 0.135" virgin acrylic, gasketed.
9. Voltage: Universal 120-277 V.
10. LED drivers: Provide LED drivers as recommended by the manufacturer.
11. Dimming Options: Provide 0-10v dimming options for all fixtures. Other dimming options are not permitted, unless directed by the Owner.
12. Provide emergency power supply unit in luminaires designated with "EM" on the drawings.
   a. Operate two lamp(s) at a minimum of 1350 lumens unless otherwise indicated with indicated illumination evenly divided between the lamps.
   b. Emergency battery packs are only permitted where not generator or inverter power is available.

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13. Provide with the following features/accessories:
    a. Fusing: Fast blow type.
14. Mounting: Lay-in, grid ceiling.

J. Recessed compact downlight.
1. Products:
    a. Gotham Lighting:
        1) Incito Series.
        2) EVO Series.
    b. Prescolite:
        1) LF6SL Series.
    c. Lightolier:
        1) EasyLyte or LyteProfileSeries
    d. Halo:
        1) HC6 Series
    e. No Substitutes permitted.
2. Reflector Finish: Semi-specular, clear.
3. Trim: Match reflector finish.
4. Voltage: Universal 120-277 V.
5. Provide emergency power supply unit in luminaires designated with "EM" on the drawings.
6. Provide sloped ceiling adapters suitable for the installed location where required.
7. Provide with the following features/accessories:
    a. Fusing.
8. Mounting: Recessed.
9. Listings:
    a. Non-IC Rated: Not suitable for direct contact with insulation and combustible materials.

K. Exit sign.
1. Products:
    a. Dual-Lite.
        1) Generator/Inverter Power Operation:
            (a) Single face #SESGW
            (b) Double face #SEDGW
        2) Emergency Battery Operation:
            (a) Single face #SESGWE
            (b) Double face #SEDGWE
    b. No alternate manufacturers permitted.
2. Lamps: LED.
3. Housing: Die cast aluminum.
4. Finish: White.
5. Mounting Type: Universal.
6. Number of Faces: As specified.
7. Letter Color: Green.
8. Emergency Operation: For use only where generator or inverter power is not available..
    a. Battery: Nickel cadmium.
    b. Only permitted in areas where no generator or inverter power is available.
9. Voltage: Dual 120/277 V.
10. Mounting:
    a. Ceiling-mounted: _____.
    b. Wall-mounted: _____.

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L. High bay luminaire.
    1. Products:
        a. GE Lighting.
            1) Albeo #ABV3 series
        b. Lithonia.
            1) I-beam, LBG
        c. Metalux
            1) OHB Series

M. Under counter lighting.
    1. Products:
        a. H.E. Williams.
            1) 1SF Series.
        b. Nora Lighting.
            1) NUD-88 Series
        c. EELP
            1) VLUC Series.
        d. Eaton
            1) HU30
        e. Housing: Steel, painted white.
        f. Correlated Color Temperature: 4,100 K.
        g. Voltage: Universal 120-277 V.
        h. Provide with the following features/accessories:
            1) Built-in on/off rocker switch
            2) End to end connectors
        i. Mounting: Surface mount to bottom of cabinet.

N. Tape Light
    1. Products
        a. Sylvania Osram
        b. Q-Tran

O. Wall mounted strip
    1. Products
        a. Lithonia Lighting
            1) #WL4 Series
        b. Philips Lighting
            1) Fluxstream #FSW Series

P. Wall wash linear
    1. Products
        a. ELP
            1) AKTB LED Series

Q. Track Lighting
    1. Products
        a. Track
            1) Halo
                (a) L650 Series
            2) LSI (Lighting Services Inc.)
                (a) Surface Track (120V).
        b. Heads
            1) Philips Lightolier

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(a) Corepro Mini Cylinder Series, #LT-H-08--
(1) Beam spread, CRI/CCT, and finish color to be determined per project.
2) LSI (Lighting Services Inc.)
(a) LED light sourced track heads.
3) Halo
(a) L808

R. Pole mounted LED area Luminaire.
1. Configuration: As required for proper illumination per Illumination Engineering Society of North America (IESNA).
2. Luminaire (Fixture Heads):
a. Products:
1) Kim Lighting
2) Substitutions are not permitted.
b. Housing: Aluminum.
c. Finish: Painted
1) Academic Campus Areas: Custom Color "CC" - PMS 462 Gloss Brown.
2) Heritage Housing Areas: Custom Color "CC" - RAL 7008.
d. Luminaire Head Shape: Rectilinear.
e. Illumination Source LED.
f. Shielding: Flat glass lens.
g. Lighting Distribution per IES RP-8:
1) Lateral Distribution: Types II, III, IV and V.
2) Cutoff Category: Full cutoff.
h. Voltage: Multi-tap 120/208/240/277 V.
i. Driver: Provide LED driver per manufacturer's recommendations.
j. Pole Mounting: Standard arm suitable for mounting on specified pole, finish to match luminaire.
k. Building/Wall Mounting: Standard arm suitable for wall-mounting.
l. Provide with the following features/accessories:
1) Fusing.
2) Integral locking receptacle for photo control complying with ANSI C136.10.
3) House-side shield, external, if required for critical areas.
m. Listings:
1) Suitable for wet locations.
3. Pole:
a. Products:
1) Kim Lighting:
(a) Roadway and Parking Areas: #PAR25-6188.
(b) Walkways and Sidewalks: #PAR14-4188.
(c) License Plate Readers: #PRA12-6250.
2) Substitutions are not permitted.
b. Material: Aluminum.
c. Shape: Round straight.
d. Finish: Match luminaire finish.
e. Mounting Height: _____. Height dictated by area of use, described above.
f. Mounting: _____. Mount on Owner standard concrete base.
g. Provide with the following features/accessories:
1) Top cap.
2) Handhole, per manufacture size.

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3) Anchor base cover.
4) Provision for pole-mounted weatherproof GFI receptacle, where indicated on the drawings.

4. Type Pole Mounted LED Flood/Spot Lights: _____.
   a. Configuration: Single Luminaire(s) orientation as shown on Drawings.
   b. Luminaire(s):
      1) Products:
      2) Kim Lighting.
      3) Housing: Aluminum.
      4) Finish: Match pole light color. .
      5) Illumination Source: LED.
      6) Shielding: Flat glass lens.
      7) Lighting Distribution: As shown on Drawings. .
      8) Voltage: Multi-tap 120/208/240/277 V.
      9) Driver: Provide LED driver per manufacturer's recommendations.
      10) Mounting Provision: Yoke mount.
      11) Mounting: Pole-top bracket suitable for mounting on specified pole, finish to match pole.
      12) Provide with the following features/accessories:
         (a) Fusing.
         (b) Integral locking receptacle for photo control complying with ANSI C136.10.
      13) Listings:
         (a) Suitable for wet locations.

S. Wall-mounted Exterior LED luminaire.
   1. Products:
      a. Kim:
         1) Wall Director - Small: #WD14 Series:
         2) Wall Director - Large: #WD18 Series:
      b. Sylvania:
         1) Small Wall Pack: #SMWL-1N-015-UNV-7-50-NC-BZ.
         2) Medium Wall Pack: #WALPAK-(Generation)-(Wattage)-UNV-7-NC-BZ-(Options).
            (a) Generation:1N, 2N or 3N.
            (b) Wattage: 030 (30 watts), 050 (50 watts), 075 (75 watts), 105 (105 watts).
            (c) Options: P (Photocontrol); (E) Emergency Battery Pack.
      c. Eaton
         1) Medium Wall Pak: DPMLED
            (a) Options: P (Photocontrol)
   2. Substitutions not permitted.
   3. Housing: Aluminum.
   4. Finish: Color by Architect. _____.
   5. Shape: Rectangular.
   6. Lamp: _____.
   7. Shielding: Clear tempered glass lens.
   8. Lighting Distribution:
      a. Lateral Distribution: Forward throw.
      b. Cutoff Category: Full cutoff.
   9. Voltage: Multi-tap 120/208/240/277 V.
   10. Driver: Provide LED driver per manufacturer's recommendations.
   11. Mounting: _____. Surface mount on building/structure.

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12. Provide emergency power supply unit in luminaires designated with "EM" on the drawings.
13. Provide with the following features/accessories:
    a. Wireguard as specified on Drawings.
14. Listings:
    a. Suitable for wet locations.

T. LED Bollard Luminaire.
1. Products:
    a. Philips Lighting, "BRM832".
    b. Substitutions not permitted.
2. Housing: Aluminum.
3. Finish: _____.
    a. Academic Campus Areas: Custom Color "CC" - PMS 462 Gloss Brown.
    b. Heritage Housing Areas: Standard Color - "BZ" (Bronze).
    c. Athletic Areas: Custom Color "CC" - RAL 5002.
4. Shape: Round.
5. Nominal Size: 8 inches (diameter).
6. Nominal Height: "42" - 42 inches high.
7. Illumination Characteristics: _____.
    a. Quantity of LEDs: "108L" - 36 led's per louver with 360 degree distribution.
    b. LED Drive Current: "58" - 58 mA drive current.
    c. LED Color Generation: "CW-G2" - Cool White, 5000K, 70 CRI, Generation 2.
8. Surge Protection: 10 kA (Standard Option).
9. Lighting Distribution: Symmetrical.
10. Voltage: Multi-tap 120/208/240/277 V.
11. Mounting: Mount on Owner approved concrete base..
12. Provide with the following features/accessories:
    a. Fusing.
    b. Anchor bolts.
    c. _____.
13. Listings:
    a. Suitable for wet locations.
    b. _____.
14. _____.

U. Light Fixture manufacturers NOT permitted on campus.
1. Spectrum Lighting. All light fixtures manufactured by Spectrum Lighting.

END OF SECTION

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SECTION 265100
INTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Interior luminaires.
B. Emergency lighting units.
C. Exit signs.
D. Ballasts and drivers.
E. Emergency power supply units.
F. Lamps.
G. LED retrofit luminaire conversion kits.
H. Luminaire accessories.

1.02 RELATED REQUIREMENTS

A. Section 260529 - Hangers and Supports for Electrical Systems.
B. Section 260533.16 - Boxes for Electrical Systems.
C. Section 260548 - Vibration and Seismic Controls for Electrical Systems.
D. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
E. Section 260923 - Lighting Control Devices: Automatic controls for lighting including occupancy sensors, outdoor motion sensors, time switches, outdoor photo controls, and daylighting controls.
F. Section 262725 - Wiring Devices: Manual wall switches and wall dimmers.
G. Section 265013 - Luminaire Schedule.
H. Section 265561 - Theatrical Lighting: Stage lighting units and associated controls.
I. Section 265600 - Exterior Lighting.
J. Section 275129.13 - Area of Refuge/Rescue Assistance Systems: Area of refuge/rescue assistance signage.

1.03 REFERENCE STANDARDS

A. ANSI C82.11 - American National Standard for Lamp Ballasts - High Frequency Fluorescent Lamp Ballasts - Supplements; 2011.
B. IEC 60529 - Degrees of Protection Provided by Enclosures (IP Code); 2013-08, with 2015 Corrigendum.
C. IEEE C62.41.2 - Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits; 2002 (Cor 1, 2012).
D. IES LM-63 - IESNA Standard File Format for Electronic Transfer of Photometric Data and Related Information; 2002 (Reaffirmed 2008).
E. IESNA LM-63 - ANSI Approved Standard File Format for Electronic Transfer of Photometric Data and Related Information; 2002 (Reaffirmed 2008).
F. IES LM-79 - Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products; 2008.
G. IES LM-80 - Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules; 2015.

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H. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

I. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; 2006.

J. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; 2006.

K. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts; 2015.

L. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility; 2012.

M. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

N. NFPA 101 - Life Safety Code; 2015.

O. UL 844 - Luminaires for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.

P. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.

Q. UL 935 - Fluorescent-Lamp Ballasts; Current Edition, Including All Revisions.

R. UL 1598 - Luminaires; Current Edition, Including All Revisions.

S. UL 1598C - Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits; Current Edition, Including All Revisions.

T. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
   2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
   3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.
   4. Notify Architect and Owner's Construction Project Coordinator, of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings:
   1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
   2. Provide photometric calculations where luminaires are proposed for substitution upon request.

C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
   1. LED Luminaires:
   2. Ballasts/Drivers: Include wiring diagrams and list of compatible lamp configurations.
   3. Lamps: Include rated life, color temperature, color rendering index (CRI), and initial and mean lumen output.

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4. Emergency Power Supply Unit: Include list of compatible lamp configurations and associated lumen output.
5. LED Retrofit Luminaire Conversion Kits: Include list of compatible luminaires and/or criteria for compatibility.

D. Certificates for Dimming Drivers: Manufacturer's documentation of compatibility with dimming controls to be installed.

E. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

F. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

G. Project Record Documents: Record actual connections and locations of luminaires and any associated remote components.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.07 DELIVERY, STORAGE, AND PROTECTION

A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting), NECA/IESNA 502 (industrial lighting), and manufacturer's written instructions.

B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.08 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.09 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Provide five year manufacturer warranty for all LED luminaires, including drivers.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

A. Furnish products as indicated in luminaire schedule included on the drawings.

B. Substitutions: See Section 016000 - Product Requirements, except where individual luminaire types are designated with substitutions not permitted.

2.02 LUMINAIRES

A. Provide products that comply with requirements of NFPA 70.

B. Provide products that are listed and labeled as complying with UL 1598, where applicable.

C. Provide products listed, classified, and labeled as suitable for the purpose intended.

D. Provide products complying with Federal Energy Management Program (FEMP) requirements.

E. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.

F. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.

G. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

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H. Recessed Luminaires:
   1. Ceiling Compatibility: Comply with NEMA LE 4.
   2. Luminaires Recessed in Insulated Ceilings: Listed and labeled as IC-rated, suitable for direct contact with insulation and combustible materials.
   3. Luminaires Recessed in Sloped Ceilings: Provide suitable sloped ceiling adapters.

I. Hazardous (Classified) Location Luminaires: Listed and labeled as complying with UL 844 for the classification of the installed location.

J. Fluorescent Luminaires:
   1. Provide ballast disconnecting means complying with NFPA 70 where required.

K. LED Luminaires:
   1. Components: UL 8750 recognized or listed as applicable.
   2. Tested in accordance with IES LM-79 and IES LM-80.
   3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

L. LED Tape Lighting Systems: Provide all power supplies, drivers, cables, connectors, channels, covers, mounting accessories, and interfaces as necessary to complete installation.
   1. LED Tape - General Requirements:
      a. Listed.
      b. Designed for field cutting in accordance with listing.
      c. Wet Location Applications: IEC 60529, IP 68 (waterproof) rated.

M. Track Lighting Systems: Provide track compatible with specified track heads, with all connectors, power feed fittings, dead ends, hangers and canopies as necessary to complete installation.

N. Luminaires Mounted in Continuous Rows: Provide quantity of units required for length indicated, with all accessories required for joining and aligning.

2.03 EMERGENCY LIGHTING UNITS

A. See Section 263323: Central Battery Equipment for Emergency Lighting Units.

2.04 EXIT SIGNS

A. Description: Internally illuminated exit signs with LEDs unless otherwise indicated; complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
   1. Number of Faces: Single or double as indicated or as required for the installed location.
   2. Directional Arrows: As indicated or as required for the installed location.

B. Self-Powered Exit Signs:
   1. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
   2. Battery: Sealed maintenance-free nickel cadmium unless otherwise indicated.
   3. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
   4. Provide low-voltage disconnect to prevent battery damage from deep discharge.

C. Photoluminescent Exit Signs: Powder-coated sheet aluminum with photoluminescent pigmented material, are not permitted for use on this project.

D. Accessories:
   1. Provide compatible accessory high impact polycarbonate vandal shields where indicated.
   2. Provide compatible accessory wire guards where indicated.

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2.05 BALLASTS AND DRIVERS

A. Ballasts/Drivers - General Requirements:
   1. Provide drivers based upon luminaire manufacture's recommendations.
   2. Provide ballasts containing no polychlorinated biphenyls (PCBs).
   3. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.
   4. Electronic Ballasts/Drivers: Inrush currents not exceeding peak currents specified in NEMA 410.

B. Dimmable LED Drivers:
   1. Dimming Range: Continuous dimming from 100 percent to five percent relative light output unless dimming capability to lower level is indicated, without flicker.
   2. Control Compatibility: Fully compatible with the dimming controls to be installed.
      a. Lighting Controls: See Section 260923.
      b. Lighting Control Systems: See Section 260936.

2.06 EMERGENCY POWER SUPPLY UNITS

A. Manufacturers:
   1. Iota Engineering, LLC; _____: www.iotaengineering.com
   2. Philips Emergency Lighting/Bodine; _____: www.bodine.com

B. Description: Self-contained emergency power supply units suitable for use with indicated luminaires, complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.

C. Compatibility:
   1. Driver: Compatible with electronic, energy saving, and dimming LED driver.

D. Operation: Upon interruption of normal power source, solid-state control automatically switches connected lamp(s) to the fluorescent emergency power supply for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.

E. Battery: Sealed maintenance-free high-temperature nickel cadmium unless otherwise indicated.

F. Diagnostics: Provide accessible and visible multi-chromatic combination test switch/indicator light to display charge, test, and diagnostic status and to manually activate emergency operation.

G. Operating Temperature: From 32 degrees F to 122 degrees F unless otherwise indicated or required for the installed location.

2.07 LED RETROFIT LUMINAIRE CONVERSION KITS

A. Manufacturers:
   1. OSRAM Sylvania, Inc; _____: www.osram.us/ds
   2. Where a specific manufacturer or model is indicated elsewhere on the drawings, substitutions are not permitted unless explicitly indicated.

B. Description: Light-emitting diode (LED) retrofit luminaire conversion kits, including but not limited to LED lamps and arrays, control modules, drivers, power supplies, wiring, lampholders, brackets, wire connectors, reflectors, and diffusers, intended for replacement of existing light sources in existing luminaires; listed as complying with UL 1598C; suitable for installation in luminaire to be converted.

2.08 ACCESSORIES

A. Stems for Suspended Luminaires: Steel tubing, size as indicated, factory finished to match luminaire or field-painted as directed.

B. Threaded Rods for Suspended Luminaires: Zinc-plated steel, size as indicated.

C. Provide accessory plaster frames for luminaires recessed in plaster ceilings.

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PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.

C. Verify that suitable support frames are installed where required.

D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of luminaires provided under this section.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Install products in accordance with manufacturer's instructions.

D. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).

E. Provide required support and attachment in accordance with Section 260529.

F. Provide required seismic controls in accordance with Section 260548.

G. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.

H. Suspended Ceiling Mounted Luminaires:
   1. Do not use ceiling tiles to bear weight of luminaires.
   2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.
   3. Fixture length shall not exceed 12 ft.
   4. Secure surface-mounted, recessed, and pendant-mounted luminaires to framing members or to building structure.
   5. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.
   6. In addition to ceiling support wires, provide two galvanized steel safety wire(s), minimum 12 gage, connected from opposing corners of each recessed luminaire to building structure.
   7. See appropriate Division 9 section where suspended grid ceiling is specified for additional requirements.

I. Recessed Luminaires:
   1. Install trims tight to mounting surface with no visible light leakage.
   2. Non-IC Rated Luminaires: Maintain required separation from insulation and combustible materials according to listing.
   3. Luminaires Recessed in Fire-Rated Ceilings: Install using accessories and firestopping materials to meet regulatory requirements for fire rating.

J. Suspended Luminaires:
   1. Unless otherwise indicated, specified mounting heights are to bottom of luminaire.
   2. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.

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3. Provide minimum of two supports for each luminaire equal to or exceeding 4 feet nominal length, with no more than 12 feet between supports, as per manufacture recommendations.
4. Install canopies tight to mounting surface.
5. Unless otherwise indicated, support pendants from swivel hangers.

K. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to bottom of luminaire.

L. Install accessories furnished with each luminaire.

M. Bond products and metal accessories to branch circuit equipment grounding conductor.

N. Emergency Lighting Units:
1. Unless otherwise indicated, connect unit to unswitched power from circuit indicated. Bypass local switches, contactors, or other lighting controls.

O. Exit Signs:
1. Unless otherwise indicated, connect unit to unswitched power from circuit indicated. Bypass local switches, contactors, or other lighting controls.

P. Emergency Power Supply Units:
1. For field-installed units, install inside luminaire unless otherwise indicated. Where installation inside luminaire is not possible, install on top of luminaire.
2. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal ballast(s) in luminaire. Bypass local switches, contactors, or other lighting controls.
3. Remote Power Supply Units: Install in accessible location as indicated or as required to complete installation, using conductors per manufacturer's recommendations not exceeding manufacturer's recommended maximum conductor length to luminaire.

Q. Identify luminaires connected to emergency power system in accordance with Section 260553.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Inspect each product for damage and defects.

C. Operate each luminaire after installation and connection to verify proper operation.

D. Test self-powered exit signs, emergency lighting units, and emergency power supply units to verify proper operation upon loss of normal power supply.

E. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy generator transfer device as determined by Architect.

3.05 ADJUSTING

A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.

B. Aim and position adjustable emergency lighting unit lamps to achieve optimum illumination of egress path as required or as directed by Architect or authority having jurisdiction.

C. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Architect or authority having jurisdiction.

3.06 CLEANING

A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.07 CLOSEOUT ACTIVITIES

A. See Section 017800 - Closeout Submittals, for closeout submittals.

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B. See Section 017900 - Demonstration and Training, for additional requirements.

C. Demonstration: Demonstrate proper operation of luminaires to Architect, and correct deficiencies or make adjustments as directed.

D. Just prior to Substantial Completion, LED drivers or boards that have failed.

3.08 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

END OF SECTION

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SECTION 284600

FIRE DETECTION AND ALARM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire alarm system design and installation, including all components, wiring, and conduit.
B. Communication with Owner's dispatch station.
C. Circuits from protected premises to dispatch station, including conduit.
D. Remote annunciator panels.
E. Detection devices.
F. Notification/signaling appliances.
G. Battery standby power.
H. Remote relay units.
I. Manual fire-alarm boxes.
J. System smoke detectors.
K. Heat detectors.
L. Magnetic door holders.
M. Addressable interface device.
N. Horn strobe booster panel power supplies.
O. Fire Watch.
P. Replacement and removal of existing fire alarm system components, wiring, and conduit indicated.
Q. Repairs of fire alarm system under contract for specified warranty period.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping: Materials and methods for work to be performed by this installer.
B. Section 083477 - Smoke and Fire Protective Curtain Assemblies: Smoke and fire curtains to be released by fire alarm system or smoke detectors.
C. Section 083313 - Coiling Counter Doors: Coiling fire doors to be released by fire alarm system.
D. Section 083323 - Overhead Coiling Doors: Coiling fire doors to be released by fire alarm system.
E. Section 087100 - Door Hardware: Electrically operated locks and door holder devices to be monitored and released by fire alarm system.
F. Section 142100 - Electric Traction Elevators: Elevator systems monitored and controlled by fire alarm system.
G. Section 142400 - Hydraulic Elevators: Elevator systems monitored and controlled by fire alarm system.
H. Section 211300 - Fire-Suppression Sprinkler Systems: Supervisory, alarm, and actuating devices installed in sprinkler system.
I. Section 212200 - Clean-Agent Fire Extinguishing System: Supervisory, alarm, and releasing devices installed in extinguishing system.
J. Section 213000 - Fire Pumps: Supervisory devices.
K. Section 233300 - Air Duct Accessories: Smoke dampers monitored and controlled by fire alarm system.
L. Section 260519 - Low-Voltage Electrical Power Conductors and Cables.

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M. Section 260526 - Grounding and Bonding for Electrical Systems.

N. Section 260533.13 - Conduit for Electrical Systems.

O. Section 260533.16 - Boxes for Electrical Systems.

P. Section 260536 - Cable Trays for Electrical Systems.

Q. Section 260533 - Identification for Electrical Systems.

R. Section 275129.13 - Area of Refuge/Rescue Assistance Systems: Two-way emergency communication systems for areas of refuge/rescue assistance.

S. Section 284050 - Conductors and Cables for Fire Alarm Detection and Alarm: Conductor and cable requirements for fire alarm systems.

1.03 REFERENCE STANDARDS

A. International Building Code.

B. International Fire Code.

C. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.

D. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

E. IEEE C62.41.2 - Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits; 2002 (Cor 1, 2012).

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. NFPA 72 - National Fire Alarm and Signaling Code; 2016.

H. NFPA 101 - Life Safety Code; 2015.

I. NFPA 601 - Standard for Security Services in Fire Loss Prevention; 2015.

J. UL 268 - Standard for Smoke Detectors for Fire Alarm Systems; Current Edition, Including All Revisions.

1.04 DEFINITIONS

A. LED: Light-emitting diode.

B. NEC: National Electrical Code.

C. NICET: National Institute for Certification in Engineering Technologies.

D. FACP: Fire Alarm Control Panel.

E. FARAP: Fire Alarm Remote Annunciator Panel.

F. NCM: Network Communication Module.

G. FAHSB: Fire Alarm Horn Strobe Booster Panel Power Supply.

H. XPIQ: Fire Alarm Audio Transponder.

I. DVC: Digital Voice Controller (For the Newest Notifier Panel).

J. SLC: Signaling Line Circuit.

K. PDF: Portable Document Format.

L. AutoCAD: Software program used to produce electronically drafted or designed documents.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Proposal Documents: Submit the following with proposal:
   1. NFPA 72 "Record of Completion", filled out to the extent known at the time.

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2. Manufacturer's detailed data sheet for each control unit, initiating device, and notification appliance.
3. Certification by Contractor that the system design will comply with the contract documents.

C. Drawings must be prepared using the current version of Revit. _____.
1. Owner will provide floor plan drawings for Contractor's use; verify all dimensions on Owner-provided drawings.

D. Evidence of designer qualifications.

E. Design Documents: Submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, riser diagrams, and description of operation:
1. NFPA 72 "Record of Completion", filled out to the extent known at the time.
2. Clear and concise description of operation, with input/output matrix similar to that shown in NFPA 72 Appendix A-7-5-2.2(9), and complete listing of software required.
3. System zone boundaries and interfaces to fire safety systems.
4. Location of all components, circuits, and raceways; mark components with identifiers used in control unit programming.
5. Circuit layouts; number, size, and type of raceways and conductors; conduit fill calculations; spare capacity calculations; notification appliance circuit voltage drop calculations.
6. List of all devices on each signaling line circuit, with spare capacity indicated.
7. Manufacturer's detailed data sheet for each component, including wiring diagrams, installation instructions, and circuit length limitations.
8. Air-Sampling Smoke Detection Systems: Include air-sampling pipe network layout with sampling ports identified; include calculations demonstrating compliance with specified requirements.
9. Description of power supplies; if secondary power is by battery include calculations demonstrating adequate battery power.
10. Certification by either the manufacturer of the control unit or by the manufacturer of each other component that the components are compatible with the control unit.
11. Certification by the manufacturer of the control unit that the system design complies with the contract documents.
12. Certification by Contractor that the system design complies with the contract documents.
13. Show existing components to be removed.

F. Evidence of installer qualifications.

G. Evidence of instructor qualifications; training lesson plan outline.

H. Evidence of maintenance contractor qualifications, if different from installer.

I. Inspection and Test Reports:
1. Submit inspection and test plan prior to closeout demonstration.
2. Submit documentation of satisfactory inspections and tests.
3. Submit NFPA 72 "Inspection and Test Form," filled out.

J. Operating and Maintenance Data: See Section 017800 for additional requirements; revise and resubmit until acceptable; have one set available during closeout demonstration:
1. Complete set of specified design documents, as approved by authority having jurisdiction.
2. Additional printed set of project record documents and closeout documents, bound or filed in same manuals.
3. Contact information for firm that will be providing contract maintenance and trouble call-back service.
4. List of recommended spare parts, tools, and instruments for testing.
5. Replacement parts list with current prices, and source of supply.
6. Detailed troubleshooting guide and large scale input/output matrix.
7. Preventive maintenance, inspection, and testing schedule complying with NFPA 72; provide printed copy and computer format acceptable to Owner.

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8. Detailed but easy to read explanation of procedures to be taken by non-technical administrative personnel in the event of system trouble, when routine testing is being conducted, for fire drills, and when entering into contracts for remodeling.

K. Project Record Documents: See Section 017800 for additional requirements; have one set available during closeout demonstration:
   1. Complete set of floor plans showing actual installed locations of components, conduit, and zones.
   2. "As installed" wiring and schematic diagrams, with final terminal identifications.
   3. "As programmed" operating sequences, including control events by device, updated input/output chart, and voice messages by event.

L. Closeout Documents:
   1. Certification by manufacturer that the system has been installed in compliance with his installation requirements, is complete, and is in satisfactory operating condition.
   2. NFPA 72 "Record of Completion", filled out completely and signed by installer and authorized representative of authority having jurisdiction.
   3. Certificate of Occupancy.
   4. Maintenance contract.
   5. Report on training results.
   6. Upon Date of Substantial Completion, the contractor shall provide a document stating the date commencing the system warranty.

M. Maintenance Materials, Tools, and Software: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.
   2. Furnish spare parts of same manufacturer and model as those installed; deliver in original packaging, labeled in same manner as in operating and maintenance data and place in spare parts cabinet.
   3. In addition to the items in quantities indicated in PART 2, furnish the following:
      a. All tools, software, and documentation necessary to modify the fire alarm system using Owner's personnel; minimum modification capability to include addition and deletion of devices, circuits, and zones, and changes to system description, operation, and evacuation and instructional messages.
      b. One copy, on CD-ROM, of all software not resident in read-only-memory.
      c. Extra Fuses: Two for each installed fuse; store inside applicable control cabinet.
   4. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.
   5. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

N. Provide system drawings documenting location of the FACP and any Fire Alarm Remote Annunciator Panel (FARAP), and the address and location of all notification and detection devices.

1.06 QUALITY ASSURANCE

A. Fire Watch: If the existing fire alarm system has been deactivated, and the replacement system is not in operation, the contractor shall provide a continual fire watch until either the existing fire alarm system is reactivated or the new fire alarm system is in normal operation.

B. Copies of Design Criteria Documents: Maintain at the project site for the duration of the project, bound together, an original copy of NFPA 72, the relevant portions of applicable codes, and instructions and guidelines of authorities having jurisdiction; deliver to Owner upon completion.

C. Designer Qualifications: NICET Level III or IV (3 or 4) certified fire alarm technician or registered fire protection engineer, employed by fire alarm control panel manufacturer, Contractor, or installer, with experience designing fire alarm systems in the jurisdictional area of the authorities having jurisdiction.

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D. Installer Qualifications: Firm with minimum 3 years documented experience installing fire alarm systems of the specified type and providing contract maintenance service as a regular part of their business.
   1. Authorized representative of control unit manufacturer; submit manufacturer's certification that installer is authorized; include name and title of manufacturer's representative making certification.
   2. Installer Personnel: At least 2 years of experience installing fire alarm systems.
   3. Supervisor: NICET level III or IV (3 or 4) certified fire alarm technician; furnish name and address.

E. Maintenance Contractor Qualifications: Same entity as installer or different entity with specified qualifications.

F. Instructor Qualifications: Experienced in technical instruction, understanding fire alarm theory, and able to provide the required training; trained by fire alarm control unit manufacturer.

G. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

H. The ability for selective input/output control functions based on ANDing, ORing, NOTing, timing and special coded operations shall also be incorporated in the resident software programming of the system.

I. To accommodate and facilitate job site changes, initiation circuits shall be individually configurable on site to provide either alarm/trouble operation, alarm only, trouble only, current limited alarm, no alarm, normally closed device monitoring, a non-latching circuit or an alarm verification circuit.

J. To accommodate and facilitate job site changes indicating appliance circuits shall be individually configurable on site to provide upon activation a steady alarm until (silenced) or (reset) upon any output circuit.

K. The Electrical Contractor is responsible for the installation of the entire system and working very closely with BYU Electrical Shop, and is to provide a completely tested and functioning fire alarm system to the Owner.

L. During the final period prior to final testing, provide the BYU electrical shop with as built drawings of all installed devices, of all programming, shop drawings and other possibly important information: specifically, provide a list of all points appropriate for by-passing the system. In the event of an emergency prior to the final inspection, this information is valuable for a professional response by BYU personnel.

M. All panels and peripheral devices shall be new, in original packaging products of an authorized manufacturer, and shall display the manufacturer's name on each assembly.

N. Installation of Fire Alarm Control Panel (FACP) and field devices:
   1. Prior to installation of FACP boards and field devices, a construction meeting shall be scheduled with the owner’s project manager, fire alarm personnel and electrical engineer, general contractor, electrical contractor, project architect and electrical engineer; to coordinate the installation of fire alarm system components. Installation of this equipment, prior to this meeting shall not be accepted by the owner and will need to be replaced prior to the Owner’s acceptance of the project fire alarm system.

1.07 INSTRUCTIONS TO THE BIDDER

A. The bid shall include all costs deemed necessary to cover all contingencies essential to the installation of the specified system.

B. Total cost for installation, materials, labor project management, permit fees, and other miscellaneous items must be listed separately.

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C. A complete material list, including description, manufacturer, catalog number, quantity, unit price, line item total cost, freight expense, programming and miscellaneous related expenses must also be included.

D. All products and materials shall be new and in original packaging, clean and free of defects.

E. Where any discrepancies are found during the bid process, the most stringent requirements must be taken into account for bid preparation purposes.

F. Any cost encountered, but not itemized in the bid, shall not be passed on to the Owner, unless specifically agreed upon in writing.

G. No additional compensation will be allowed for extra work incurred on the part of the contractor due to bidder's failure to notice any pre-existing condition necessitating the additional labor and/or materials.

H. Owner to be notified immediately upon the discovery of any omissions or errors in the specification so corrective addenda may be issued. Such notification must be received by the Owner prior to the bid opening in accordance with bidding instructions.

1.08 RIGHTS OF THE OWNER

A. Reserves the right to accept or reject any bid at its discretion, or to reject all bids for whatever reasons deemed applicable.

B. Reserves the right to purchase all, or part of the materials and hardware for the project.

C. Receipt of a bid response does not obligate the Owner to pay any expenses incurred by the bidder in preparation of the bid response or obligate the Owner in any other respect.

D. Reserves the right to modify the specifications anytime during the bidding period through addendum, or job instruction/change order during project performance will be binding upon the Owner. No verbal instructions or interpretations of requirements shall be accepted.

E. Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary guard service according to requirements indicated:
   1. Notify Owner no fewer than seven days in advance of proposed interruption of fire-alarm service.
   2. Do not proceed with interruption of fire-alarm service without Owner's written permission.

1.09 FIELD CONDITIONS

A. Field conditions shall comply with the following: Do not install/operate equipment unless the following items are in compliance:
   1. Where detectors are installed for signal initiation during construction, they shall be cleaned and verified to be operating in accordance with the listed sensitivity, or they shall be replaced prior to the final acceptance of the system. NFPA 72, 2016, 17.7.1.11.1.
   2. Where detectors are installed but not operational during construction, they shall be protected from construction debris, dust, dirt, and damage in accordance with the manufacturer's recommendations and verified to be operating in accordance with the listed sensitivity , or they shall be replaced prior to the final acceptance test of the system. NFPA 72, 2016, 17.7.1.11.2.
   3. Where detection is not required during construction, detectors shall not be installed until after all construction trades have completed cleanup. NFPA 72, 2016, 17.7.1.11.3.
   4. In areas where the fire alarm control panel (FACP) and/or the fire alarm remote annunciator is install, the fire alarm equipment shall not be installed until after all construction trades have completed cleanup.

1.10 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Provide control panel manufacturer's warranty that system components other than wire and conduit are free from defects and will remain so for 1 year after date of Substantial Completion.

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C. Provide installer's warranty that the installation is free from defects and will remain so for 1 year after date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fire Alarm Control Units - Other Acceptable Manufacturers: Provided their products meet or exceed the performance of the basis of design product, products of the following are acceptable:
   1. Honeywell Security & Fire Solutions/Notifier; _____: www.notifier.com. Fire Protection services, (FPS) - (801-363-9696.

2.02 FIRE ALARM SYSTEM

A. Fire Alarm System: Provide a new automatic fire detection and alarm system:
   1. Provide all components necessary, regardless of whether shown in the contract documents or not.
   2. Protected Premises: Entire building shown on drawings.
   3. Comply with the following; where requirements conflict, order of precedence of requirements is as listed:
      a. ADA Standards.
      b. The requirements of the local authority having jurisdiction.
      c. Applicable local codes.
      d. The contract documents (drawings and specifications).
      e. NFPA 101.
      f. NFPA 72; where the word "should" is used consider that provision mandatory; where conflicts between requirements require deviation from NFPA 72, identify deviations clearly on design documents.
   4. Continuously operate alarm notification appliances.
   5. Identify alarm at fire-alarm control unit and remote annunciators.
   6. Transmit an alarm signal to the remote alarm receiving station.
   7. Notification Appliance Circuit: Operation shall sound per ANSI S3.41
   8. Evacuation Alarm: Multiple smoke zones; allow for evacuation notification of any individual zone or combination of zones, in addition to general evacuation of entire premises.
   9. Voice Notification: Provide emergency voice/alarm communications with multichannel capability; digital.
   10. General Evacuation Zones: Each smoke zone is considered a general evacuation zone unless otherwise indicated, with alarm notification in all zones on the same floor, on the floor above, and the floor below.
   11. Program notification zones and voice messages as directed by Owner.
   12. Hearing Impaired Occupants: Provide visible notification devices in all public areas and in dwelling units.
   13. Fire Command Center: As indicated on the drawings..
   14. Master Control Unit (Panel): New, located at fire command center.
   15. Two-Way Telephone: Provide two-way telephone service for the use of the fire service and others; provide jacks and two portable handsets.
   16. The alarm activation of any initiation device shall not prevent the subsequent alarm operation of any other initiation circuit.
   17. Disarrangement conditions of any circuit shall not affect the operation of the other circuits.
   18. All auxiliary manual controls shall be supervised so that all switches must be returned to the normal automatic position to clear system trouble.
   19. Each independently supervised circuit shall include a discreet LCD readout to indicate disarrangement conditions per circuit.

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20. The incoming power to the system shall be supervised so that any power failure must be audibly and visually indicated at the control panel (and the remote annunciator). A green "power on" LED shall be displayed continuously while incoming power is present.
21. The system batteries shall be supervised so that a low battery condition or disconnection of the battery shall be audibly and visually indicated at the control panel.
22. The fire alarm system shall have built-in diagnostics that shall display trouble conditions on the LCD display and shall describe in plain English, the location and type of trouble.
23. The system shall have the capability of pinpointing certain system troubles to card and device.
24. The system shall include the means to disconnect any zone, signal circuit or control circuit from an on-board keypad. When the circuit is in the disconnected mode, a system trouble shall be generated and logged into memory with a time and date notation.
25. Contractor shall furnish and install the necessary raceway, conductors and Network Card (NCM) to interface the fire alarm control panel to the campus control station.
26. System trouble signal initiation shall be by one or more of the following devices and actions:
    a. Open circuits, shorts, and grounds in designated circuits.
    b. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
    c. Loss of primary power at fire-alarm control unit.
    d. Ground or a single break in fire-alarm control unit internal circuits.
    e. Abnormal ac voltage at fire-alarm control unit.
    f. Break in standby battery circuitry.
    g. Failure of battery charging.
    h. Abnormal position of any switch at fire-alarm control unit or annunciator.
27. Door Controls: Door hold-open devices that are controlled by smoke detectors at doors in smoke barrier walls shall be connected to fire-alarm system.
28. Remote Smoke-Detector Sensitivity Adjustment: Controls shall select specific addressable smoke detectors for adjustment, display their current status and sensitivity settings, and change those settings. Allow controls to be used to program repetitive, time-scheduled, and automated changes in sensitivity of specific detector groups.
29. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to a remote alarm station.
30. Voice/Alarm Signaling Service: Central emergency communication system with redundant microphones, preamplifiers, amplifiers, and tone generators provided as a special module that is part of fire-alarm control unit.

B. Supervising Stations and Fire Department Connections:
    1. On-Premises Supervising Station: Existing proprietary station operated by Owner, located in the BYU Talmage Building (TMCB) basement._____.

C. Power Requirements
    1. The FACP and sub-panels shall receive 120 VAC power (as noted on the plans) via dedicated and surge protected circuits.
    2. The system shall be provided with a sufficient battery capacity to operate the entire system upon loss of normal 120 VAC power in a normal supervisory mode for a period of twenty-four (24) hours with 5 minutes of alarm operation using horn/strobe notification devices at the end of this period. For those systems with speaker/strobes, the run time following the 24 hour test period, shall be 15 minutes. The system shall automatically transfer to the standby batteries upon power failure. All battery charging and recharging operations shall be automatic.
    3. All circuits requiring system-operating power shall be 24 VDC and shall be individually fuses at the control panel.
    4. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory signals supervisory

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and digital alarm communicator transmitters **and water flow switches** shall be powered by 24-V dc source. Updated Oct 2022

a. Alarm current draw of entire fire-alarm system shall not exceed 80 percent of the power-supply module rating.

5. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.
   a. Batteries: Provide sufficient stand-by, lead-acid maintenance-free battery capacity in the FACP for 24 hours of supervisory operation with AC power off. Provide for 5 minute of 100% alarm current after 24 hours of power outage.
   b. Battery Manufacturer: The following are approved manufacturers. The contractor shall only use batteries from the approved list of manufactures, all other manufacturers are not approved to bid on this project:
      1) Universal Battery Brand.
      2) Interstate “Power Patrol”.
      3) ELK Brand.

D. Circuits:
   1. Initiating Device Circuits (IDC): Class A.
   2. Signaling Line Circuits (SLC) Within Single Building: Class A.
   3. Notification Appliance Circuits (NAC): Class A.

E. Spare Capacity:
   1. Initiating Device Circuits: Minimum 20 percent spare capacity.
   2. Notification Appliance Circuits: Minimum 20 percent spare capacity,
   3. Speaker Amplifiers: Minimum 20 percent spare capacity.
   4. Master Control Unit: Capable of handling all circuits utilized to capacity without requiring additional components other than plug-in control modules.

F. Power Sources:
   1. Primary: Dedicated emergency powered branch circuits of the facility emergency power distribution system.
   2. Secondary: Storage batteries.
   3. Capacity: Sufficient to operate entire system for period specified by NFPA 72.
   4. Each Computer System: Provide uninterruptible power supply (UPS).

2.03 EXISTING COMPONENTS

A. Existing Fire Alarm System: Remove existing components indicated and incorporate remaining components into new system, under warranty as if they were new; do not take existing portions of system out of service until new portions are fully operational, tested, and connected to existing system. Remove labels from new equipment when put into service and label existing fire-alarm equipment "NOT IN SERVICE" until removed from the building.

B. Clearly label components that are "Not In Service."

C. Remove unused existing components and materials from site and dispose of properly.

2.04 FIRE SAFETY SYSTEMS INTERFACES

A. Supervision: Provide supervisory signals in accordance with NFPA 72 for the following:
   1. Sprinkler water control valves.
   2. Dry-pipe sprinkler system pressure.
   3. Dry-pipe sprinkler valve room low temperature.
   4. Sprinkler water storage tank low level.
   5. Sprinkler water storage tank low temperature.
   6. Fire pump(s).
   7. Elevator shut-down control circuits.

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B. Alarm: Provide alarm initiation in accordance with NFPA 72 for the following:
   1. Sprinkler water flow.
   2. Total flooding suppression system activation.
   3. Kitchen hood suppression activation; also disconnect fuel source from cooking equipment.
   4. Elevator lobby, elevator hoistway, and elevator machine room smoke detectors.
   5. Generator room heat detector.
   6. Duct smoke detectors.

C. Elevators:
   1. Elevator lobby, hoistway, and machine room smoke detectors: Elevator recall for fire fighters' service.
   2. Elevator Machine Room Heat Detector: Shut down elevator power prior to hoistway sprinkler activation.
   3. Sprinkler pressure or waterflow: Shut down elevator power prior to hoistway sprinkler activation.

D. HVAC:
   1. Duct Smoke Detectors: Close dampers indicated; shut down air handlers indicated.

E. Doors:
   1. Smoke Barrier Door Magnetic Holders: Release upon activation of smoke detectors in smoke zone on either side of door, upon alarm from manual pull station on same floor, and upon sprinkler activation on same floor. Refer to Section 087100.
   2. Electromagnetic Door Locks on Egress Doors: Unlock upon activation of any alarm initiating device or suppression system in smoke zone that doors serve as egress from. Refer to Section 087100.
   3. Overhead Coiling Fire Doors: Release upon activation of smoke detectors in smoke zone on either side of door, upon alarm from manual pull station on same floor, and upon sprinkler activation on same floor. Refer to Section 083323.

2.05 COMPONENTS

A. General:
   1. Provide flush mounted units where installed in finish areas; in unfinished areas, surface mounted unit are acceptable.
   2. Provide legible, permanent labels for each control device, using identification used in operation and maintenance data.

B. Fire Alarm Control Units, Initiating Devices, and Notification Appliances: Analog, addressable type; listed, classified, and labeled as suitable for the purpose intended.

C. Master Control Unit: As specified for Basis of Design above, or equivalent.

D. REMOTE ANNUNCIATOR (FARAP)
   1. Description: Annunciator functions shall match those of fire-alarm control unit for alarm, supervisory, and trouble indications. Manual switching functions shall match those of fire-alarm control unit, including acknowledging, silencing, resetting, and testing.
      a. Mounting: Flush cabinet, NEMA 250, Type 1.
   2. Annunciator Panel Model Number:
      a. Notifier, #NCA-2.
   3. Display Type and Functional Performance: Alphanumeric display and LED indicating lights shall match those of fire-alarm control unit. Provide controls to acknowledge, silence, reset, and test functions for alarm, supervisory, and trouble signals.

E. MANUAL FIRE-ALARM BOXES
   1. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.

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a. Single-action mechanism, pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
b. Station Reset: Reset shall require a key common to the control panel.
c. Device shall be constructed of high impact, red Lexan or die cast aluminum housing with raised white lettering and a smooth high gloss finish. Once pulled down, the lever shall remain at a 900 angle from the front of the station to provide a visual indication of the station in alarm. Pull station shall be by the same manufacturer to insure compatibility.
d. Indoor Protective Shield: Factory-fabricated clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm. Provide shield where indicated on drawings.
e. Weatherproof Protective Shield: Factory-fabricated clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm.
f. Mounting: Wall mounted with flush trim ring, unless otherwise indicated, surface provide skirt to cover surface box in all public areas. Skirt to match device color.
g. Manufacturer - Notifier

F. SYSTEM SMOKE DETECTORS
1. General Requirements for System Smoke Detectors:
a. Comply with UL 268; operating at 24-V dc, nominal and shall be documented compatible with the control equipment to which it is connected.
b. Detectors shall be two-wire type, intelligent.
c. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
d. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
e. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
f. Integral Visual-Indicating Light. The sensor base shall contain a red LED, which shall pulse to indicate power on and glow continuously to indicate an alarm or a sensor trouble condition.
g. Furnish and install where indicated on the plans with addressable base.
h. When used with a sounder base, see Notification Appliances section below.
i. Remote Control: Unless otherwise indicated, detectors shall be analog-addressable type, individually monitored at fire-alarm control unit for calibration, sensitivity, and alarm condition and individually adjustable for sensitivity by fire-alarm control unit.
1) Provide multiple levels of detection sensitivity for each sensor.
2. Photoelectric Smoke Detectors:
a. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
b. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
1) Primary status.
2) Device type.
3) Present average value.
4) Present sensitivity selected.
5) Sensor range (normal, dirty, etc.).
c. Photoelectric type and shall communicate actual smoke chamber values to the system controller.
d. The sensors shall be sensitivity programmable from the system controller. Sensitivity may be varied on a time-factored input. Sensors shall be programmable for "pre-alarm", "sensor very dirty" indications at the system controller. The sensitivity of the sensors shall remain constant throughout the entire range of acceptable dirty buildup until the "sensor very dirty" indication is processed. All "dirty" indications shall be logged into memory at the system

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controller for call up by maintenance personnel. Any sensor which is not self-compensating for dirt build up is not acceptable.

e. Incorporate a 30 mesh insect screen. The sensor electronics shall be completely shielded to protect against false alarms from EMI and RFI.
f. Contain an anti-tamper device to discourage unauthorized removal of the sensor from its base.
g. Manufacturer - Notifier, #

3. Duct Smoke Detectors:
   a. Photoelectric type complying with UL 268A.
   b. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
   c. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
      1) Primary status.
      2) Device type.
      3) Present average value.
      4) Present sensitivity selected.
      5) Sensor range (normal, dirty, etc.).
   d. Weatherproof Duct Housing Enclosure: Type 4; NRTL listed for use with the supplied detector.
   e. Each sensor shall have multiple levels of detection sensitivity.
   f. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
   g. Relay Fan Shutdown: Rated to interrupt fan motor-control circuit.
   h. Furnish and install addressable duct detector with sampling tube, photo electric, as shown on plans.
   i. Manufacturer:
      1) Notifier, #DNRW.
      2) System Sensor.
   j. Provide remote test station for all duct smoke detectors that are not readily accessible.

G. PROJECTED BEAM SMOKE DETECTORS
1. Projected Beam Light Source and Receiver: Designed to accommodate small angular movements and continue to operate and not cause nuisance alarms.
2. Detector Address: Accessible from fire-alarm control unit and able to identify the detector's location within the system and its sensitivity setting.
3. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
   a. Primary status.
   b. Device type.
   c. Present average value.
   d. Present sensitivity selected.
   e. Sensor range (normal, dirty, etc.).
   f. Manufacture - Xtrallis (OSID)

H. HEAT DETECTORS
1. General Requirements for Heat Detectors:
   a. Comply with UL 521.
   b. Heat detector type:
      1) Combination type. Actuated by either a fixed temperature of 135 deg F or a rate of rise that exceeds 15 deg F per minute unless otherwise indicated.
      2) Rate-of-rise temperature characteristic shall be selectable at fire-alarm control unit for 15 or 20 deg F (8 or 11 deg C) per minute.

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3) Fixed-temperature sensing shall be independent of rate-of-rise sensing and shall be settable at fire-alarm control unit to operate at 135 or 155 deg F (57 or 68 deg C).

c. Mounting: Twist-lock base interchangeable with addressable smoke-detector bases.

d. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

e. When the fixed-temperature portion is activated, the units shall be restorable and give visual evidence of such operation.

f. Manufacturer - Notifier, #FST-951.

I. ROOF HATCH FIREMAN ACCESS

1. Install a pushbutton near automated roof hatch. When fire alarm system is activated, the push button becomes activate and provide an override on the access control system to help the firemen access the roof.

J. NOTIFICATION APPLIANCES

1. General Requirements for Notification Appliances: Connected to notification appliance signal circuits, zoned as indicated, equipped for mounting as indicated and with screw terminals for system connections.
   a. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated and with screw terminals for system connections.
   b. Faceplate: Factory finished; red for wall mounted, white for ceiling mounted.
   c. Mounting: Wall mounted with flush trim ring, unless otherwise indicated, surface provide skirt to cover surface box in all public areas. Skirt to match device color.
2. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet (3 m) from the horn, using the coded signal prescribed in UL 464 test protocol.
3. Visible Notification Appliances: Xenon strobe lights comply with UL 1971, with clear or nominal white lexan lens mounted on an aluminum faceplate. The word "FIRE" in red lettering engraved in minimum 1-inch- (25-mm-) high letters on the sides and shall be pyramidical in shape to allow for side viewing and shall be suitable for installation in the locations shown on the drawings.
   a. Rated Light Output:
      1) 15/30/75/110 cd, selectable in the field.
   b. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
   c. Flashing shall be in a temporal pattern, synchronized with other units.
   d. Strobe Leads: Factory connected to screw terminals.
   e. T tapping of signal device conductors to signal circuit conductors shall NOT be accepted.
   f. Manufacturer - System Sensor, Cooper Wheelock and Notifier.
4. Voice/Tone Notification Appliances:
   a. Appliances shall comply with UL 1480 and shall be listed and labeled by an NRTL.
   b. High-Range Units: Rated 2 to 15 W.
   c. Low-Range Units: Rated 1 to 2 W.
   d. Matching Transformers: Tap range matched to acoustical environment of speaker location.
   e. Use high-range speakers in noisy environments and low-range speakers in quiet locations.
   f. Select speakers for each location to comply with NFPA 72 and ADA 3 requirements.
   g. The alarm speakers shall have multi-tap capabilities from 1/8 to 2 watts and shall be operated by 24 VDC.
   h. Each speaker assembly shall include separate wire leads for in/out wiring for each leg of the associated signal circuit.
   i. The alarm speakers shall be audio-visual assemblies, which shall be flush trim ring.
   j. Output of speaker at minimum wattage across a frequency range of 400 to 4000 Hz.

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k. Manufacturer - System Sensor, Cooper Wheelock.

5. Smoke Detector Sounder Bases (Residential Units):
   a. Appliances shall comply with UL 268 and 464 and shall be listed and labeled by an NRTL.
   b. Sound pressure: 85 dBA (min) continuous tone at 10 feet
   c. Maximum installation temperature 161 degrees F (68 degrees C).
   d. Manufacturer - System Sensor, Cooper Wheelock.

K. MAGNETIC DOOR HOLDERS
   1. Description: Units are equipped for wall or floor mounting as indicated and are complete with matching doorplate.
      a. Wall-Mounted Units: Flush mounted unless otherwise indicated.
      b. Rating: 120-v ac and 24-v dc.
      c. Manufacturer - ESL, #DH24120XY. X = surface (S) or semi-flush (F) mount. Y = Brushed Chrome (C) or Brushed Brass (B).
   2. Material and Finish: Match door hardware. Use either brushed chrome or brushed brass.

L. ADDRESSABLE INTERFACE DEVICE (AM) - Look at difference between Monitorin Module and relay Module
   1. Description: Microelectronic monitor module, NRTL listed for use in providing a system address for alarm-initiating devices for wired applications with normally open contacts.
   2. Furnish and install one AM for each non-addressable device on normally open dry contacts, i.e., sprinkler flow and tamper switches, manual pull stations and NAC power supply (FCPS 24).
   3. Manufacturer - Notifier.

M. NON-ADDRESSABLE INTERFACE DEVICE (PAM)
   1. Description: Electronic control module, UL listed for use in providing operation of equipment. Provide with normally open and normally closed contacts. 24VDC (7.0 amps) 120 VAC (10 amps).
   2. Furnish and install one for all equipment requiring relay operation, with current requirements higher that AM or addressable devices.
   3. Manufacturer - Air Products and Controls, #PAM-1.

N. QUAD INTELLIGENT AUDIO TRANSPONDERS
   1. Suitable for distributed, multi-channel voice evacuation systems with capability of playing up to four simultaneous messages.
   2. Integrated audio amplification and distribution sub systems shall be controlled by the FACP via the SLC (Signaling Line Circuit).

O. Locks and Keys: Deliver keys to Owner.
   1. Provide the same standard lock and key for each key operated switch and lockable panel and cabinet; provide 2 keys of each type

P. Instruction Charts: Printed instruction chart for operators, showing steps to be taken when a signal is received (normal, alarm, supervisory, and trouble); easily readable from normal operator's station.
   1. Frame: Stainless steel or aluminum with polycarbonate or glass cover.
   2. Provide one for each control unit where operations are to be performed.
   3. Obtain approval of Owner prior to mounting; mount in location acceptable to Owner.
   4. Provide extra copy with operation and maintenance data submittal.

Q. Extra Materials
   1. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
      a. Smoke Detectors, Heat Detectors and Pull Stations: Quantity equal to 10 percent of amount of each type installed, but no less than 2 units of each type.
      b. Detector Bases: Quantity equal to 2 percent of amount of each type installed, but no less than 2 unit of each type.

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c. Keys and Tools: One extra set for access to locked and tamper proof components.
d. Audible and Visual Notification Appliances: Two of each type installed.
e. Fuses: Four of each type installed in the system.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with applicable codes, NFPA 72, NFPA 70, and the contract documents.

B. Conceal all wiring, conduit, boxes, and supports where installed in finished areas.

C. Obtain Owner's approval of locations of devices, before installation.

D. Install instruction cards and labels.

E. Equipment Mounting:
1. If equipment is wall mounted, install fire-alarm control unit (FACP and FARAP) on finished wall with top of display at 70 inches above the finished floor. All enclosures without a display shall be mounted with the top of the equipment at 70 inches above the finished floor.
2. If equipment is installed in high ceilings, the fire alarm devices shall be visible from the floor and readily accessible. In this instance, readily accessible, shall be defined per the NEC. We will allow an exception, when a device is located on the ceiling, that a device may be accessed with a portable ladder. In this instance, the device shall be visible from the floor.
3. Equipment shall not be located above a hard (sheet rocked, etc.) or grid ceiling systems.

F. Speaker, Strobes and Horns: Shall be uniform throughout building at 90“, from center of device, to above the finished floor.

G. Pull Stations: Shall be uniform throughout building at 48" to top of rough-in box. Intent: 46" +/- 1” to the hand pull handle.

H. Horns, Speaker s and Strobes that are to be surface mounted, require Surface Mount Kit with skirt over the J-box. Surface mount kit shall be the same size as device and back box.

I. Smoke- or Heat-Detector Spacing:
1. Comply with NFPA 72, "Smoke-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for smoke-detector spacing.
2. Comply with NFPA 72, "Heat-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for heat-detector spacing.
3. Smooth ceiling spacing shall not exceed 30 feet.
4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Appendix A in NFPA 72.
5. HVAC: Locate detectors not closer than 3 feet from air-supply diffuser or return-air opening.
6. Lighting Fixtures: Locate detectors not closer than 12 inches from any part of a lighting fixture.

J. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct.

K. Heat Detectors in Elevator Shafts: Coordinate temperature rating and location with sprinkler rating and location.

L. Remote Status and Alarm Indicators: Install near each smoke detector and each sprinkler water-flow switch and valve-tamper switch that is not readily visible from normal viewing position.

M. Audible Alarm-Indicating Devices: Install not less than 6 inches below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille.

N. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches below the ceiling.

O. Device Location-Indicating Lights: Locate in public space near the device they monitor.

P. Installation of all devices shall meet the currently adopted NFPA and International Fire alarm codes.

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Q. Install fire alarm and detection systems as indicated, in accordance with equipment manufacturer's written instructions and comply with applicable portions of the NEC and NECA's "Standards of Installation".

R. All panels shall be mounted with 4ft. horizontal clearance in front and the width of the panel for observation and testing. All fire alarm junction boxes must be clearly marked for easy identification.

S. Wiring splices are to be avoided, make connections at terminal strips in the cabinets or equipment terminals. Transposing or changing wire color-coding of the wires shall not be permitted.

T. Initiating circuits shall be Class A (Style 6) with separate runs for outgoing and return portions of the loop, such that a single fault in the initiating loop does not prevent operation of indicating devices. Outgoing and return conduits shall be separated by a minimum of 12" vertical and 48" horizontal, per NFPA Annex A 64222.

U. The system shall incorporate NFPA 72D (Style 6) wiring which provides the necessary circuitry for emergency operation of the signaling line circuit during a single break or ground fault.

V. The Contractor is responsible to coordinate with the fire alarm system supplier and the BYU Electrical Shop to insure that raceway size, wire quantity, size and type is suitable for equipment supplied, NEC standards and U.L. requirements. Label all wires and cables with Scotch brand labels for easy identification.

W. Where it is necessary to penetrate existing concrete walls above the ceiling, appropriate sealants shall be used to seal around the conduit, with the fire alarm system installer providing and installing the sealant. Where duct work is penetrated and smoke detectors installed, ducts shall be resealed and provision made to provide access to smoke detectors for servicing and cleaning.

X. When networking fire alarm control panels, existing tunnels shall be utilized.

Y. The screen of the FACP and the remote annunciators shall report the point of alarm or trouble.

Z. Notify the BYU Electrical Shop prior to making any changes in any part of an existing fire alarm system.

AA. Routing of new fire alarm circuits must be coordinated with the BYU Electrical Shop.

AB. 120 VAC power circuits shall not be permitted in alarm raceways.

AC. Provide and install the system in accordance with the plans and specifications of all applicable codes and the manufacturer's recommendations. All wiring shall be installed in strict compliance with all the provisions of NEC - Article 760 A and C, Power Limited Fire Protective Signaling Circuits or if required may be reclassified as non-power limited and wired in accordance with NEC Article 760 A and B. Upon completion, the Contractor shall so certify in writing to the Owner and General Contractor.

AD. All fire alarm devices including but not limited to smoke detectors; heat detectors; relays; pull stations; strobes; speakers; horn strobes; speaker strobes; etc. shall be clearly labeled with its loop, unique address and circuit number. All devices shall have labels which are easily readable from the floor and minimum of ½" x ½" per character in size. Provide 1"x1" for high ceiling mounted devices.

AE. Installation of all fire equipment shall be closely coordinated with all appropriate sub-contractors.

AF. The Owner will network the new installation with the Campus Notifier, Onyx Works system.

AG. The Contractor shall thoroughly remove debris from within the panels and j-boxes, and from the work site before completion of the installation.

AH. The authorized fire system service representative shall terminate the panels, program the panel and test all devices.

3.02 LABELING OF FIRE ALARM DEVICES

A. Labeling requirements:
   1. Electrical contractor shall coordinate and install labels and heads.
   2. If the equipment is located in a public area, install label in an area not visible to the public.

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B. Labeling shall include:
   1. Date the equipment was installed. This requirement shall not supersede the date of substantial completion, in regards to the fire alarm system warranty.
   2. All addressable devices shall be labeled with their appropriate loop and address numbers.
   3. Provide engraved labels for panel enclosures. Reger to Section 260553 for engraved label requirements.

C. Provide labels for the following equipment/devices:
   1. Main fire alarm panel.
   2. Notification appliance circuit (NAC) panel.
   3. Remote annunciator.
   4. Smoke detectors.
   5. Heat detectors.
   6. Notification horn and/or strobes.
   7. Notification voice and/or strobes.
   8. Control, relay and monitor modules.
   9. Pull stations.
   10. Beam detectors.
   11. Batteries.

3.03 CONNECTIONS

A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Division 08 Section "Door Hardware." Connect hardware and devices to fire-alarm system.
   1. Verify that hardware and devices are NRTL listed for use with fire-alarm system in this Section before making connections.

B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 3 feet from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.
   1. Alarm-initiating connection to stairwell and elevator-shaft pressurization systems.
   2. Smoke dampers in air ducts of designated air-conditioning duct systems.
   3. Alarm-initiating connection to activate emergency shutoffs for gas and fuel supplies.
   4. Supervisory connections at valve supervisory switches.

3.04 ACTIVATION OF FIRE ALARM SYSTEM

A. The building fire alarm system shall not be activated and the devices uncovered, until all grinding and dust producing operations have ceases.

B. Activation of the fire alarm system and uncovering of devices, prior to final grinding and dust production, may make the fire alarm system unacceptable to the owner. If this occurs, per the owner’s direction, the fire alarm system panels and devices may have to be replaced at the contractor’s expense.

3.05 INSTALLATION OF RACEWAYS

A. All conduit, mounting boxes, junction boxes, panels, detectors, alarm devices, etc. shall be mounted and fastened with appropriate fittings to insure positive grounding throughout the system.

B. Raceways with horn strobe circuiting. Locate ceiling junction boxes no more than 60 feet apart.

C. Install at the Main FACP, a wire gutter capable of handling all system wiring. The minimum gutter size shall be 8” by 8” by 24” long. Run appropriate conduits between gutter and panel.

D. All fire alarm conduits are to be installed in class “A” style, i.e., leave the fire alarm panel in 3/4" conduit and after completing a trunk line circle, return to the fire alarm panel. Each conduit loop may be run separately, such as 1st Floor “A” loop, 2nd Floor “B” loop, etc. (Exception: Where only one

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device, such as a horn/strobe or hand pull is remote from the main trunk line or FACP, a “T” conduit is allowable. Where two related devices, such as a valve tamper and its companion flow switch are together, then one conduit is also permitted. Wiring, however, must be supervised in a normal fashion, with a class “A” loop.

E. EMT conduit is required, except for a 6' maximum length of ½” flexible conduit to smoke detectors and similar devices.

F. All new power limited cabling shall be installed in EMT conduit. Wire is to be provided by the electrical contractor and closely coordinated so as to insure proper codes and U.L. requirements are met, as well as the BYU color codes.

G. All conduit is to be minimum 3/4" conduit and all junction boxes shall be 4" sq x 2-1/8" deep or 4 11/16” x 2 1/8” when needed, using blank covers, plaster rings, etc., as required, unless otherwise approved.

H. Where deemed prudent provide spare wires and/or cables in conduits. Coordinate with BYU Electrical Shop.

I. For those particularly challenging locations where EMT conduit is impossible, and with the BYU Electrical Shop concurrence, utilize the following raceway methods:
   1. Metallic flexible conduit above the ceiling and in the walls;
   2. Wiremold #700 wireway on the exposed walls and ceiling, painted to match existing surfaces.

3.06 DEVICE HARDWARE

A. Provide relay contacts for mechanical system shutdown. All mechanical system supply and return air fans are to be shut down immediately upon any alarm condition.

B. “Fan Shut-Down” shall be controlled by a slave relay driven by addressable relays. Furnish and install relays for fans.

C. If a Fire Suppression System is an element of this project, provide addressable modules and necessary relays to tie as specified in the drawings to the FACP.

3.07 FIRE ALARM SPEAKERS

A. Design speaker system at 80% of speaker capacity. Once speakers are installed, verify that the speakers are set at 80% of speaker output.

3.08 TESTING OF FIRE ALARM SYSTEM

A. Each device shall be tested for compliance to manufacturers listed operation.

B. Provide (2) two hard copies of testing report to owner, including the operational status of each device.

3.09 BUILDING FIRE ALARM DRAWINGS NEAR REMOTE ANNUNCIATOR

A. Provide a laminated set of fire alarm drawings, visibly located adjacent to the fire alarm remote annunciator. The drawings shall be housed in a framed cabinet or permanently attached to the wall. The fire alarm drawings shall include fire alarm plans with all fire alarm equipment/devices, located and identified, with their loop and identification number.

3.10 GROUNDING

A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.

3.11 INSPECTION AND TESTING FOR COMPLETION

A. Notify Owner 7 days prior to beginning completion inspections and tests.

B. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.

C. Provide the services of the installer's supervisor or person with equivalent qualifications to supervise inspection and testing, correction, and adjustments.

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D. Prepare for testing by ensuring that all work is complete and correct; perform preliminary tests as required.

E. Provide all tools, software, and supplies required to accomplish inspection and testing.

F. Perform inspection and testing in accordance with NFPA 72 and requirements of local authorities; document each inspection and test.

G. Correct defective work, adjust for proper operation, and retest until entire system complies with contract documents.

H. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.

I. Fire-alarm system will be considered defective if it does not pass tests and inspections.

J. At the rough-in phase, the contractor shall schedule a rough-in Inspection with Provo City Fire Marshal's office. This inspection shall occur when the raceway and boxes have been installed and before the ceiling have been installed. The Rough-in inspection will assist in examining the fire alarm installation and avoiding any unnecessary alteration to building construction.

K. Demonstration
   1. Engage a factory-authorized service representative to Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system.
   2. The manufacturer of the fire alarm system shall provide the owner with the necessary on-site training to program, service and maintain the fire alarm panel. The training shall include, but not limited to:
      a. Add or remove devices device from service.
      b. Diagnosis of the fire alarm system.

3.12 OWNER PERSONNEL INSTRUCTION

A. Provide the following instruction to designated Owner personnel:
   1. Hands-On Instruction: On-site, using operational system.

B. Basic Operation: One-hour sessions for attendant personnel, security officers, and engineering staff; combination of classroom and hands-on:
   1. Initial Training: 1 session pre-closeout.

C. Furnish the services of instructors and teaching aids; have copies of operation and maintenance data available during instruction.

D. Provide means of evaluation of trainees suitable to type of training given; report results to Owner.

3.13 CLOSEOUT

A. Closeout Demonstration: Demonstrate proper operation of all functions to Owner.
   1. Be prepared to conduct any of the required tests.
   2. Have at least one copy of operation and maintenance data, preliminary copy of project record drawings, input/output matrix, and operator instruction chart(s) available during demonstration.
   3. Have authorized technical representative of control unit manufacturer present during demonstration.
   4. Demonstration may be combined with inspection and testing required by authority having jurisdiction; notify authority having jurisdiction in time to schedule demonstration.
   5. Repeat demonstration until successful.

B. Occupancy of the project will not occur prior to Substantial Completion.

C. Substantial Completion of the project cannot be achieved until inspection and testing is successful and:
   1. Specified diagnostic period without malfunction has been completed.
   2. Approved operating and maintenance data has been delivered.
   3. Spare parts, extra materials, and tools have been delivered.

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4. All aspects of operation have been demonstrated to Owner.
5. Final acceptance of the fire alarm system has been given by authorities having jurisdiction.
6. Occupancy permit has been granted.
7. Specified pre-closeout instruction is complete.

D. As-built Drawings:
1. Provide “Hard Copy” as-built drawings (3 copies) supplied engineer for review and submission to owner.
2. Provide an electronic copy of manufacturer‘s fire alarm drawings, with all corrections.
3. Identify all panel booster power supplies, addressable modules, etc., that are located throughout the project.
4. The Owner will install building fire alarm maps as required adjacent to the FACP and each remote annunciation panel.

E. Electronic Data Files shall be supplied to the engineer. These files shall include all information required to allow the Owner to maintain and modify the fire alarm program, and shall contain a minimum of the following:
1. CAD of the building fire alarm map indicating the exact location of all devices along with the addresses of the individual devices.
2. CAD drawing files of “as-built” fire alarm panel components and point-to-point connections.
3. General configuration programming.
4. Job specific configuration programming.
5. Tutorial file on complete programming of fire alarm system.

F. Operating and Maintenance Manuals (three sets) shall be submitted prior to testing of the system, unless the specific manuals are already on file in the BYU Electrical Shop.

3.14 MAINTENANCE DURING WARRANTY PERIOD

A. See Section 017000 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.

B. Provide to Owner, at no extra cost, a written maintenance contract for entire manufacturer's warranty period, to include the work described below.

C. Perform repairs as needed, due to failure of fire alarm system.
1. Emergency response. The fire alarm equipment supplier shall provide an emergency response within four hours of any reported system failure to resolve the problem during 1-year warranty. Repairs required, unless due to improper use, accidents, or negligence beyond the control of the maintenance contractor.
2. Record keeping required by NFPA 72 and authorities having jurisdiction, for the duration of the warranty period.

D. Provide trouble call-back service upon notification by Owner:
1. Provide on-site response within 12 hours of notification.

E. Provide a complete description of work performed, equipment replaced and/or adjusted, with a detailed schedule.

F. Maintain a log at each fire alarm control unit, listing the date and time of each call-back visit, the condition of the system, nature of the trouble, correction performed, and parts replaced. Submit duplicate of each log entry to Owner's representative upon completion of site visit.

G. Comply with Owner's requirements for access to facility and security.

END OF SECTION

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