

GREENWICH PUBLIC SCHOOLS
Purchasing Department
290 Greenwich Avenue
Greenwich, Connecticut 06830
(203) 625-7411
eugene.watts@greenwich.k12.ct.us

EUGENE H. WATTS
Manager of School Procurement

August 13, 2024

On behalf of the Julian Curtiss Building Committee, you are invited to submit a bid for an ADA Renovations Phase I & II to include a new elevator and main entrance at Julian Curtiss School. The attached bid specifications detail the requirements we are looking for.

Bidders are urged to read all documents carefully and fill out all information requested. Bids which are incomplete, obscure, or conditional, and which contain irregularities of any kind, will be subject to rejection for failure to comply strictly with these conditions.

Each bid must be submitted with one (1) original copy/set, and (10) ten copies/sets and one (1) electronic copy (via flash USB drive) of the bid. Bidders must submit bids in a clear, concise and legible manner so as to permit proper evaluation of responsive bids. The original bid and copies must be in a sealed envelope plainly marked:

Julian Curtiss School ADA Renovations Phase I & II
Opening Date: 9/10/24
Opening Time: 11:00 a.m.
Bid No.: 2458-24

A mandatory pre-bid meeting will be held on August 20, 2024 at 2:00 p.m. at the site located at 180 East Elm Street Greenwich, CT. Meet in the main lobby of the Julian Curtiss School ("JCS").

The Town of Greenwich, Julian Curtiss Building Committee, and the District/School Administration reserves the right to reject any and all responses not deemed to be in the best interest of the Town of Greenwich. Each also reserves the right to waive any informalities in or reject any or all bids or any part of any bid.

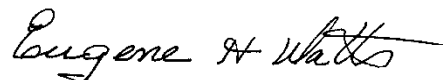
The meeting for the bid opening will be held remotely by telephone in real time.

The details to join the meeting remotely are as follows:

Dial-In by phone: +1 413-308-2410 PIN: 870 243 023#

All bidders and other interested people are invited to call in to hear Bid # 2458-24 being read at 11:00 a.m.

Very truly yours,



Eugene H. Watts

GREENWICH PUBLIC SCHOOLS
JULIAN CURTISS SCHOOL
PHASE I: ELEVATOR & ACCESSIBILITY UPGRADES
PHASE II: FRONT ENTRANCE
& MAIN OFFICE SECURITY UPGRADES
180 East Elm Street, Greenwich, Connecticut 06830
Antinozzi Project No. 23015

PROJECT MANUAL
July 17, 2024



ANTINOZZI
ASSOCIATES
ARCHITECTURE
+ INTERIORS

ISSUED FOR BID – JULY 17, 2024

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Not in this Submission

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PART 1 - GENERAL

- 1.1 The **Greenwich Board of Education**, Greenwich, CT, invites bid proposals for the following:
- A. **ADA Renovations including a new elevator and main entrance** for the Greenwich Board of Education at the following location:
- Julian Curtiss School: 180 East Elm Street, Greenwich, CT 06830**
- 1.2 BACKGROUND:
- A. TOWN / DISTRICT: The Town of Greenwich is approximately 30 miles northeast of New York City and has a population of about 62,000 residents. The Greenwich Public Schools enjoy a national reputation for excellence and have strong support from the community. The fifteen public schools have an enrollment of 9,000 students and consists of eleven elementary schools (K-5), the middle schools (6-8), and one comprehensive high school (9-12).
- B. Architect: Antinozzi Associates, 271 Fairfield Avenue, Bridgeport, CT 06604
- 1.3 SCHEDULE:
- A. Initial Bid Posting Date: **August 13, 2024**
- B. Bid Due Date:
1. Sealed proposals will be received as indicated below, and at that time and place will be publicly opened and read aloud.
 2. Date: **September 10, 2024**
 3. Time: **11:00 AM local time**
 4. Location: District Offices
 5. Address: GREENWICH BOARD OF EDUCATION, 290 Greenwich Ave., Greenwich, Connecticut 06830, (203) 625-7411
 6. All bidders and other interested persons are invited to a virtual bid opening.
Dial-In by phone: +1 413-308-2410 PIN: 870 243 023#
- C. QUESTIONS:
1. Questions concerning this bid will be received by email only and directed to:
 - a. **bid_department@greenwich.k12.ct.us**
 2. In the subject line you must put **BID 2458-24, Julian Curtiss ADA Renovations Phase I & II.**
 3. All questions must be submitted no later than noon on **August 27, 2024.**

**JULIAN CURTISS SCHOOL
ADA RENOVATIONS PHASE I & II
GREENWICH, CT**

4. All answers to bidder's questions will be provided by written BID ADDENDUM by noon on **September 3, 2024**. It is the responsibility of all bidders to check www.greenwichschools.org for all current addenda up to 48 hours before the bid is due.
5. Failure to comply with these conditions will result in the bidder waiving his right to dispute the bid specifications and conditions.

1.4 BID SUBMISSION / REQUIREMENTS:

- A. Each bid shall be signed and accompanied by a bid security payable to the Town of Greenwich in the amount of ten (10%) of the bid and shall be in the form of a Bid Bond only as issued in the bid documents. Bid Bonds must use the Greenwich Public Schools Bid Bond Form (included within the bid documents), issued by a surety company listed on the current U.S. Dept of Treasury's Federal Register and be licensed to underwrite bonds in the State of Connecticut.
- B. Each bid shall be accompanied by a completed copy of the CONTRACTOR'S QUALIFICATION STATEMENT included in the bid documents. The Greenwich Public Schools reserves the right to request further information and/or supplemental information with respect to the QUALIFICATION STATEMENT at their sole discretion.
- C. Each bidder shall utilize the specified manufacturers. Should the contractor desire to substitute other articles, materials, apparatus, products or process, other than those specified or approved as equal, the contractor shall apply to the architect, in writing, for approval of such substitution. It should be noted that the bid shall not be based on a substituted article, material, apparatus, product or process. No substitution review shall take place prior to bid.
- D. Each form of the bid contains a section for alternates and for unit prices. All alternates prices must be completed with a dollar value. Blanks, "Not Applicable" (N/A), "No Effect", etc., in these portions of the BID FORM shall be construed to indicate that the particular alternate shall be performed without increased to the contract price as they relate to the scope of the trade package.
- E. Unit prices which do not affect the work all the bidder's trade may be filled in "Not Applicable" or "(N/A)". "Not Applicable" or Blanks in these Bid Forms shall be construed to indicate that the unit price is not applicable as it relates to the scope of the trade package.
- F. TAX: No amount shall be added for the Connecticut sales tax or Federal tax. The Greenwich Public School system is exempt from the payment of taxes imposed by the Federal government and/or State of Connecticut. Taxes must not be included in the bid price.
- G. PERMIT FEES: Greenwich Public Schools will secure the building permit(s) and upon award of the Contract they will be transferred to the awarded contractor / vendor. No cost should be included in the base bid for the building permit.
- H. WAGES: All work shall be done in accordance with applicable State statutes; conditions of Prevailing Wages shall apply where required by State of CT DAS, projects over \$100,000. Prevailing Wage Schedule provided herein is for demonstrable purposes only. It is the responsibility of the bidder / vendor to verify actual rates.

I. COLLUSION AMONG BIDDERS:

1. More than one offer from an individual, firm, partnership, corporation, or association under the same or different name will be rejected. Reasonable grounds for believing that a bidder is interested in more than one bid for the work contemplated will cause rejection of all bids in which the bidder is interested. Any or all bidders will be rejected if there is any reason for believing that collusion exists among the bidders.
2. Participants in such collusion may not be considered in the future offers for the same work. Each bidder, by submitting a bid, certifies that it is not part to any collusive action.
3. Each bid shall be accompanied by a completely filled in and properly executed Non- Collusive Affidavit, provided.

J. EMPLOYMENT DISCRIMINATION BY CONTRACTOR PROHIBITED: The successful bidder will not discriminate against any employee or applicant for employment because of race, religion, color, sex, or nation origin, except where religion, sex or national original is a bona fide occupational qualification reasonably necessary to the normal operation of the contractor. The successful bidder agrees to post in a conspicuous place, available to employees and applicants for employment, notices setting forth the provision of this nondiscrimination clause. The successful bidder in all solicitations or advertisements for employment, placed by or on behalf of the contractor, will state that such successful bidder in an EQUAL OPPORTUNITY EMPLOYER.

K. QUALIFICATIONS: No qualifications to the bid are allowed. If bids are qualified, they may be deemed non-responsive and subsequently rejected.

L. No Bidder may withdraw their Bid within 90 days after the actual date of Bid Opening.

M. COPIES: Failure to submit a bid with four copies does not constitute a material defect.

N. BID EVALUATION: A committee composed of various administrators will evaluate bids. The following criteria guidelines will be used in analyzing and evaluating this bid:

1. Conformance to the requirements of this bid, i.e. conformance to Terms, Conditions and Scope of Work.
2. Proven skills and technical competence.
3. Background of the firm.
4. For Vendor firm, identification of all personnel who will have a principal responsibility.
5. The Board of Education may consider proximity of the vendor's service as a factor in determining lowest responsible bid. Companies must be located within 60 miles of the School District in order to submit a bid.
6. The Board of Education shall have the right to take such steps as it deems necessary to determine the ability of the bidder to perform the work and the bidder shall furnish the Board of Education with information and data for this purpose as the Board of Education may request. The right is reserved to reject any bid where, on investigation, the evidence or information submitted by such bidders does not satisfy the Board of Education that the bidder is qualified to carry out properly the terms of the Contract.

**JULIAN CURTISS SCHOOL
ADA RENOVATIONS PHASE I & II
GREENWICH, CT**

7. Apparent low bidder agrees to submit the following Supplements to Greenwich Public Schools within 48 hours after submission of the Bid for consideration in award of the Contract:
 - a. Subcontractors; Include the names of all Subcontractors and the portions of the Work they will perform.
 - b. Cost Breakdown identifying the Bid Price/Sum segmented into portions as requested, broken down per school building. (Schedule of Values)
 - O. AWARD: The Contract shall be awarded to the lowest responsible and qualified bidder, meaning the bidder whose bid is the lowest of those bidders possessing the skill, ability, and integrity necessary to faithfully perform the work based on objective criteria considering past performance and financial responsibility. In considering past performance, the Greenwich Public Schools shall evaluate the skill, ability, and integrity of bidders in terms of the bidders' fulfillment of contract obligations and all the bidders' experience or lack of experience with projects of similar size and scope. The Greenwich Public Schools reserves the right to consider as unqualified to do the work required by the bid documents any bidder that does not habitually perform with its own forces the major portion of the work involved in the bid documents. No contract will be awarded to any bidder who is at time of award not qualified under applicable regulations issued by the Secretary of Labor, United States of Department of Labor, or any applicable State and local laws and regulations.
 - P. REJECTION: after review of all sectors, terms, and conditions, including price, Greenwich Public Schools reserves the right to reject any and all bids, or any part thereof, or waive defects in same.
 - Q. Any bid may be withdrawn prior to the opening time and date. Any bids received after the specified time and date will not be considered.
- 1.5 BIDDER QUALIFICATIONS:
- A. Companies must be located within 60 miles of the School District in order to submit a bid.
 - B. Companies submitting a bid must be in business under the same corporate name for a minimum of five (5) years.
 - C. Contractor must have the resources to complete the scope of work for this project with a minimum of 50% of their own workforce.
 - D. Non-Connecticut Contractors: Pursuant to Connecticut General Statutes §12-430(7), as amended by Public Act No. 11-61, Section 66, a non-resident contractor shall comply with the State of Connecticut's bonding requirements.
- 1.6 CONTRACT:
- A. SINGLE PRIME CONTRACT will be let for:
 1. General Construction
 2. Bid awards must be approved by the Greenwich Public Schools. All contractors shall be required to execute the Greenwich Public Schools standard form of Contract and

accompanying Payment & Performance Bonds without exception.

- B. **LENGTH:** This bid is for awarding the contract to cover the period outlined in the Milestone Schedule. Once this Bid is awarded, successful bidder must make arrangements to meet with Greenwich Public Schools as required. In the event that the work is not substantially complete on the date identified in the Milestone Schedule, liquidated damages will be in effect at \$500 per calendar day and if all work is not final complete as scheduled, the liquidated damages will increase to \$2,500 per calendar day.
- C. **AWARD OF CONTRACT:** The contract will be awarded by the Board of Education to a qualified firm or person at compensation determined to be fair and reasonable considering budgetary limitations, scope, complexity, and the nature of goods and/or services.
 - 1. If there is a conflict between the Contract Agreement and the General Conditions, the Contract Agreement shall prevail.
 - 2. The successful bidder will produce for the Greenwich Public Schools review, a current financial statement, which will remain strictly confidential.
- D. The contractor shall simultaneously with the signing of the Contract, furnish the Town the executed Performance, Maintenance, and Payment Bond of a surety company authorized to do business the State of Connecticut, and acceptable to the Town, in the sum of all the full amount of the Contract Obligation in the form provided by the Town. The Performance Bond will not be required where the total estimated cost of labor and materials under the contract with respect to which such general bid is submitted is less than one hundred thousand dollars (\$100,000). Once a contract exceeds \$100,000 the bidder will be responsible for obtaining and paying for all bonds required by Greenwich Public Schools.
- E. Within 60 calendar days of award of the Contract, the contractor shall obtain Employee Background Checks as imposed by Section 2 of Public Act 16-67, which amended Connecticut General Statute 10-222c. Refer to attached forms following the Instructions to Bidders which must be completed for the Employee Background Checks.
- F. **PAYMENTS:** The Greenwich Public Schools reserves the right to provide payment in accordance with completion of services based on the Project Schedule.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 PROVISIONS:

- A. Consumption or use of alcohol and / or drugs is prohibited on school property. Any individual with alcohol or drugs will be removed from said property and will not be allowed to work on the project. Smoking is prohibited in all school buildings and on school grounds.
- B. Greenwich Public Schools reserves the right to reject any proposed subcontractor for reasonable cause.

END OF SECTION

STATE OF CONNECTICUT
Contractor Verification
(in accordance with Public Act 16-67)

Directions to Contractor: Connecticut law requires that any contractor applying or bidding for a contract (including individuals who are independent contractors) with a local or regional board of education, a governing council of a state or local charter school, or interdistrict magnet school operator require any employee with the contractor who would be in a position involving direct student contact to supply the contractor with the information provided in this form. Information may be collected either through a written communication or telephonically.

In addition, pursuant to Connecticut General Statutes (C.G.S.) § 10-222c, the contractor is required to contact – either telephonically or through written communication – any current or former employer of an employee if such employer was a local or regional board of education, a governing council of a state or local charter school, or interdistrict magnet school operator or if the employment caused the employee to have contact with children, to request any information concerning whether there was a finding of abuse or neglect or sexual misconduct against the employee. If the contractor receives any information indicating such a finding, or otherwise has knowledge of such a condition, the contractor must immediately forward such information to any local or regional board of education with which the contractor is under contract.

Directions to Employee of Contractor: Pursuant to Connecticut state law, employees of a contractor who would be in a position involving direct student contact must supply all of the information provided in Section 2 of this form.

Section 1 – To be completed by Contractor

Name	
Street address	
City, State, Zip Code	
Contact person	
Telephone number/email address	

Section 2 – To be completed by Employee of Contractor

****Part A.** On a separate sheet of paper, please list the name, address and telephone number of each current or former employer, if such current or former employer was a local or regional board of education, a governing council of a state or local charter school, or interdistrict magnet school operator, or if such employment otherwise caused you to have contact with children.

Part B. Please complete the questions below in their entirety.

Have you ever:

Y N
☐ ☐

Been the subject of an abuse or neglect or sexual misconduct investigation by any employer, state agency or municipal police department (answer “no” if the investigation resulted in a finding that all allegations were unsubstantiated)?

Y N
☐ ☐

Been disciplined or asked to resign from employment or resigned from or otherwise separated from any employment while an allegation of abuse or neglect was pending or under investigation by the Department of Children and Families (the “department”), or an allegation of sexual misconduct was pending or under investigation or due to an allegation substantiated pursuant to section 17a-101g of abuse or neglect, or of sexual misconduct or a conviction for abuse or neglect or sexual misconduct?

Y N
☐ ☐

Had a professional or occupational license or certificate suspended or revoked or ever surrendered such a license or certificate while an allegation of abuse or neglect was pending or under investigation by the department or an investigation of sexual misconduct was pending or under investigation, or due to an allegation substantiated by the department of abuse or neglect or of sexual misconduct or a conviction for abuse or neglect or sexual misconduct?

Part C – Written Consent and Disclosure Authorization. I hereby authorize the entities I have listed in Section 2 of this form to release to the entity listed in Section 1 of this form the information required to be released by my previous employer pursuant to (C.G.S.) § 10-222c along with any related records. I hereby consent to and authorize disclosure by the State Department of Education of the information requested pursuant to C.G.S. § 10-222c, as amended by Public Act 16-67, and I hereby authorize the release by the State Department of Education of any related records. I further hereby release the above-named employer(s) and the State Department of Education from any and all liability of any kind that may arise from the disclosure or release of records requested pursuant to C.G.S. § 10-222c, as amended by Public Act 16-67.

Signature of Applicant

Date

NOTES:

The terms provided below are currently defined in state law as follows. Please note that statutes may be amended from time to time.

Sexual Misconduct means – “any verbal, nonverbal, written or electronic communication, or any other act directed toward or with a student that is designed to establish a sexual relationship with the student, including a sexual invitation, dating or soliciting a date, engaging in sexual dialog, making sexually suggestive comments, self-disclosure or physical exposure of a sexual or erotic nature and any other sexual, indecent or erotic contact with a student.” Connecticut General Statutes § 10-222c(k).

Abuse or neglect means – “abuse or neglect as described in Section 46b-120, and includes any violation of Sections 53a-70, 53a-70a, 53a-71, 53a-72a, 53a-72b or 53a-73a.” Connecticut General Statutes § 10-222c(k).

The Connecticut State Department of Education is an affirmative action/equal opportunity employer and does not discriminate on the basis of race, color, religion, sex, gender identity or expression, sexual orientation, marital status, national origin, ancestry, age, criminal record, political beliefs, genetic information, intellectual disability, past or present history of mental disability, learning disability, or physical disability, including, but not limited to, blindness or any other basis prohibited by Connecticut state and/or federal nondiscrimination laws.

SECTION 000400 - BID FORM

JULIAN CURTISS SCHOOL: ADA RENOVATIONS PHASE I & II

The undersigned hereby proposes to furnish all labor, materials, devices, appliances, supplies, equipment, services and other facilities necessary to complete all of the work of the above referenced Contract, as required by, and in accordance with, the provisions of the Instructions to Bidders, the Conditions of the Contract, the Drawings and Specifications as prepared by Antinozzi Associates and dated **July 17, 2024** and that, if this Proposal is accepted, the Undersigned agrees to enter into an Agreement with the Owner to perform this work for the sum(s) as follows:

SUBMITTED BY: _____

Bidder's Full Name _____

Address _____

City, State, Zip

1.1 BASE BID

- A. **BASE BID:** The Base Bid of this proposal for all work required by the Contract Documents for **ADA RENOVATIONS PHASE I & II AT JULIAN CURTISS SCHOOL** and Related Work:

_____ (\$) DOLLARS

1.2 ACCEPTANCE

- A. If this bid is accepted by Greenwich Public Schools within the time period stated above, we will:
1. Execute the Agreement within seven days of receipt of Notice of Award.
 2. Furnish the required bonds within seven days of receipt of Notice of Award.
- B. If this bid is accepted within the time stated, and we fail to commence the Work or we fail to provide the required Bond(s), the security deposit shall be forfeited as damages to Greenwich Public Schools by reason of our failure, limited in amount to the lesser of the face value of the security deposit or the difference between this bid and the bid upon which a Contract is signed.

1.3 CONTRACT TIME

- A. The Undersigned agrees in the Base Bid to complete the work per the Milestone Schedule provided in the Specifications.

1.4 ADDENDA

- A. The following Addenda have been received. The modifications to the Bid Document noted below have been considered and all costs are included in the Bid Sum.

1. Addendum# _____ Date _____.
2. Addendum# _____ Date _____.
3. Addendum# _____ Date _____.
4. Addendum# _____ Date _____.
5. Addendum# _____ Date _____.

1.5 ALTERNATES

- A. See Section 012300 for further detail. All lines must be filled in. If there is no cost impact to your scope of work indicate on the alternate line "NO CHANGE". If an Alternate line is left blank, it will be assumed that the Alternate has a zero-cost impact. Alternate bids shall be open for acceptance for a period of one hundred eighty days (180) after the date of the bid opening.

1. Alternate No. 1: Provide vinyl composite tile VCT-1 in lieu of vinyl sheet flooring VSF-1.
 - a. Refer to Finish Legend on sheet FI-901 for information specific to each product.
 - b. Refer to Finish Plans for locations of VSF-1 per Base Bid.

ADD/DEDUCT _____ Dollars

\$ _____

2. Alternate No. 2: ADD roof ladder to replace existing from Room 238 to roof.
 - a. Refer to Specification Section 055000, "Metal Fabrications," for ladder requirements.
 - b. Include safety panel to prevent access to ladder. Match existing.

ADD/DEDUCT _____ Dollars

\$ _____

3. Alternate No. 3: Provide entry-resistant glass with 45-minute fire rating at door 101 along with associated sidelites and transom per Frame Type 2.

a. Refer to Drawings.

ADD/DEDUCT _____ Dollars

\$ _____

1.6 UNIT PRICES

- A. See Section 012200 for more detail. The undersigned proposes and agrees that the following unit prices shall be the basis for computing extra costs to the contract for additional work and credits for deleted work. Unit prices shall include costs for all materials, equipment, tools, small tools, labor, permits, fees, overhead, profit, supervision, home office support, project management, estimating, safety, travel, shop drawings and as built drawings for all parties involved in the work.
- B. All work is to be accomplished in accordance with applicable Sections of the Specifications. The Owner reserves the right to selectively reject any of the unit prices without any affect on the remainder of the bid.
- C. Unit Prices listed below are considered additive unit pricing, deductive unit prices will based on the prices below less ten percent (10%). Unit Prices listed below marked (ACBM) are coordinated with Asbestos-containing Building Material (ACBM) table in Section 028213, "Hazardous Materials Abatement;" refer to Section for additional information.

1. Unit Price 01: 1' x 2' Cork Ceiling Adhesive (ACBM)

a. Cost per Square Foot: \$ _____ SF

2. Unit Price 02: Pipe Insulation Debris (ACBM). Associated mastic is not asbestos-containing.

a. Cost per Linear Foot \$ _____ LF

3. Unit Price 03: Kitchen Exhaust Duct (ACBM)

a. Cost per Linear Foot \$ _____ LF

4. Unit Price 04: Soft Coat Plaster Ceiling (ACBM).

a. Cost per Square Foot: \$ _____ SF

5. Unit Price 05: Metal and Wood Fire Doors (ACBM). Interior of doors was not available for sampling.

a. Cost per Door: \$ _____ Each Door

6. Unit Price 06: Pipe Insulation at Wet Walls and other hidden locations (ACBM).

a. Cost per Linear Foot \$_____LF

7. Unit Price 07: Electrical Backer Board (ACBM).

a. Cost per Backer Board \$_____Each Backer Board

1.7 BIDDER'S FURTHER AFFIRMATION AND DECLARATION

A. The above name bidder and should this bid be a joint bid each party thereto, further affirm and declares;

1. That said bidder is of lawful age and the only one interested in this bid; and that no other person, firm or corporation, except those herein above names has any interest in this bid or in the contract proposed to be entered into.
2. That said bidder is not in arrears to the Greenwich Public School upon debt or contract, and is not a defaulter, as surety or otherwise upon any obligation to the Greenwich Public Schools.
3. That no member of the Greenwich Public Schools or any officer or employee of the Greenwich Public School or person whose salary is payable in whole or in part from the School District treasury, or the spouse of any foregoing is or shall be or become interested, directly or indirectly, as a contracting party, partner, stockholder, surety or otherwise, in this bid, or in the performance of the Contract, or in the supplies, materials or equipment and work or labor to which it relates, or in any portion of the profits thereof.
4. That he/she has carefully examined the site of the work and that, from his / her own investigations, he/ she has satisfied him/ herself as to the nature and location of the work, and character, quality and quantity of material, and all difficulties likely to be encountered, the kind and extent of equipment and other facilities needed for the performance of the work, the general and local conditions, and all other items which may, in any way, effect the work or its performance.
5. That if a corporation, this bid or proposal containing the Non-Collusive Binding Certification and the foregoing Affirmation and Declaration has been authorized by the Board of Directors of such Corporation, which authorization includes the signing and submission of this bid or proposal and the inclusion therein of the said Certificate of Non-Collusion and Affirmation and Declaration as the Act and Deeds of the Corporation.

1.8 BID FORM SIGNATURE(S)

Signature

Corporate SealCompany Name:

was hereunto affixed in the presence of:

Subscribed and sworn before me this day of

202_Notary Public:

My Commission Expires:

END OF SECTION

GREENWICH PUBLIC SCHOOLS

REQUEST FOR BID # DEADLINE: AT

RFB TITLE: _____

STATEMENT OF NON-COLLUSION

In submitting this bid/proposal, the undersigned declares that this is made without any connection with any persons making another bid/proposal on the same contract; that the bid/proposal is in all respects fair and without collusion, fraud, or mental reservation; and that no elected or appointed official of the Town, or any person or entity in the employ of the Town, is directly or indirectly interested in said bid/proposal or in the supplies or work to which it relates, or in any portion of the profits thereof, except as permitted under the Town of Greenwich Code of Ethics.

CODE OF ETHICS

In submitting this bid, the undersigned further declares and certifies that a) it has not, and will not induce or attempt to induce any Town of Greenwich employee or officer to violate the Town of Greenwich Code of Ethics in connection with its offer to provide goods or services under, or otherwise in the performance of, such contract, and b) if an elected or appointed official or any person in the employ of the Town has a direct or indirect interest in Vendor or any supplier or Subcontractor expected to be involved with the contract, such person or entity is in compliance with the safe harbor procedures established by the Town of Greenwich Board of Ethics or has received an advisory from the Town's Board of Ethics with respect to such involvement.

The undersigned further understands that the above declarations are material representations to the Town of Greenwich made as a condition to the acceptance of the bid/proposal. If found to be false, the Town of Greenwich retains the right to reject said bid/proposal and rescind any resulting contract and/or purchase order and notify the undersigned accordingly, thereby declaring as void said bid/proposal and contract or purchase order.

The Town of Greenwich Code of Ethics can be found at www.greenwichct.gov. Relevant provisions of the Town's Code of Ethics state:

Section 2. DEFINITIONS. (1) Indirect interest, without limiting its generality, shall mean and include the interest of any subcontractor in any prime contract with the Town and the interest of any person or his immediate family in any corporation, firm, or partnership which has a direct or indirect interest in any transaction with the Town. (2) Substantial financial interest shall mean any financial interest, direct or indirect, which is more than nominal, and which is not common to the interest of other citizens of the Town. (3) Town officer shall mean and include any official, employee, agent, consultant, or member, elected or appointed, of any board, department, commission, committee, legislative body, or other agency of the Town. (4) Transaction shall mean and include the offer, sale, or furnishing of any real or personal property, material, supplies, or services by any person, directly or indirectly, as Vendor, prime contractor, subcontractor, or otherwise, for the use and benefit of the Town for a valuable consideration, excepting the services of any person as a Town officer.

Section 3. GIFTS AND FAVORS. No Town officer or his immediate family shall accept any valuable gift, thing, favor, loan, or promise that might influence the performance or nonperformance of his official duties.

Section 4. IMPROPER INFLUENCE. No Town officer having a substantial financial interest in any transaction with the Town or in any action to be taken by the Town shall use his office to exert his influence or to vote on such transaction or action.

By signing below, the undersigned acknowledges reviewing and understanding the Non-Collusion and Code of Ethics statements contained herein and confirms compliance with the contents:

AUTHORIZED SIGNATURE: _____

PRINT NAME: _____

BIDDER'S COMPANY NAME: _____

GREENWICH PUBLIC SCHOOLS

REQUEST FOR BID # _____ DEADLINE: _____ AT: _____

RFB TITLE: _____

BIDDER INFORMATION:

BIDDER'S COMPANY NAME _____

ADDRESS _____

TELEPHONE # _____ FAX # _____

E-MAIL ADDRESS _____

WEB SITE _____

AUTHORIZED SIGNATURE _____

PRINT NAME _____

TITLE _____

STATE OF CT TAXPAYER ID # _____

FEDERAL TAXPAYER ID # _____

INCORPORATED IN THE STATE OF _____ Corporate Seal ☐Yes ☐No**AWARD/CONTRACT SIGNATURE**

The Bidder shall indicate below, the full name, title, and the email address of the authorized person (i.e., **officer of the company**) who will (Docu) sign the contract (if applicable) for this procurement:

SECTION 000410 - CONTRACTOR'S QUALIFICATION STATEMENT

With the submittal of the Bid Form (Section 000400), the bidder shall attach this Contractor's Qualification Statement and shall answer the Questions herein. Failure to answer these questions in full may be cause for rejection of the bidder's proposal. **If more space is needed, please attach other sheets with reference to subject paragraph.**

The Board of Education reserves the right to consider, but not limited to, the financial responsibility, experience and reputation in the construction industry, as well as the specific qualifications listed below and elsewhere in this document in considering bids and awarding the contract. The Board of Education reserves the right to waive any informalities if, at its discretion the interest of the Greenwich Public Schools will be better served.

The Undersigned certifies under oath that the information provided herein is true and sufficiently complete so as not to be misleading.

SUBMITTED TO: **Greenwich Board of Education**

ADDRESS: **290 Greenwich Avenue, Greenwich, CT 06830**

SUBMITTED BY: Corporation

NAME Partnership

ADDRESS: Individual

PRINCIPAL OFFICE Other

NAME OF PROJECT: **Greenwich High School: Slab Repair**

TYPE OF WORK (file separate for each Classification of Work)

_____ General Construction

_____ HVAC

_____ Plumbing

_____ Electrical

_____ Other

1.1 ORGANIZATION

- A. How many years has your organization been in business as a Contractor?
- B. How many years has your organization been in business under its present business name?
 - 1. Under what other or former names has your organization operated?
- C. What is the firm's bonding range?
 - 1. Single
 - 2. Aggregate
- D. If your organization is a corporation, answer the following:
 - 1. Date of Incorporation:
 - 2. State of Incorporation:
 - 3. President's name:
 - 4. Vice-president's name(s):
 - 5. Secretary's name:
 - 6. Treasurer's name:
- E. If your organization is a partnership, answer the following:
 - 1. Date of organization:
 - 2. Type of partnership (if applicable):
 - 3. Name(s) of general partner(s):
- F. If your organization is individually owned, answer the following:
 - 1. Date of organization:
 - 2. Name of owner:
- G. If the form of your organization is individually owned, answer the following:
 - 1. If the form of your organization is other than those listed above, describe it and name the principals:

1.2 OWNERSHIP, MANAGEMENT, AFFILIATION

- A. Identify each person who is or has been within the past five years, an owner of 5.0% or more of the firm's shares, one of the five largest shareholders, a director, an officer, a partner or the proprietor, or a managerial employee.

First Name	MI	Last Name	DOB	% Owned	Director Y or N	Officer Y or N	Title	Partner Y or N

- B. Joint Ventures: Provide information for all firms involved. Fill in name, % owned, office held; indicate by Y or N whether director, officer, partner and title.

First Name	MI	Last Name	DOB	% Owned	Director Y or N	Officer Y or N	Title	Partner Y or N

- C. Identify any other firms in which now or in the past five years, the firm or any of the individuals listed in questions 1.2.A and 1.2.B above, either owned or owns 5.0% or more of the shares of or was or is one of the five largest shareholders, a director, an officer, a partner or a proprietor of said other firm. _____ Yes, list below _____ No

Federal ID No.	% Owned	Firm/Company Name: Position	Company Address

- D. Has the firm or any firm listed in response to questions above defaulted or been terminated and its surety called upon to complete, any contract awarded within the past five years?

**JULIAN CURTISS SCHOOL
ADA RENOVATIONS PHASE I & II
GREENWICH, CT**

() Yes, () No. If yes, give date(s), agency(ies)/owner(s), project(s), contract numbers, and describe including the result:

- E. List below any projects performed by the bidder in the past five (5) years on which any of the following events occurred:

1. Were any extension of time requested by the contractor, and were such requests granted?
2. Was litigation and/or arbitration commenced by either the Owner or the bidder as a result of the work of the project performed by the bidder?
3. Were any liens filed on the project by subcontractors or material suppliers of the bidder?
4. Did the bidder make any claims for extra work on the project, and did said claim result in a change order?

<u>Project</u>	<u>Type of Event</u>	<u>Name/Address of Owner</u>	<u>Name & Phone # of Contact Person at Owner</u>
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- F. For **all** contracts within the past five years: (a) List all liens or claims over \$25,000 filed against the firm and remaining undischarged or unsatisfied for more than 90 days; and (b) list and describe all liquidated damages assessed.

1.3 FINANCIAL INFORMATION

- A. Provide a copy of the firm's most recent annual financial statement.

1.4 OTHER INFORMATION

- A. Within the past five years has the firm, any affiliate, any predecessor company or entity or any person identified in questions number 1.1 through 1.2 above been the subject of any of the following: (Respond to each question and describe in detail the circumstances of each affirmative answer: (Attach additional pages if necessary).

1. A judgment of conviction for any business-related conduct constituting a crime under state or federal law. No _____ Yes _____
2. A criminal investigation or indictment for any business-related conduct constituting a crime under state or federal law? No _____ Yes _____
3. An order of protection filed against an officer or employee prohibiting access to jobsite(s) or prohibiting contact with any staff of any owner? No _____ Yes _____
4. A grant of immunity for any business-related conduct constituting a crime under state and federal law? No _____ Yes _____

**JULIAN CURTISS SCHOOL
ADA RENOVATIONS PHASE I & II
GREENWICH, CT**

5. A federal or state suspension or debarment? No_____ Yes_____
6. A rejection of any bid for lack of qualifications, responsibility or because of the submission of an informal, non-responsive or incomplete bid? No_____ Yes_____
7. A rejection of any proposed subcontract for lack of qualifications, responsibility or because of the submission of an informal, non-responsive or incomplete bid? No_____ Yes_____
8. A denial or revocation of prequalification? No_____ Yes_____
9. A voluntary exclusion from bidding/contracting agreement? No_____ Yes_____
10. Any administrative proceeding or civil action seeking specific performance or restitution in connection with any public works contract except any disputed work proceeding? No_____ Yes_____
11. An OSHA Citation and Notification of Penalty containing a violation classified as serious? No_____ Yes_____
12. An OSHA Citation or Notification of Penalty containing a violation classified as willful? No_____ Yes_____
13. A prevailing wage or supplement payment violation? No_____ Yes_____
14. A State Labor Law violation deemed willful? No_____ Yes_____
15. Any other federal or state Citations, Notices, violation orders, pending administrative hearings or proceedings or determinations of a violation of any labor law or regulation? No_____ Yes_____
16. Any criminal investigation, felony indictment or conviction concerning formation of or any business association with, an allegedly false or fraudulent women's, minority or disadvantaged business enterprise? No_____ Yes_____
17. Any denial, decertification, revocation or forfeiture of Women's Business Enterprise, Minority Business Enterprise or Disadvantaged Business Enterprise status? No_____ Yes_____
18. Rejection of a low bid on a State contract for failure to

**JULIAN CURTISS SCHOOL
ADA RENOVATIONS PHASE I & II
GREENWICH, CT**

- meet statutory affirmative action M/WBE requirements? No_____ Yes____
19. A consent order with the CT Department of Environmental Protection or a federal, state or local government enforcement determination involving a violation of federal or state environmental laws? No_____ Yes_____
20. Any bankruptcy proceeding? No_____ Yes_____
21. Any suspension or revocation of any business or professional license? No_____ Yes_____
22. Any citations, notices, violation orders, pending administrative hearings or proceedings or determinations for violation of: No_____ Yes_____
- a. Federal, state or local health laws, rules or regulations . No_____ Yes_____
- b. Federal, state or local environmental laws, rules and regulations. No_____ Yes_____
- c. Unemployment insurance or workers compensation coverage or claim requirements. No_____ Yes_____
- d. ERISA (Employee Retirement Income Security Act). No_____ Yes_____
- e. Federal, state or local human rights laws. No_____ Yes_____
- f. Federal or state security laws. No_____ Yes_____
- g. Withdrawal or an agreement to withdraw a bid submitted to a public owner or a request by a public owner to withdraw a bid? No_____ Yes_____
- B. During the five-year period preceding the submissions of this bid, has the bidder been named as a part in any lawsuit in an action involving a claim for personal injury or wrongful death arising from performance of work related to any project in which it has been engaged? If the answer to this question is yes, list all such lawsuits, the index number associated with said suit and the status of the lawsuit at the time of the submission of this bid.
No_____ Yes_____
- C. During the five-year period preceding the submission of this bid, has the bidder been the subject of proceedings before the Department of Labor for alleged violations of the Labor Law as it relates to the payment of prevailing wages and/or supplemental payment requirements? If the answer to this question is yes, please list each such instance of the commencement of a Department of Labor proceeding, for which project such proceeding was commenced, and the status of the proceeding at the time of the submission of this bid.
No_____ Yes_____

**JULIAN CURTISS SCHOOL
ADA RENOVATIONS PHASE I & II
GREENWICH, CT**

- D. During the five-year period preceding the bidder's submission of this bid, has the bidder been the subject of proceedings involving allegations that it violated the Worker's Compensation Law including but not limited to the failure to provide proof of worker's compensation or disability coverage and/or any lapses thereof. If the answer to this question is yes, list such instance of violation and the status of the claimed violation at the time of disposition of this bid.

No_____ Yes_____

- E. Has the bidder, its officers, directors, owner and/or managerial employees been convicted of a crime or been the subject of a criminal indictment during the five years preceding the submission of this bid? If the answer to this question is yes, list the name of the individual convicted or indicted the charge against the individual and the date of disposition of the charge.

No_____ Yes_____

- F. During the five year period preceding the bidder's submission of this bid, has the bidder been charged with and/or found guilty of any violations of federal, state, or municipal environmental and/or health laws, codes, rules and/or regulations. If the answer to this question is yes, list the nature of the charge against the bidder, the date of the charge, and the status of the charge at the time of the submission of this bid.

No_____ Yes_____

- G. Has the bidder ever defaulted or had its surety called upon to complete any contract awarded within the past five years. If the answer to this question is yes, list the projects, the dates and the nature of the termination (convenience, suspension, for cause).

No_____ Yes_____

- H. Has any officer or partner of the bidder's organization ever defaulted or had its surety called upon to complete any contract awarded within the past five years or been an officer or partner of some other organization that has been terminated from a project by an owner? If yes, state

No_____ Yes_____

Name of
Individual(s)

Name of
Organization(s)

Reason(s)

1.5 LICENSING

- A. List jurisdictions and trade categories in which your organization is legally qualified to do business, and indicate registration of license numbers, if applicable.
- B. List jurisdictions in which your organization's partnership or trade name is filed:
- C. Has any director, officer, owner or managerial employee had any professional license suspended or revoked? If the answer is yes, list the name of the individual, the professional license he/she formally had, whether the license was revoked or suspended and the date of the revocation or suspension

No _____ Yes _____

1.6 EXPERIENCE

- A. List the categories of work that your organization will perform with its own forces:
- B. Claims and Suits. (If the answer of any of the questions below is yes, please attach details.)
 - 1. Have you or has any director, officer, owner or managerial employee ever failed to complete any work awarded to them? If yes, list the project(s) the date(s) and the reason(s) for the failure to complete.

No _____ Yes _____
 - 2. Are there any judgments, claims, arbitration proceedings or suits pending or outstanding against your organization or its officers?

No _____ Yes _____
 - 3. Has your organization filed any law suits or requested arbitration with regard to construction contracts within the last five years?

No _____ Yes _____
- C. Within the last five years, has any officer or principal of your organization ever been an officer or principal of another organization when it failed to complete a construction contract? (If the answer is yes, please attach details.)

No _____ Yes _____
- D. On a separate sheet, list **all** similar construction projects your organization has in progress or completed, giving the name of project, owner, architect, contract amount, percent complete and scheduled completion date.

1. State total worth of work in progress and under contract:
- E. On a separate sheet, list **all** projects, not listed above, that your organization has completed or in progress in the past five years, giving the name of the project, owner, architect, contract amount, date of completion and percentage of the cost of the work performed with your own forces.
 1. State average annual amount of construction work performed during the past five years:
- F. On a separate sheet, list the construction experience and present commitment of the key individuals of your organization.

1.7 REFERENCES

- A. Trade reference:
- B. Bank references:
- C. Surety:
 1. Name of present bonding company:
 2. Name and address of agent:
 3. Name or previous bonding company:

1.8 CERTIFICATION

- A. The undersigned recognizes that this questionnaire is submitted for the purpose of the Greenwich Public Schools (Owner) to award a contract or approve a subcontract; acknowledges that the Owner may in its discretion, by means which it may choose, determine the truth and accuracy of all statements made herein; acknowledge that intentional submission of false or misleading information may constitute a felony, or a misdemeanor, and may also be punishable by a fine or imprisonment; and states that the information submitted in this questionnaire and any attached pages is true, accurate and complete.

Dated at this day of _____

Name of Organization:

By:

Title:

SWORN AND SUBSCRIBED TO BEFORE ME, A NOTARY PUBLIC, IN AND FOR

THE COUNTY OF _____ AND THE STATE OF _____

THIS _____ DAY OF _____, 2024

NOTARY
PUBLIC

MY COMMISSION EXPIRES _____

END OF SECTION 000410



Minimum Rates and Classifications
for Building Construction

ID#: 24-65126

Connecticut Department of Labor
Wage and Workplace Standards Division

By virtue of the authority vested in the Labor Commissioner under provisions of Section 31-53 of the General Statutes of Connecticut, as amended, the following are declared to be the prevailing rates and welfare payments and will apply only where the contract is advertised for bid within 20 days of the date on which the rates are established. Any contractor or subcontractor not obligated by agreement to pay to the welfare and pension fund shall pay this amount to each employee as part of his/her hourly wages.

Project Number: Project Town: Greenwich
State#: FAP#:
Project: Julian Curtiss School: Accessibility Upgrades: Elevator, Entrance, Front Office

CLASSIFICATION	Hourly Rate	Benefits
1b) Asbestos/Toxic Waste Removal Laborers: Asbestos removal and encapsulation (except its removal from mechanical systems which are not to be scrapped), toxic waste removers, blasters.**See Laborers Group 7**		
1c) Asbestos Worker/Heat and Frost Insulator	47.06	33.30
2) Boilermaker	46.21	29.35
3a) Bricklayer, Cement Mason, Concrete Finisher (including caulking), Stone Masons	41.11	35.68 + a
3b) Tile Setter	38.81	32.20
3c) Tile and Stone Finishers	32.0	26.69
3d) Marble & Terrazzo Finishers	33.0	25.69
3e) Plasterer	44.52	29.63

-----LABORERS-----

4) Group 1: General laborers, carpenter tenders, concrete specialists, wrecking laborers and fire watchers.	34.5	27.26
4) Group 1a: Acetylene Burners (Hours worked with a torch)	35.5	27.26
4a) Group 2: Mortar mixers, plaster tender, power buggy operators, powdermen, fireproofers/mixer/nozzleman (Person running mixer and spraying fireproof only).	34.75	27.26
4b) Group 3: Jackhammer operators/pavement breaker, mason tender (brick), mason tender (cement/concrete), forklift operators and forklift operators (masonry).	35.0	27.26
4c) **Group 4: Pipelayers (Installation of water, storm drainage or sewage lines outside of the building line with P6, P7 license) (the pipelayer rate shall apply only to one or two employees of the total crew who primary task is to actually perform the mating of pipe sections) P6 and P7 rate is \$26.80.	35.5	27.26
4d) Group 5: Air track operator, sand blaster and hydraulic drills.	35.25	27.26
4e) Group 6: Blasters, nuclear and toxic waste removal.	37.5	27.26
4f) Group 7: Asbestos/lead removal and encapsulation (except it's removal from mechanical systems which are not to be scrapped).	37.5	27.26
4g) Group 8: Bottom men on open air caisson, cylindrical work and boring crew.	35.0	27.26
4h) Group 9: Top men on open air caisson, cylindrical work and boring crew.	34.5	27.26
4i) Group 10: Traffic Control Signalman	20.7	27.26
4j) Group 11: Toxic Waste Removers A or B With PPE	37.5	27.26

As of: August 12, 2024

5) Carpenter, Acoustical Ceiling Installation, Soft Floor/Carpet Laying, Metal Stud Installation, Form Work and Scaffold Building, Drywall Hanging, Modular-Furniture Systems Installers, Lathers, Piledrivers, Resilient Floor Layers.	39.54	28.68
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5a) Millwrights	40.56	28.87
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6) Electrical Worker (including low voltage wiring) (Trade License required: E1,2 L-5,6 C-5,6 T-1,2 L-1,2 V-1,2,7,8,9)	44.0	42.745
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7a) Elevator Mechanic (Trade License required: R-1,2,5,6)	64.01	39.19+a+b
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-----LINE CONSTRUCTION-----

Groundman	26.5	6.5% + 9.00
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Linemen/Cable Splicer	48.19	6.5% + 22.00
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8) Glazier (Trade License required: FG-1,2)	41.63	25.80+ a
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9) Ironworker, Ornamental, Reinforcing, Structural, and Precast Concrete Erection	45.25	41.27 + a
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----OPERATORS----

Group 1: Crane Handling or Erecting Structural Steel or Stone; Hoisting Engineer (2 drums or over). (Trade License Required)	55.42	28.80 + a
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Group 1a: Front End Loader (7 cubic yards or over); Work Boat 26 ft. and Over	50.79	28.80 + a
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Group 2: Cranes (100 ton rate capacity and over); Bauer Drill/Caisson. (Trade License Required)	55.03	28.80 + a
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As of: August 12, 2024

Group 2a: Cranes (under 100 ton rated capacity).	54.09	28.80 + a
Group 2b: Excavator over 2 cubic yards; Pile Driver (\$3.00 premium when operator controls hammer)	50.4	28.80 + a
Group 3: Excavator; Gradall; Master Mechanic; Hoisting Engineer (all types of equipment where a drum and cable are used to hoist or drag material regardless of motive power of operation), Rubber Tire Excavator (Drott-1085 or similar); Grader Operator; Bulldozer Finegrade. (slopes, shaping, laser or GPS, etc.). (Trade License Required)	49.45	28.80 + a
Group 4: Trenching Machines; Lighter Derrick; CMI Machine or Similar; Koehring Loader (Skooper); Goldhofer.	48.97	28.80 + a
Group 5: Specialty Railroad Equipment; Asphalt Spreader, Asphalt Reclaiming Machine; Line Grinder; Concrete Pumps; Drills with Self Contained Power Units; Boring Machine; Post Hole Digger; Auger; Pounder; Well Digger; Milling Machine (over 24 mandrel).	48.22	28.80 + a
Group 5 continued: Side Boom; Combination Hoe and Loader; Directional Driller.	48.22	28.80 + a
Group 6: Front End Loader (3 up to 7 cubic yards); Bulldozer (rough grade dozer).	47.83	28.80 + a
Group 7: Asphalt Roller; Concrete Saws and Cutters (ride on types); Vermeer Concrete Cutter; Stump Grinder; Scraper; Snooper; Skidder; Milling Machine (24" and under mandrel).	47.4	28.80 + a
Group 8: Mechanic; Grease Truck Operator; Hydroblaster; Barrier Mover; Power Stone Spreader; Welding; Work Boat Under 26 ft.; Transfer Machine; Rigger Foreman.	46.9	28.80 + a
Group 9: Front End Loader (under 3 cubic yards); Skid Steer Loader regardless of attachments; (Bobcat or Similar); Forklift, Power Chipper; Landscape Equipment (including Hydroseeder); Vacuum Excavation Truck and Hydrovac Excavation Truck (27 HG pressure or greater).	46.35	28.80 + a

As of: August 12, 2024

Group 10: Vibratory hammer; ice machine; diesel and air, hammer, etc.	43.77	28.80 + a
Group 11: Conveyor, earth roller, power pavement breaker (whiphammer), robot demolition equipment.	43.77	28.80 + a
Group 12: Wellpoint Operator.	43.69	28.80 + a
Group 13: Compressor Battery Operator.	42.97	28.80 + a
Group 14: Elevator Operator; Tow Motor Operator (solid tire no rough terrain).	41.52	28.80 + a
Group 15: Generator Operator; Compressor Operator; Pump Operator; Welding Machine Operator; Heater Operator.	41.01	28.80 + a
Group 16: Maintenance Engineer.	40.19	28.80 + a
Group 17: Portable Asphalt Plant Operator; Portable Crusher Plant Operator; Portable Concrete Plant Operator; Portable Grout Plant Operator; Portable Water Filtration Plant Operator.	45.63	28.80 + a
Group 18: Power Safety Boat; Vacuum Truck; Zim Mixer; Sweeper; (Minimum for any job requiring a CDL license); Rigger; Signalman.	42.57	28.80 + a
Surveyor: Chief of Party	45.87	28.80 + a
Surveyor: Assistant Chief of Party	42.3	28.80 + a
Surveyor: Instrument Man	40.7	28.80 + a
Surveyor: Rodman or Chainman	35.03	28.80 + a

-----PAINTERS (Including Drywall Finishing)-----

As of: August 12, 2024

10a) Brush and Roller	38.07	25.80
10b) Taping Only/Drywall Finishing	38.82	25.80
10c) Paperhanger and Red Label	38.57	25.80
10e) Blast and Spray	41.07	25.80
11) Plumber (excluding HVAC pipe installation) (Trade License required: P-1,2,6,7,8,9 J-1,2,3,4 SP-1,2)	49.58	36.15
12) Well Digger, Pile Testing Machine	37.26	24.05 + a
Roofer: Cole Tar Pitch	45.0	23.85 + a
Roofer: Slate, Tile, Composition, Shingles, Singly Ply and Damp/Waterproofing	43.5	23.85 + a
15) Sheetmetal Worker (Trade License required for HVAC and Ductwork: SM-1,SM-2,SM-3,SM-4,SM-5,SM-6)	53.22	46.19
16) Pipefitter (Including HVAC work) (Trade License required: S-1,2,3,4,5,6,7,8 B-1,2,3,4 D-1,2,3,4, G-1, G-2, G-8 & G-9)	49.58	36.15
-----TRUCK DRIVERS-----		
17a) 2 Axle, Helpers	33.16	32.36 + a
17b) 3 Axle, 2 Axle Ready Mix	33.27	32.36 + a

As of: August 12, 2024

17c) 3 Axle Ready Mix	33.33	32.36 + a
17d) 4 Axle	33.39	32.36 + a
17e) 4 Axle Ready Mix	33.44	32.36 + a
17f) Heavy Duty Trailer (40 Tons and Over)	35.66	32.36 + a
17g) Specialized Earth Moving Equipment (Other Than Conventional Type on-the-Road Trucks and Semi-Trailers, Including Euclids)	33.44	32.36 + a
17h) Heavy Duty Trailer up to 40 tons	34.39	32.36 + a
17i) Snorkle Truck	33.54	32.36 + a
18) Sprinkler Fitter (Trade License required: F-1,2,3,4)	49.98	32.85 + a
19) Theatrical Stage Journeyman	25.76	7.34

Welders: Rate for craft to which welding is incidental.

Surveyors: Hazardous material removal: \$3.00 per hour premium.

*Note: Hazardous waste removal work receives additional \$1.25 per hour for truck drivers.

**Note: Hazardous waste premium \$3.00 per hour over classified rate

Crane with 150 ft. boom (including jib) - \$1.50 extra

Crane with 200 ft. boom (including jib) - \$2.50 extra

Crane with 250 ft. boom (including jib) - \$5.00 extra

Crane with 300 ft. boom (including jib) - \$7.00 extra

Crane with 400 ft. boom (including jib) - \$10.00 extra

All classifications that indicate a percentage of the fringe benefits must be calculated at the percentage rate times the "base hourly rate".

Apprentices duly registered under the Commissioner of Labor's regulations on "Work Training Standards for Apprenticeship and Training Programs" Section 31-51-d-1 to 12, are allowed to be paid the appropriate percentage of the prevailing journeymen hourly base and the full fringe benefit rate, providing the work site ratio shall not be less than one full-time journeyman instructing and supervising the work of each apprentice in a specific trade.

As of: August 12, 2024

The Prevailing wage rates applicable to this project are subject to annual adjustments each July 1st for the duration of the project.

Each contractor shall pay the annual adjusted prevailing wage rate that is in effect each July 1st, as posted by the Department of Labor.

It is the contractor's responsibility to obtain the annual adjusted prevailing wage rate increases directly from the Department of Labor's website.

The annual adjustments will be posted on the Department of Labor's Web page:

www.ct.gov/dol. For those without internet access, please contact the division listed below.

The Department of Labor will continue to issue the initial prevailing wage rate schedule to the Contracting Agency for the project.

All subsequent annual adjustments will be posted on our Web Site for contractor access.

Contracting Agencies are under no obligation pursuant to State labor law to pay any increase due to the annual adjustment provision.

Effective October 1, 2005 - Public Act 05-50: any person performing the work of any mechanic, laborer, or worker shall be paid prevailing wage

All Person who perform work ON SITE must be paid prevailing wage for the appropriate mechanic, laborer, or worker classification.

All certified payrolls must list the hours worked and wages paid to All Persons who perform work ON SITE regardless of their ownership i.e.: (Owners, Corporate Officers, LLC Members, Independent Contractors, et. al)

Reporting and payment of wages is required regardless of any contractual relationship alleged to exist between the contractor and such person.

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

Please direct any questions which you may have pertaining to classification of work and payment of prevailing wages to the Wage and Workplace Standards Division, telephone (860)263-6790.

As of: August 12, 2024

As of: August 12, 2024

Important Information:

For use with Building, Heavy/Highway, and Residential

Welders: Rate for craft to which welding is incidental.

*Note: Hazardous waste removal work receives additional \$1.25 per hour for truck drivers.

**Note: Hazardous waste premium \$3.00 per hour over classified rate.

ALL Cranes: When crane operator is operating equipment that requires a fully licensed crane operator to operate he receives an extra \$4.00 premium in addition to the hourly wage rate and benefit contributions:

- 1) Crane handling or erecting structural steel or stone; hoisting engineer (2 drums or over)
- 2) Cranes (100 ton rate capacity and over) Bauer Drill/Caisson
- 3) Cranes (under 100 ton rated capacity)

Crane with boom including jib, 150 feet - \$1.50 extra.

Crane with boom including jib, 200 feet - \$2.50 extra.

Crane with boom including jib, 250 feet - \$5.00 extra.

Crane with boom including jib, 300 feet - \$7.00 extra.

Crane with boom including jib, 400 feet - \$10.00 extra.

All classifications that indicate a percentage of the fringe benefits must be calculated at the percentage rate times the "base hourly rate".

- Apprentices duly registered under the Commissioner of Labor's regulations on "Work Training Standards for Apprenticeship and Training Programs" Section 31-51-d-1 to 12, are allowed to be paid the appropriate percentage of the prevailing journeymen hourly base and the full fringe benefit rate, providing the work site ratio shall not be less than one full-time journeyman instructing and supervising the work of one apprentice in a specific trade.

Connecticut General Statute Section 31-55a: Annual Adjustments to wage rates by contractors doing state work

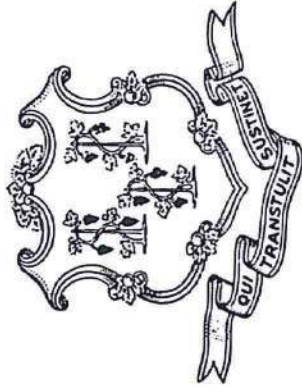
- The Prevailing wage rates applicable to this project are subject to annual adjustments each July 1st for the duration of the project.
- Each contractor shall pay the annual adjusted prevailing wage rate that is in effect each July 1st, as posted by the Department of Labor.
- It is the contractor's responsibility to obtain the annual adjusted prevailing wage rate increases directly from the Department of Labor's website.
- The annual adjustments will be posted on the Department of Labor's Web page: www.ctdol.state.ct.us.
- The Department of Labor will continue to issue the initial prevailing wage rate schedule to the Contracting Agency for the project.
- All subsequent annual adjustments will be posted on our Web Site for contractor access.

Effective October 1, 2005 - Public Act 05-50: any person performing the work of any mechanic, laborer, or worker shall be paid prevailing wage.

- All Persons who perform work ON SITE must be paid prevailing wage for the appropriate mechanic, laborer, or worker classification.
- All certified payrolls must list the hours worked and wages paid to All Persons who perform work ON SITE regardless of their ownership i.e.: (Owners, Corporate Officers, LLC Members, Independent Contractors, et. al)
- Reporting and payment of wages is required regardless of any contractual relationship alleged to exist between the contractor and such person.

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

Please direct any questions which you may have pertaining to classification of work and payment of prevailing wages to the Wage and Workplace Standards Division, telephone (860)263-6790.



THIS IS A PUBLIC WORKS PROJECT

Covered by the

PREVAILING WAGE LAW

CT General Statutes Section 31-53

**If you have QUESTIONS regarding your wages
CALL (860) 263-6790**

Section 31-55 of the CT State Statutes requires every contractor or subcontractor performing work for the state to post in a prominent place the prevailing wages as determined by the Labor Commissioner.

Sec. 31-53b. Construction safety and health course. New miner training program. Proof of completion required for mechanics, laborers and workers on public works projects. Enforcement. Regulations. Exceptions. (a) Each contract for a public works project entered into on or after July 1, 2009, by the state or any of its agents, or by any political subdivision of the state or any of its agents, described in subsection (g) of section 31-53, shall contain a provision requiring that each contractor furnish proof with the weekly certified payroll form for the first week each employee begins work on such project that any person performing the work of a mechanic, laborer or worker pursuant to the classifications of labor under section 31-53 on such public works project, pursuant to such contract, has completed a course of at least ten hours in duration in construction safety and health approved by the federal Occupational Safety and Health Administration or, has completed a new miner training program approved by the Federal Mine Safety and Health Administration in accordance with 30 CFR 48 or, in the case of telecommunications employees, has completed at least ten hours of training in accordance with 29 CFR 1910.268.

(b) Any person required to complete a course or program under subsection (a) of this section who has not completed the course or program shall be subject to removal from the worksite if the person does not provide documentation of having completed such course or program by the fifteenth day after the date the person is found to be in noncompliance. The Labor Commissioner or said commissioner's designee shall enforce this section.

(c) Not later than January 1, 2009, the Labor Commissioner shall adopt regulations, in accordance with the provisions of chapter 54, to implement the provisions of subsections (a) and (b) of this section. Such regulations shall require that the ten-hour construction safety and health courses required under subsection (a) of this section be conducted in accordance with federal Occupational Safety and Health Administration Training Institute standards, or in accordance with Federal Mine Safety and Health Administration Standards or in accordance with 29 CFR 1910.268, as appropriate. The Labor Commissioner shall accept as sufficient proof of compliance with the provisions of subsection (a) or (b) of this section a student course completion card issued by the federal Occupational Safety and Health Administration Training Institute, or such other proof of compliance said commissioner deems appropriate, dated no earlier than five years before the commencement date of such public works project.

(d) This section shall not apply to employees of public service companies, as defined in section 16-1, or drivers of commercial motor vehicles driving the vehicle on the public works project and delivering or picking up cargo from public works projects provided they perform no labor relating to the project other than the loading and unloading of their cargo.

(P.A. 06-175, S. 1; P.A. 08-83, S. 1.)

History: P.A. 08-83 amended Subsec. (a) by making provisions applicable to public works project contracts entered into on or after July 1, 2009, replacing provision re total cost of work with reference to Sec. 31-53(g), requiring proof in certified payroll form that new mechanic, laborer or worker has completed a 10-hour or more construction safety course and adding provision re new miner training program, amended Subsec. (b) by substituting "person" for "employee" and adding "or program", amended Subsec. (c) by adding "or in accordance with Federal Mine Safety and Health Administration Standards" and setting new deadline of January 1, 2009, deleted former Subsec. (d) re "public building", added new Subsec. (d) re exemptions for public service company employees and delivery drivers who perform no labor other than delivery and made conforming and technical changes, effective January 1, 2009.

Informational Bulletin

THE 10-HOUR OSHA CONSTRUCTION SAFETY AND HEALTH COURSE

(applicable to public building contracts entered into *on or after July 1, 2007*, where the total cost of all work to be performed is at least \$100,000)

- (1) This requirement was created by Public Act No. 06-175, which is codified in Section 31-53b of the Connecticut General Statutes (pertaining to the prevailing wage statutes);
- (2) The course is required for public building construction contracts (projects funded in whole or in part by the state or any political subdivision of the state) entered into on or after July 1, 2007;
- (3) It is required of private employees (not state or municipal employees) and apprentices who perform manual labor for a general contractor or subcontractor on a public building project where the total cost of all work to be performed is at least \$100,000;
- (4) The ten-hour construction course pertains to the ten-hour Outreach Course conducted in accordance with federal OSHA Training Institute standards, and, for telecommunications workers, a ten-hour training course conducted in accordance with federal OSHA standard, 29 CFR 1910.268;
- (5) The internet website for the federal OSHA Training Institute is http://www.osha.gov/fso/ote/training/edcenters/fact_sheet.html;
- (6) The statutory language leaves it to the contractor and its employees to determine who pays for the cost of the ten-hour Outreach Course;
- (7) Within 30 days of receiving a contract award, a general contractor must furnish proof to the Labor Commissioner that all employees and apprentices performing manual labor on the project will have completed such a course;
- (8) Proof of completion may be demonstrated through either: (a) the presentation of a *bona fide* student course completion card issued by the federal OSHA Training Institute; *or* (2) the presentation of documentation provided to an employee by a trainer certified by the Institute pending the actual issuance of the completion card;
- (9) Any card with an issuance date more than 5 years prior to the commencement date of the construction project shall not constitute proof of compliance;

- (10) Each employer shall affix a copy of the construction safety course completion card to the certified payroll submitted to the contracting agency in accordance with Conn. Gen. Stat. § 31-53(f) on which such employee's name first appears;
- (11) Any employee found to be in non-compliance shall be subject to removal from the worksite if such employee does not provide satisfactory proof of course completion to the Labor Commissioner by the fifteenth day after the date the employee is determined to be in noncompliance;
- (12) Any such employee who is determined to be in noncompliance may continue to work on a public building construction project for a maximum of fourteen consecutive calendar days while bringing his or her status into compliance;
- (13) The Labor Commissioner may make complaint to the prosecuting authorities regarding any employer or agent of the employer, or officer or agent of the corporation who files a false certified payroll with respect to the status of an employee who is performing manual labor on a public building construction project;
- (14) The statute provides the minimum standards required for the completion of a safety course by manual laborers on public construction contracts; any contractor can exceed these minimum requirements; and
- (15) Regulations clarifying the statute are currently in the regulatory process, and shall be posted on the CTDOL website as soon as they are adopted in final form.
- (16) Any questions regarding this statute may be directed to the Wage and Workplace Standards Division of the Connecticut Labor Department via the internet website of <http://www.ctdol.state.ct.us/wgwkstnd/wgemenu.htm>; or by telephone at (860)263-6790.

THE ABOVE INFORMATION IS PROVIDED EXCLUSIVELY AS AN EDUCATIONAL RESOURCE, AND IS NOT INTENDED AS A SUBSTITUTE FOR LEGAL INTERPRETATIONS WHICH MAY ULTIMATELY ARISE CONCERNING THE CONSTRUCTION OF THE STATUTE OR THE REGULATIONS.

November 29, 2006

Notice
To All Mason Contractors and Interested Parties
Regarding Construction Pursuant to Section 31-53 of the
Connecticut General Statutes (Prevailing Wage)

The Connecticut Labor Department Wage and Workplace Standards Division is empowered to enforce the prevailing wage rates on projects covered by the above referenced statute.

Over the past few years the Division has withheld enforcement of the rate in effect for workers who operate a forklift on a prevailing wage rate project due to a potential jurisdictional dispute.

The rate listed in the schedules and in our Occupational Bulletin (see enclosed) has been as follows:

Forklift Operator:

- **Laborers (Group 4) Mason Tenders** - operates forklift solely to assist a mason to a maximum height of nine feet only.
- **Power Equipment Operator (Group 9)** - operates forklift to assist any trade and to assist a mason to a height over nine feet.

The U.S. Labor Department conducted a survey of rates in Connecticut but it has not been published and the rate in effect remains as outlined in the above Occupational Bulletin.

Since this is a classification matter and not one of jurisdiction, effective January 1, 2007 the Connecticut Labor Department will enforce the rate on each schedule in accordance with our statutory authority.

Your cooperation in filing appropriate and accurate certified payrolls is appreciated.

STATUTE 31-55a

- SPECIAL NOTICE -

To: All State and Political Subdivisions, Their Agents, and Contractors

Connecticut General Statute 31-55a - Annual adjustments to wage rates by contractors doing state work.

Each contractor that is awarded a contract on or after October 1, 2002, for (1) the construction of a state highway or bridge that falls under the provisions of section 31-54 of the general statutes, or (2) the construction, remodeling, refinishing, refurbishing, rehabilitation, alteration or repair of any public works project that falls under the provisions of section 31-53 of the general statutes shall contact the Labor Commissioner on or before July first of each year, for the duration of such contract, to ascertain the prevailing rate of wages on an hourly basis and the amount of payment or contributions paid or payable on behalf of each mechanic, laborer or worker employed upon the work contracted to be done, and shall make any necessary adjustments to such prevailing rate of wages and such payment or contributions paid or payable on behalf of each such employee, effective each July first.

- The prevailing wage rates applicable to any contract or subcontract awarded on or after October 1, 2002 are subject to annual adjustments each July 1st for the duration of any project which was originally advertised for bids on or after October 1, 2002.
- Each contractor affected by the above requirement shall pay the annual adjusted prevailing wage rate that is in effect each July 1st, as posted by the Department of Labor.
- It is the **contractor's** responsibility to obtain the annual adjusted prevailing wage rate increases directly from the Department of Labor's Web Site. The annual adjustments will be posted on the Department of Labor Web page: www.ctdol.state.ct.us. For those without internet access, please contact the division listed below.
- The Department of Labor will continue to issue the initial prevailing wage rate schedule to the Contracting Agency for the project. All subsequent annual adjustments will be posted on our Web Site for contractor access.

Any questions should be directed to the Contract Compliance Unit, Wage and Workplace Standards Division, Connecticut Department of Labor, 200 Folly Brook Blvd., Wethersfield, CT 06109 at (860)263-6790.

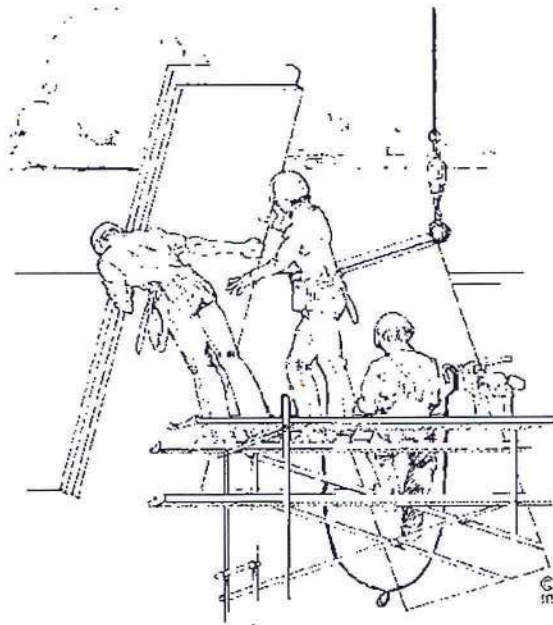
~NOTICE~

TO ALL CONTRACTING AGENCIES

Please be advised that Connecticut General Statutes Section 31-53, requires the contracting agency to certify to the Department of Labor, the total dollar amount of work to be done in connection with such public works project, regardless of whether such project consists of one or more contracts.

Please find the attached "Contracting Agency Certification Form" to be completed and returned to the Department of Labor, Wage and Workplace Standards Division, Public Contract Compliance Unit.

 Inquiries can be directed to (860)263-6543.



CONNECTICUT DEPARTMENT OF LABOR
WAGE AND WORKPLACE STANDARDS DIVISION
CONTRACT COMPLIANCE UNIT

CONTRACTING AGENCY CERTIFICATION FORM

I, _____, acting in my official capacity as _____,
authorized representative title

for _____, located at _____,
contracting agency address

do hereby certify that the total dollar amount of work to be done in connection with

_____, located at _____,
project name and number address

shall be \$_____, which includes all work, regardless of whether such project
consists of one or more contracts.

CONTRACTOR INFORMATION

Name: _____

Address: _____

Authorized Representative: _____

Approximate Starting Date: _____

Approximate Completion Date: _____

Signature

Date

Return To: Connecticut Department of Labor
Wage & Workplace Standards Division
Contract Compliance Unit
200 Folly Brook Blvd.
Wethersfield, CT 06109

Date Issued: _____

CONNECTICUT DEPARTMENT OF LABOR
WAGE AND WORKPLACE STANDARDS DIVISION

CONTRACTORS WAGE CERTIFICATION FORM
Construction Manager at Risk/General Contractor/Prime Contractor

I, _____ of _____
Officer, Owner, Authorized Rep. Company Name

do hereby certify that the _____
Company Name

Street

City

and all of its subcontractors will pay all workers on the

Project Name and Number

Street and City

the wages as listed in the schedule of prevailing rates required for such project (a copy of which is attached hereto).

Signed

Subscribed and sworn to before me this _____ day of _____.

Notary Public

Return to:

Connecticut Department of Labor
Wage & Workplace Standards Division
200 Folly Brook Blvd.
Wethersfield, CT 06109

Rate Schedule Issued (Date): _____

[New] In accordance with Section 31-53b(a) of the C.G.S. each contractor shall provide a copy of the OSHA 10 Hour Construction Safety and Health Card for each employee, to be attached to the first certified payroll on the project.

<div> <div> In accordance with Connecticut General Statutes, § 31-53 Certified Payrolls with a statement of compliance shall be submitted monthly to the contracting agency. </div> <div> <div> PAYROLL CERTIFICATION FOR PUBLIC WORKS PROJECTS </div> <div> WEEKLY PAYROLL </div> </div> <div> Connecticut Department of Labor Wage and Workplace Standards Division 200 Folly Brook Blvd. Wethersfield, CT 06109 </div> </div>																		
CONTRACTOR NAME AND ADDRESS:		SUBCONTRACTOR NAME & ADDRESS										WORKER'S COMPENSATION INSURANCE CARRIER						
PERSON/WORKER, ADDRESS and SECTION	Week-Ending Date	PROJECT NAME & ADDRESS	DAY AND DATE							Total ST Hours	GROSS PAY FOR ALL WORK PERFORMED THIS WEEK	TOTAL DEDUCTIONS			GROSS PAY FOR THIS PREVAILING RATE JOB	CHECK # AND NET PAY		
			S	M	T	W	TH	F	S			FICA	WITH-HOLDING	STATE			LIST OTHER	
			HOURS WORKED EACH DAY							TOTAL FRINGE BENEFITS Per Hour 1 through 6 (see back)								
										Total O/T Hours		CASH						
												\$	1. \$					
												Base Rate	2. \$					
												\$	3. \$					
												Cash Fringe	4. \$					
												\$	5. \$					
												Cash Fringe	6. \$					
												\$	1. \$					
												Base Rate	2. \$					
												\$	3. \$					
												Cash Fringe	4. \$					
												\$	5. \$					
												Cash Fringe	6. \$					
												\$	1. \$					
												Base Rate	2. \$					
												\$	3. \$					
												Cash Fringe	4. \$					
												\$	5. \$					
												Cash Fringe	6. \$					
												\$	1. \$					
												Base Rate	2. \$					
												\$	3. \$					
												Cash Fringe	4. \$					
												\$	5. \$					
												Cash Fringe	6. \$					

12/9/2013
WWS-CPI

*IF REQUIRED

*SEE REVERSE SIDE

PAGE NUMBER OF

***FRINGE BENEFITS EXPLANATION (P):**

Bona fide benefits paid to approved plans, funds or programs, except those required by Federal or State Law (unemployment tax, worker's compensation, income taxes, etc.).

Please specify the type of benefits provided:

- 1) Medical or hospital care _____ 4) Disability _____
2) Pension or retirement _____ 5) Vacation, holiday _____
3) Life Insurance _____ 6) Other (please specify) _____

CERTIFIED STATEMENT OF COMPLIANCE

For the week ending date of _____,

I, _____ of _____, (hereafter known as

Employer) in my capacity as _____ (title) do hereby certify and state:

Section A:

1. All persons employed on said project have been paid the full weekly wages earned by them during the week in accordance with Connecticut General Statutes, section 31-53, as amended. Further, I hereby certify and state the following:

- a) The records submitted are true and accurate;
- b) The rate of wages paid to each mechanic, laborer or workman and the amount of payment or contributions paid or payable on behalf of each such person to any employee welfare fund, as defined in Connecticut General Statutes, section 31-53 (h), are not less than the prevailing rate of wages and the amount of payment or contributions paid or payable on behalf of each such person to any employee welfare fund, as determined by the Labor Commissioner pursuant to subsection Connecticut General Statutes, section 31-53 (d), and said wages and benefits are not less than those which may also be required by contract;
- c) The Employer has complied with all of the provisions in Connecticut General Statutes, section 31-53 (and Section 31-54 if applicable for state highway construction);
- d) Each such person is covered by a worker's compensation insurance policy for the duration of his employment which proof of coverage has been provided to the contracting agency;
- e) The Employer does not receive kickbacks, which means any money, fee, commission, credit, gift, gratuity, thing of value, or compensation of any kind which is provided directly or indirectly, to any prime contractor, prime contractor employee, subcontractor, or subcontractor employee for the purpose of improperly obtaining or rewarding favorable treatment in connection with a prime contract or in connection with a prime contractor in connection with a subcontractor relating to a prime contractor; and
- f) The Employer is aware that filing a certified payroll which he knows to be false is a class D felony for which the employer may be fined up to five thousand dollars, imprisoned for up to five years or both.

2. OSHA~The employer shall affix a copy of the construction safety course, program or training completion document to the certified payroll required to be submitted to the contracting agency for this project on which such persons name first appears.

(Signature)

(Title)

Submitted on (Date)

*****THIS IS A PUBLIC DOCUMENT*****

*****DO NOT INCLUDE SOCIAL SECURITY NUMBERS*****

**Weekly Payroll Certification For
Public Works Projects (Continued)**

PAYROLL CERTIFICATION FOR PUBLIC WORKS PROJECTS

Week-Ending Date:
Contractor or Subcontractor Business Name:

WEEKLY PAYROLL

PERSON/WORKER, ADDRESS and SECTION	APPR RATE %	MALE/ FEMALE AND RACE*	WORK CLASSIFICATION Trade License Type & Number - OSHA 10 Certification Number	DAY AND DATE							Total ST Hours	BASE HOURLY RATE	TYPE OF FRINGE BENEFITS Per Hour 1 through 6 (see back)	GROSS PAY FOR ALL WORK PERFORMED THIS WEEK	TOTAL DEDUCTIONS			GROSS PAY FOR THIS PREVAILING RATE JOB	CHECK # AND NET PAY						
				S	M	T	W	TH	F	S					FICA WITH- HOLDING	STATE	LIST OTHER								
HOURS WORKED EACH DAY							Total O/T Hour	1. \$	2. \$	3. \$	4. \$	5. \$	6. \$	1. \$	2. \$	3. \$	4. \$	5. \$	6. \$	1. \$	2. \$	3. \$	4. \$	5. \$	6. \$

•IF REQUIRED

[New] In accordance with Section 31-53b(a) of the C.G.S., each contractor shall provide a copy of the OSHA 10 Hour Construction Safety and Health Card for each employee, to be attached to the first certified payroll on the project.

PAYROLL CERTIFICATION FOR PUBLIC WORKS PROJECTS																			
In accordance with Connecticut General Statutes, 31-53 Certified Payrolls with a statement of compliance shall be submitted monthly to the contracting agency.																			
WEEKLY PAYROLL																			
CONTRACTOR NAME AND ADDRESS: Landon Corporation, 15 Connecticut Avenue, Northford, CT 06472																			
SUBCONTRACTOR NAME & ADDRESS XYZ Corporation 2 Main Street Yanlis, CT 06389																			
WORKERS COMPENSATION INSURANCE CARRIER Travelers Insurance Company POLICY # #BAG8888928																			
EFFECTIVE DATE: 1/1/09 EXPIRATION DATE: 12/31/09																			
CONNECTICUT DEPARTMENT OF LABOR Wage and Workplace Standards Division 200 Folly Brook Blvd. Wethersfield, CT 06099																			
PAYROLL NUMBER	Week-Ending Date	PROJECT NAME & ADDRESS DOT 105-296, Route 82	DAY AND DATE							Total ST Hours	BASE HOURLY RATE	TYPE OF FRINGE BENEFITS 1 through 6 (see back)	GROSS PAY FOR ALL WORK PERFORMED THIS WEEK	TOTAL DEDUCTIONS		GROSS PAY FOR THIS PREVAILING RATE JOB	CHECK # AND NET PAY		
			S	M	T	W	TH	F	S					WITH- HOLDING	LIST OTHER				
PERSON/WORKER ADDRESS and SECTION	APPR MALE/ RATE/FEMALE % AND RACE*	WORK CLASSIFICATION Trade License Type & Number - OSHA 10 Certification Number	HOURS WORKED EACH DAY							Total O-T Hour	TOTAL FRINGE BENEFIT PLAN CASH	FRINGE PLAN	GROSS PAY FOR ALL WORK PERFORMED THIS WEEK	FICA	WITH- HOLDING	LIST OTHER	GROSS PAY FOR THIS PREVAILING RATE JOB	CHECK # AND NET PAY	
			20	21	22	23	24	25	26										
1	9/26/09																		
Robert Craft 81 Maple Street Williamantic, CT 06226	M/C	Electrical Lineman E-1 1234567 Owner OSHA 123456		8	8	8	8	8	8										
Ronald Jones 212 Elm Street Norwich, CT 06360	65% M/B	Electrical Apprentice OSHA 234567		8	8	8	8	8	8										
Franklin T. Smith 234 Washington Rd. New London, CT 06320 SECTION B	M/H	Project Manager		8															

OSHA 10 ~ ATTACH CARD TO 1ST CERTIFIED PAYROLL

***FRINGE BENEFITS EXPLANATION (P):**

Bona fide benefits paid to approved plans, funds or programs, except those required by Federal or State Law (unemployment tax, worker's compensation, income taxes, etc.).

Please specify the type of benefits provided:

- 1) Medical or hospital care Blue Cross 4) Disability _____
2) Pension or retirement _____ 5) Vacation, holiday _____
3) Life Insurance Utopia 6) Other (please specify) _____

CERTIFIED STATEMENT OF COMPLIANCE

For the week ending date of 9/26/09.

I, Robert Craft of XYZ Corporation, (hereafter known as Employer) in my capacity as Owner (title) do hereby certify and state:

Section A:

1. All persons employed on said project have been paid the full weekly wages earned by them during the week in accordance with Connecticut General Statutes, section 31-53, as amended. Further, I hereby certify and state the following:

- a) The records submitted are true and accurate;
- b) The rate of wages paid to each mechanic, laborer or workman and the amount of payment or contributions paid or payable on behalf of each such employee to any employee welfare fund, as defined in Connecticut General Statutes, section 31-53 (h), are not less than the prevailing rate of wages and the amount of payment or contributions paid or payable on behalf of each such employee to any employee welfare fund, as determined by the Labor Commissioner pursuant to subsection Connecticut General Statutes, section 31-53 (d), and said wages and benefits are not less than those which may also be required by contract;
- c) The Employer has complied with all of the provisions in Connecticut General Statutes, section 31-53 (and Section 31-54 if applicable for state highway construction);
- d) Each such employee of the Employer is covered by a worker's compensation insurance policy for the duration of his employment which proof of coverage has been provided to the contracting agency;
- e) The Employer does not receive kickbacks, which means any money, fee, commission, credit, gift, gratuity, thing of value, or compensation of any kind which is provided directly or indirectly, to any prime contractor, prime contractor employee, subcontractor, or subcontractor employee for the purpose of improperly obtaining or rewarding favorable treatment in connection with a prime contract or in connection with a prime contractor in connection with a subcontractor relating to a prime contractor; and
- f) The Employer is aware that filing a certified payroll which he knows to be false is a class D felony for which the employer may be fined up to five thousand dollars, imprisoned for up to five years or both.

2. OSHA-The employer shall affix a copy of the construction safety course, program or training completion document to the certified payroll required to be submitted to the contracting agency for this project on which such employee's name first appears.

Robert Craft owner 10/2/09
(Signature) (Title) Submitted on (Date)

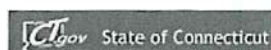
Section B: Applies to CONNDOT Projects ONLY

That pursuant to CONNDOT contract requirements for reporting purposes only, all employees listed under Section B who performed work on this project are not covered under the prevailing wage requirements defined in Connecticut General Statutes Section 31-53.

Robert Craft owner 10/2/09
(Signature) (Title) Submitted on (Date)

Note: CTDOL will assume all hours worked were performed under Section A unless clearly delineated as Section B WWS-CP1 as such. Should an employee perform work under both Section A and Section B, the hours worked and wages paid must be segregated for reporting purposes.

THIS IS A PUBLIC DOCUMENT
DO NOT INCLUDE SOCIAL SECURITY NUMBERS



Governor Dannel P. Malloy

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Misclassification \(JEC\)](#)[Stop Work Orders](#)[Reports of Activities](#)[FAQs](#)[Newsroom](#)[Contact Us](#)**OCCUPATIONAL CLASSIFICATION BULLETIN**

The Connecticut Department of Labor has the responsibility to properly determine "job classification" on prevailing wage projects covered under C.G.S. Section 31-53.

Note: This information is intended to provide a sample of some occupational classifications for guidance purposes only. It is not an all-inclusive list of each occupation's duties. This list is being provided only to highlight some areas where a contractor may be unclear regarding the proper classification.

Below are additional clarifications of specific job duties performed for certain classifications:

- **ASBESTOS WORKERS**

- Applies all insulating materials, protective coverings, coatings and finishes to all types of mechanical systems.

- **ASBESTOS INSULATOR**

- Handle, install apply, fabricate, distribute, prepare, alter, repair, dismantle, heat and frost insulation, including penetration and fire stopping work on all penetration fire stop systems.

- **BOILERMAKERS**

- Erects hydro plants, incomplete vessels, steel stacks, storage tanks for water, fuel, etc. Builds incomplete boilers, repairs heat exchanges and steam generators.

- **BRICKLAYERS, CEMENT MASONS, CEMENT FINISHERS, MARBLE MASONS, PLASTERERS, STONE MASONS, PLASTERERS. STONE MASONS, TERRAZZO WORKERS, TILE SETTERS**

- Lays building materials such as brick, structural tile and concrete cinder, glass, gypsum, terra cotta block. Cuts, tools and sets marble, sets stone, finishes concrete, applies decorative steel, aluminum and plastic tile, applies cements, sand, pigment and marble chips to floors, stairways, etc.

- **CARPENTERS, MILLWRIGHTS. PILEDRIVERMEN. LATHERS. RESILEINT FLOOR LAYERS, DOCK BUILDERS, DIKERS, DIVER TENDERS**

- Constructs, erects, installs and repairs structures and fixtures of wood, plywood and wallboard. Installs, assembles, dismantles, moves industrial machinery. Drives piling into ground to provide foundations for structures such as buildings and bridges, retaining walls for earth embankments, such as cofferdams. Fastens wooden, metal or rockboard lath to walls, ceilings and partitions of buildings, acoustical tile layer, concrete form builder. Applies firestopping materials on fire resistive joint systems only. Installation of curtain/window walls only where attached to wood or metal studs. Installation of insulated material of all types whether blown, nailed or attached in other ways to walls, ceilings and floors of buildings. Assembly and installation of modular furniture/furniture systems. Free-standing furniture is not covered. This includes free standing: student chairs, study top desks, book box desks, computer furniture, dictionary stand, atlas stand, wood shelving, two-position information access station, file cabinets, storage cabinets, tables, etc.

- **CLEANING LABORER**

- The clean up of any construction debris and the general cleaning, including sweeping, wash down, mopping, wiping of the construction facility, washing, polishing, dusting, etc., prior to the issuance of a certificate of occupancy falls under the *Labor classification*.

- **DELIVERY PERSONNEL**

- If delivery of supplies/building materials is to one common point and stockpiled there, prevailing wages are not required. If the delivery personnel are involved in the distribution of the material to multiple locations within the construction site then they would have to be paid prevailing wages for the type of work performed: laborer, equipment operator, electrician, ironworker, plumber, etc.

- An example of this would be where delivery of drywall is made to a building and the delivery personnel distribute the drywall from one "stockpile" location to further sub-locations on each floor. Distribution of material around a construction site is the job of a laborer/tradesman and not a delivery personnel.
- **ELECTRICIANS**
 - Install, erect, maintenance, alteration or repair of any wire, cable, conduit, etc., which generates, transforms, transmits or uses electrical energy for light, heat, power or other purposes, including the installation or maintenance of telecommunication, LAN wiring or computer equipment, and low voltage wiring. ***License required per Connecticut General Statutes: E-1,2 L-5,6 C-5,6 T-1,2 L-1,2 V-1,2,7,8,9.**
- **ELEVATOR CONSTRUCTORS**
 - Install, erect, maintenance and repair of all types of elevators, escalators, dumb waiters and moving walks. ***License required by Connecticut General Statutes: R-1,2,5,6.**
- **FORK LIFT OPERATOR**
 - Laborers Group 4) Mason Tenders - operates forklift solely to assist a mason to a maximum height of nine (9) feet only.
 - Power Equipment Operator Group 9 - operates forklift to assist any trade, and to assist a mason to a height over nine (9) feet.
- **GLAZIERS**
 - Glazing wood and metal sash, doors, partitions, and 2 story aluminum storefronts. Installs glass windows, skylights, store fronts and display cases or surfaces such as building fronts, interior walls, ceilings and table tops and metal store fronts. Installation of aluminum window walls and curtain walls is the "joint" work of glaziers and ironworkers which requires either a blended rate or equal composite workforce.
- **IRONWORKERS**
 - Erection, installation and placement of structural steel, precast concrete, miscellaneous iron, ornamental iron, metal curtain wall, rigging and reinforcing steel. Handling, sorting, and installation of reinforcing steel (rebar). Metal bridge rail (traffic), metal bridge handrail, and decorative security fence installation. Installation of aluminum window walls and curtain walls is the "joint" work of glaziers and ironworkers which requires either a blended rate or equal composite workforce. Insulated metal and insulated composite panels are still installed by the Ironworker.
- **INSULATOR**
 - Installing fire stopping systems/materials for "Penetration Firestop Systems": transit to cables, electrical conduits, insulated pipes, sprinkler pipe penetrations, ductwork behind radiation, electrical cable trays, fire rated pipe penetrations, natural polypropylene, HVAC ducts, plumbing bare metal, telephone and communication wires, and boiler room ceilings. Past practice using the applicable licensed trades, Plumber, Sheet Metal, Sprinkler Fitter, and Electrician, is not inconsistent with the Insulator classification and would be permitted.
- **LABORERS**
 - Acetylene burners, asphalt rakers, chain saw operators, concrete and power buggy operator, concrete saw operator, fence and guard rail erector (except metal bridge rail (traffic), metal bridge handrail, and decorative security fence installation.), hand operated concrete vibrator operator, mason tenders, pipelayers (installation of storm drainage or sewage lines on the street only), pneumatic drill operator, pneumatic gas and electric drill operator, powermen and wagon drill operator, air track operator, block paver, curb setters, blasters, concrete spreaders.
- **PAINTERS**
 - Maintenance, preparation, cleaning, blasting (water and sand, etc.), painting or application of any protective coatings of every description on all bridges and appurtenances of highways, roadways, and railroads. Painting, decorating, hardwood finishing, paper hanging, sign writing, scenic art work and drywall hanging+ for any and all types of building and residential work.
- **LEAD PAINT REMOVAL**
 - Painter's Rate
 1. Removal of lead paint from bridges.
 2. Removal of lead paint as preparation of any surface to be repainted.
 3. Where removal is on a Demolition project prior to reconstruction.
 - Laborer's Rate
 1. Removal of lead paint from any surface NOT to be repainted.
 2. Where removal is on a *TOTAL* Demolition project only.
- **PLUMBERS AND PIPEFITTERS**
 - Installation, repair, replacement, alteration or maintenance of all plumbing, heating, cooling and piping. ***License required per Connecticut General Statutes: P-1,2,6,7,8,9 J-1,2,3,4 SP-1,2 S-1,2,3,4,5,6,7,8 B-1,2,3,4 D-1,2,3,4.**
- **POWER EQUIPMENT OPERATORS**
 - Operates several types of power construction equipment such as compressors, pumps, hoists, derricks, cranes, shovels, tractors, scrapers or motor graders, etc. Repairs and maintains equipment. ***License required, crane operators only, per Connecticut General Statutes.**

- **ROOFERS**

- Covers roofs with composition shingles or sheets, wood shingles, slate or asphalt and gravel to waterproof roofs, including preparation of surface. (tear-off and/or removal of any type of roofing and/or clean-up of any and all areas where a roof is to be relaid)

- **SHEETMETAL WORKERS**

- Fabricate, assemble, install and repairs sheetmetal products and equipment in such areas as ventilation, air-conditioning, warm air heating, restaurant equipment, architectural sheet metal work, sheetmetal roofing, and aluminum gutters. Fabrication, handling, assembling, erecting, altering, repairing, etc. of coated metal material panels and composite metal material panels when used on building exteriors and interiors as soffits, fascia, louvers, partitions, wall panel siding, canopies, cornice, column covers, awnings, beam covers, cladding, sun shades, lighting troughs, spires, ornamental roofing, metal ceilings, mansards, copings, ornamental and ventilation hoods, vertical and horizontal siding panels, trim, etc. The sheet metal classification also applies to the vast variety of coated metal material panels and composite metal material panels that have evolved over the years as an alternative to conventional ferrous and non-ferrous metals like steel, iron, tin, copper, brass, bronze, aluminum, etc. Insulated metal and insulated composite panels are still installed by the Iron Worker. Fabrication, handling, assembling, erecting, altering, repairing, etc. of architectural metal roof, standing seam roof, composite metal roof, metal and composite bathroom/toilet partitions, aluminum gutters, metal and composite lockers and shelving, kitchen equipment, and walk-in coolers.

- **SPRINKLER FITTERS**

- Installation, alteration, maintenance and repair of fire protection sprinkler systems. ***License required per Connecticut General Statutes: F-1,2,3,4.**

- **TILE MARBLE AND TERRAZZO FINISHERS**

- Assists and tends the tile setter, marble mason and terrazzo worker in the performance of their duties.

- **TRUCK DRIVERS**

- **Definitions:**

- 1) "Site of the work" (29 Code of Federal Regulations (CFR) 5.2(l)(b) is the physical place or places where the building or work called for in the contract will remain and any other site where a significant portion of the building or work is constructed, provided that such site is established specifically for the performance of the contract or project;
 - (a) Except as provided in paragraph (l) (3) of this section, job headquarters, tool yards, batch plants, borrow pits, etc. are part of the "site of the work"; provided they are dedicated exclusively, or nearly so, to the performance of the contract or project, and provided they are adjacent to "the site of work" as defined in paragraph (e)(1) of this section;
 - (b) Not included in the "site of the work" are permanent home offices, branch plant establishments, fabrication plants, tool yards etc. of a contractor or subcontractor whose location and continuance in operation are determined wholly without regard to a particular State or political subdivision contract or uncertain and indefinite periods of time involved of a few seconds or minutes duration and where the failure to count such time is due to consideration justified by industrial realities (29 CFR 785.47)
- 2) "Engaged to wait" is waiting time that belongs to and is controlled by the employer which is an integral part of the job and is therefore compensable as hours worked. (29 CFR 785.15)
- 3) "Waiting to be engaged" is waiting time that an employee can use effectively for their own purpose and is not compensable as hours worked. (29 CFR 785.16)
- 4) "De Minimus" is a rule that recognizes that unsubstantial or insignificant periods of time which cannot as a practical administrative matter be precisely recorded for payroll purposes, may be disregarded. This rule applies only where there are uncertain and indefinite periods of time involved of a short duration and where the failure to count such time is due to consideration justified by worksite realities. For example, with respect to truck drivers on prevailing wage sites, this is typically less than 15 minutes at a time.

- **Coverage of Truck Drivers on State or Political subdivision Prevailing Wage Projects**

- Truck drivers are covered for payroll purposes under the following conditions:
 - Truck Drivers for time spent working on the site of the work.
 - Truck Drivers for time spent loading and/or unloading materials and supplies on the site of the work, if such time is not de minimus
 - Truck drivers transporting materials or supplies between a facility that is deemed part of the site of the work and the actual construction site.
 - Truck drivers transporting portions of the building or work between a site established specifically for the performance of the contract or project where a significant portion of such building or work is constructed and the physical places where the building or work outlined in the contract will remain.

For example: Truck drivers delivering asphalt are covered under prevailing wage while "engaged to wait" on the site and when directly involved in the paving operation, provided the total time is not "de minimus"

- Truck Drivers are **not** covered in the following instances:

- Material delivery truck drivers while off "the site of the work"
- Truck Drivers traveling between a prevailing wage job and a commercial supply facility while they are off the "site of the work"
- Truck drivers whose time spent on the "site of the work" is de minimus, such as under 15 minutes at a time, merely to drop off materials or supplies, including asphalt.

These guidelines are similar to U.S. Labor Department policies. The application of these guidelines may be subject to review based on factual considerations on a case by case basis.

For example:

- Material men and deliverymen are not covered under prevailing wage as long as they are not directly involved in the construction process. If, they unload the material, they would then be covered by prevailing wage for the classification they are performing work in: laborer, equipment operator, etc.
- Hauling material off site is not covered provided they are not dumping it at a location outlined above.
- Driving a truck on site and moving equipment or materials on site would be considered covered work, as this is part of the construction process.

Any questions regarding the proper classification should be directed to:

*Public Contract Compliance Unit
Wage and Workplace Standards Division
Connecticut Department of Labor
200 Folly Brook Blvd, Wethersfield, CT 06109
(860) 263-6543*

200 Folly Brook Boulevard, Wethersfield, CT 06109 / Phone: 860-263-6000
Home | CT.gov Home | Send Feedback<%end if%><%if bool (request.Cookies(Application("HOME_NAME"))("AA"))=true and request.Cookies(Application("HOME_NAME"))("CA")<>"CF83CBC7" then call Session_WriteString(" | Admin") end if%>
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**Connecticut Department of Labor
Wage and Workplace Standards Division
FOOTNOTES**

- ⇒ Please Note: If the “Benefits” listed on the schedule for the following occupations includes a letter(s) (+ a or + a+b for instance), refer to the information below.

Benefits to be paid at the appropriate prevailing wage rate for the listed occupation.

If the “Benefits” section for the occupation lists only a dollar amount, disregard the information below.

Bricklayers, Cement Masons, Cement Finishers, Concrete Finishers, Stone Masons
(Building Construction) and
(Residential- Hartford, Middlesex, New Haven, New London and Tolland Counties)

- a. Paid Holiday: Employees shall receive 4 hours for Christmas Eve holiday provided the employee works the regularly scheduled day before and after the holiday. Employers may schedule work on Christmas Eve and employees shall receive pay for actual hours worked in addition to holiday pay.

Elevator Constructors: Mechanics

- a. Paid Holidays: New Year’s Day, Memorial Day, Independence Day, Labor Day, Veterans’ Day, Thanksgiving Day, Christmas Day, plus the Friday after Thanksgiving.
- b. Vacation: Employer contributes 8% of basic hourly rate for 5 years or more of service or 6% of basic hourly rate for 6 months to 5 years of service as vacation pay credit.

Glaziers

- a. Paid Holidays: Labor Day and Christmas Day.

Power Equipment Operators
(Heavy and Highway Construction & Building Construction)

- a. Paid Holidays: New Year’s Day, Good Friday, Memorial day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day, provided the employee works 3 days during the week in which the holiday falls, if scheduled, and if scheduled, the working day before and the working day after the holiday. Holidays falling on Saturday may be observed on Saturday, or if the employer so elects, on the preceding Friday.

Ironworkers

- a. Paid Holiday: Labor Day provided employee has been on the payroll for the 5 consecutive work days prior to Labor Day.

Laborers (Tunnel Construction)

- a. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day. No employee shall be eligible for holiday pay when he fails, without cause, to work the regular work day preceding the holiday or the regular work day following the holiday.

Roofers

- a. Paid Holidays: July 4th, Labor Day, and Christmas Day provided the employee is employed 15 days prior to the holiday.

Sprinkler Fitters

- a. Paid Holidays: Memorial Day, July 4th, Labor Day, Thanksgiving Day and Christmas Day, provided the employee has been in the employment of a contractor 20 working days prior to any such paid holiday.

Truck Drivers

(Heavy and Highway Construction & Building Construction)

- a. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Christmas day, and Good Friday, provided the employee has at least 31 calendar days of service and works the last scheduled day before and the first scheduled day after the holiday, unless excused.

SECTION 000462 - REFERENCES

List at least five (5) references for similar projects in size, scope, and complexity, within Connecticut and / or New York.

THIS PAGE MUST BE COMPLETED AND SUBMITTED WITH YOUR BID.

- 1) Client _____
Project Address _____
Approximate \$ Value _____ Date: Started _____ Completed _____
Contact: Name _____ Telephone # _____
- 2) Client _____
Project Address _____
Approximate \$ Value _____ Date: Started _____ Completed _____
Contact: Name _____ Telephone # _____
- 3) Client _____
Project Address _____
Approximate \$ Value _____ Date: Started _____ Completed _____
Contact: Name _____ Telephone # _____
- 4) Client _____
Project Address _____
Approximate \$ Value _____ Date: Started _____ Completed _____
Contact: Name _____ Telephone # _____
- 5) Client _____
Project Address _____
Approximate \$ Value _____ Date: Started _____ Completed _____
Contact: Name _____ Telephone # _____

END OF SECTION

SECTION 000472 – FORM OF BID BOND

TOWN OF GREENWICH, CONNECTICUT
BID BOND

Date Bond Executed

Principal

Surety

Penal Sum of Bond (express in words and figures)

Date of Bid

KNOW ALL MEN BY THESE PRESENTS, that we, the principal and surety above named, are held and firmly bound unto the Town of Greenwich, Connecticut, in the penal sum of the amount stated above, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents, THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the principal has submitted the accompanying bid, dated as shown above for _____.

(name of bid)

NOW THEREFORE, if the principal shall not withdraw said bid within the period specified therein after the opening of the same, or if no period be specified, within sixty (60) days after said opening, and shall within the period specified therefor, or if no period specified, within ten (10) days after the prescribed forms are presented to him for signature, execute such further contractual documents, if any, as may be required by the term of the Bid as accepted, and give bonds with good and sufficient surety or sureties as may be required, for the faithful performance and proper fulfillment of the resulting contract, and for the protection of all person supplying labor and material in the prosecution of the work provided for in such contract or in the event of the withdrawal of said bid within the period

**JULIAN CURTISS SCHOOL
ADA RENOVATIONS PHASE I & II
GREENWICH, CT**

specified, or the failure to enter into such contract and give such bonds within the time specified, if the principal shall pay the Town of Greenwich, Connecticut, the difference between the amount specified in said bid and the amount for which said Town may procure the required work, supplies, and services, if the latter amount be in excess of the former, then the above obligation shall be void and of no effect, otherwise to remain in full force and virtue.

IN WITNESS WHEREOF the above bounden parties have executed this instrument under their several seals on the date indicated above. The name and corporate seal (if applicable) of each corporate party being hereto affixed:

Name of Partnership

_____(SEAL)

Business Address

Partner- (Hereunto Duly Authorized)

IN THE PRESENCE OF:

WITNESS

INDIVIDUAL PRINCIPAL

1. _____ AS TO _____ (SEAL)

2. _____ AS TO _____ (SEAL)

3. _____ AS TO _____ (SEAL)

4. _____ AS TO _____ (SEAL)

CORPORATE/ LLC PRINCIPAL

WITNESS

BUSINESS ADDRESS

AFFIX
CORPORATE
SEAL

**JULIAN CURTISS SCHOOL
ADA RENOVATIONS PHASE I & II
GREENWICH, CT**

BY- (HEREUNTO DULY AUTHORIZED)

TITLE

CORPORATE/ LLC PRINCIPAL

WITNESS

BUSINESS ADDRESS

AFFIX
CORPORATE
SEAL

BY- (HEREUNTO DULY AUTHORIZED)

TITLE

END OF SECTION

SECTION 000473 - CERTIFICATE AS TO CORPORATE PRINCIPAL

CERTIFICATE AS TO CORPORATE PRINCIPAL

I, _____, certify that I am the
_____ of the corporation named as principal in the within bond;
that _____, who signed said bond on behalf of the principal, was
then _____ of the corporation; that I know his signature, and his signature
thereto is genuine; and that said bond was duly signed, sealed and attested for and in behalf of said
corporation by authority of its governing body.

(Corporate Seal)

END OF SECTION

SECTION 000474 – PERFORMANCE, MAINTENANCE AND PAYMENT BOND

BOND NO. _____ **CONTRACT NO.** _____

KNOW ALL MEN BY THESE PRESENTS. That we _____

_____, as Principal, and _____

a corporation organized under the laws of the State of _____ and authorized to do business in the State of Connecticut as Surety, for holden and firmly bound jointly and severally unto the Town of Greenwich, Connecticut, herein referred to as the Town, the territorial corporation located in the County of Fairfield, in the penal sum of

_____ Dollars (\$ _____),

to be paid to it or its certain attorney, successors or assigns, to which payment well and truly to be made, we the said Obligors do bind ourselves, and each of us, our heirs, executors, administrators, and successors firmly by these presents.

IN WITNESS WHEREOF we have hereunto set for cause to be set our respective hands, names and seals this

_____ day of _____, 20____

The condition of this obligation is such, that whereas the above named Principal has entered into a certain written contract with the Town of Greenwich, Connecticut, dated the

_____ day of _____, 20____

NOW, THEREFORE, if the said Principal shall well and faithfully perform said contract according to its provisions, and fully indemnify and save harmless the Town from all costs and damages which the Town may suffer by reason of failure so to do, and shall pay for all equipment, appurtenances, materials and labor furnished, used or employed in the execution of said contract, and shall indemnify and save harmless the Town from all suits or claims of any nature or description against the Town by reason of any injuries or damages sustained by any person or persons on account of any act or omission of said Principal, his servants or agents, or his subcontractors in the construction of the work or in guarding the work, or on account of the use of faulty or improper materials, or by reason of claims under the Workmen's Compensation Laws or other laws by any employee of the Principal or his subcontractors, or by reason of the use of patented material, machinery, device, equipment, process, method of construction or design in any way involved in the work, and shall indemnify the Town against such defective workmanship, material and equipment as may be discovered within one (1) year after completion and final acceptance of the work, and shall make good in such defective workmanship and material as may be discovered within said period of one (1) year, then the obligation shall be void, otherwise to remain in full force and effect.

The Surety hereby stipulates and agrees that any modifications, omissions or additions in or to the terms of the aforesaid contract, or in or to the plans or specifications therefor, or any extension of time, shall in no wise affect the obligation of the Surety under this bond, the surety hereby waiving any and all right to any notice of any such modifications, omissions, changes, additions or extensions.

Contractor Name: _____ By: _____

Surety Name: _____ By: _____

END OF SECTION

SECTION 000481 - INSURANCE PROCEDURE

PLEASE NOTE:

THIS PAGE MUST BE RETURNED WITH YOUR BID/PROPOSAL. FAILURE TO DO SO MAY RESULT IN YOUR BID/PROPOSAL BEING REJECTED.

Please take the insurance requirements of the Contract to your agent/broker immediately upon receipt of the bid documents to determine your existing coverage and any costs for new or additional coverage required for the work noted in this Request for Bid/Proposal. Any bids/proposals with deficient insurance requirements will be rejected. The firm who is awarded the Bid/Proposal must return the contract, agent/broker and insurance form within two (2) weeks from the date on the award letter.

PLEASE CHECK THE APPROPRIATE BOX**YES****NO**

1. General Liability \$3,000,000.00

Includes minimum coverages for combined bodily injury and property damage liability of \$2,000,000 general aggregate and \$1,000,000 per occurrence.

2. Automobile Liability \$1,000,000.00

3. Excess Liability \$5,000,000.00

4. Worker's Compensation and Employer's Liability

5. Ability to Return Contract and Insurance Documents
Within Two (2) Weeks

6. Able to Provide the Town with Thirty (30) Days Prior
Written Notice of Cancellation

STATEMENT OF VENDOR:

I have read the insurance requirements for this work and have taken the documentation to my insurance agent/broker. The bid/proposal cost reflects any additional costs relating to insurance requirements for this work.

Signature

Date

Contract

END OF SECTION

SECTION 000482 – INSURANCE REQUIREMENTS

Insurance Requirements: Before starting and until final completion and acceptance of the work called for in the Contract and expiration of the guarantee period provided for in the Contract, the Contractor and its subcontractors, if any, shall procure and maintain insurance of the types and amounts checked in paragraphs A through F below for all Contract operations.

- ☒ A. General Liability, with minimum coverages for combined bodily injury and property damage liability of \$2,000,000 general aggregate, \$1,000,000 per occurrence including:
- ☒ 1. Commercial General Liability.
 - ☒ 2. Town as additional insured.
 - ☐ 3. Owners and Contractors Protective Liability (separate policy in the name of the Town).
- ☒ B. Comprehensive Automobile Liability, with minimum coverages of \$1,000,000 combined single limit for bodily injury and property damage, including, where applicable, coverage for any vehicle, all owned vehicles, scheduled vehicles, hired vehicles, non-owned vehicles and garage liability.
- ☒ C. Excess Liability, with minimum coverage of \$5,000,000 in umbrella form, or such other form as approved by Town Department Head and Risk Management Director.
- ☒ D. Workers' Compensation and Employer's Liability, with minimum coverages as provided by Connecticut State Statutes.
- ☐ E. Professional Liability (for design and other professionals for Errors and Omissions), with minimum coverage of \$1,000,000. If the policy is on a claims-made basis, coverage shall be continually renewed or extended for three (3) years after work is completed under the Contract.
- ☐ F. Other (Builder's Risk, etc.):_____.
- ☒ G. **CERTIFICATE HOLDER: TOWN OF GREENWICH**
ATTN: BOARD OF EDUCATION. (Also fill in on ACORD Certificate of Insurance)
101 Field Point Road, Greenwich, CT 06830.

The **Acord certificate of insurance form** must be executed by your insurance agent/broker and returned to this office. The most current Acord form should be used for insurance documentation purposes. Company name and address must conform on all documents including insurance documentation. It is required that the agent/broker note the individual insurance companies providing coverage, rather than the insurance group, on the Acord form. The Contract number (provided to the awarded Contractor), project name and a brief description must be inserted in the "Description of Operations" field. It must be confirmed on the Acord Form that the Town of Greenwich is endorsed as an additional insured by having the appropriate box checked off and stating such in the "Description of Operations" field. **A letter from the awarded vendor's agent/broker certifying that the Town of Greenwich has been endorsed onto the general liability policy as an additional insured is also mandatory.** This letter must follow exactly the format provided by the Purchasing Department and must be signed by the same individual authorized representative who signed the Acord form, both of which must be signed with original ink "wet" signatures. If the

insurance coverage required is provided on more than one Acord certificate of insurance, then additional agent/broker letters are also required. Contract development will begin upon receipt of complete, correct insurance documentation.

The Contractor shall be responsible for maintaining the above insurance coverages in force to secure all of the Contractor's obligations under the Contract with an insurance company or companies with an AM Best Rating of A:VII or better, licensed to write such insurance in Connecticut and acceptable to the Risk Manager, Town of Greenwich. For excess liability only, non-admitted insurers are acceptable, provided they are permitted to do business through Connecticut excess line brokers per listing on the current list of Licensed Insurance Companies, Approved Reinsurers, Surplus Lines Insurers and Risk Retention Groups issued by the State of Connecticut Insurance Department.

END OF SECTION

SECTION 000483A – SAMPLE ENDORSEMENT LETTER

**AGENT/BROKER
(LETTERHEAD)**

(Date)

Eugene H. Watts, Senior Buyer
Purchasing Department
Town of Greenwich/Board of Education
290 Greenwich Avenue – Havemeyer Building
Greenwich, CT 06830

Re: Company
 Town of Greenwich/Board of Education / Contract # XXXX
 Project Name

Dear Mr. Watts:

The undersigned hereby certifies as follows:

- (1) I am a duly licensed insurance agent under the laws of the State of **[insert State]** and an authorized representative of all companies affording coverage under the Acord form submitted herewith;
- (2) The Town of Greenwich has been endorsed as an additional insured under the general liability policy no. [insert policy number], issued by **[insert company affording coverage]** to **[name of insured]**;
- (3) The general liability policy referenced in paragraph (2) above meets or exceeds the coverage in Commercial General Liability ISO form CG 00 01 10 01, including contractual liability;
- (4) The policies listed in the Acord form submitted to the Town of Greenwich in connection with the above-referenced contract have been issued to the insured in the amounts stated and for the periods indicated in the Acord form; and
- (5) The Town of Greenwich shall be given thirty (30) days prior written notice of cancellation, lapse or restrictive amendment (except ten days notice of nonpayment) of the policies listed in the Acord form.

Sincerely,

Authorized Representative for all companies listed in the Acord form

END OF SECTION

000483B – A.M. BEST KEY RATING GUIDE FORM

The following insurance companies are licensed in the State of Connecticut per the 2024 edition of the
A.M. Best Key Rating Guide for Property and Casualty,

1. Company Name: _____
a) Page Number: _____
b) Rating is: _____
2. Company Name: _____
a) Page Number: _____
b) Rating is: _____
3. Company Name: _____
a) Page Number: _____
b) Rating is: _____
4. Company Name: _____
a) Page Number: _____
b) Rating is: _____
5. Company Name: _____
a) Page Number: _____
b) Rating is: _____
6. Company Name: _____
a) Page Number: _____
b) Rating is: _____

END OF SECTION

SECTION 000483C - AFFIRMATIVE ACTION COMPLIANCE AFFIDAVIT

**COMMISSION ON HUMAN RIGHTS AND OPPORTUNITIES
CONTRACT COMPLIANCE REGULATIONS NOTIFICATION TO
BIDDERS**

AFFIRMATIVE ACTION COMPLIANCE AFFIDAVIT

The contract to be awarded is subject to contract compliance requirements mandated by Sections 4a-60 and 4a-60a of the Connecticut General Statutes; and, when the awarding agency is the State, Sections 46a-71(d) and 46a-81i(d) of the Connecticut General Statutes. There are Contract Compliance Regulations codified at Section 46a-68j-21 through 43 of the Regulations of Connecticut State Agencies, which establish a procedure for awarding all contracts covered by Sections 4a-60 and 46a-71(d) of the Connecticut General Statutes. According to Section 46a-68j-30(9) of the Contract Compliance Regulations, every agency awarding a contract subject to the contract compliance requirements has an obligation to "aggressively solicit the participation of legitimate minority business enterprises as bidders, contractors, subcontractors and suppliers of materials." "Minority business enterprise" is defined in Section 4a-60 of the Connecticut General Statutes as a business wherein fifty-one percent or more of the capital stock, or assets belong to a person or persons: "(1) Who are active in daily affairs of the enterprise; (2) who have the power to direct the management and policies of the enterprise; and (3) who are members of a minority, as such term is defined in subsection (a) of Section 32-9n." "Minority" groups are defined in Section 32-9n of the Connecticut General Statutes as "(1) Black Americans . . . (2) Hispanic Americans . . . (3) persons who have origins in the Iberian Peninsula . . . (4) Women . . . (5) Asian Pacific Americans and Pacific Islanders; (6) American Indians . . ." An individual with a disability is also a minority business enterprise as provided by Section 4a-60g of the Connecticut General Statutes. The above definitions apply to the contract compliance requirements by virtue of Section 46a-68j-21(11) of the Contract Compliance Regulations.

The awarding agency will consider the following factors when reviewing the bidder's qualifications under the contract compliance requirements:

- (a) the bidder's success in implementing an affirmative action plan;
- (b) the bidder's success in developing an apprenticeship program complying with Sections 46a-68-1 to 46a-68-17 of the Administrative Regulations of Connecticut State Agencies, inclusive;
- (c) the bidder's promise to develop and implement a successful affirmative action plan;
- (d) the bidder's submission of employment statistics contained in the "Employment Information Form", indicating that the composition of its workforce is at or near parity when compared to the racial and sexual composition of the workforce in the relevant labor market area; and
- (e) the bidder's promise to set aside a portion of the contract for legitimate minority business enterprises. See Section 46a-68j-30(10)(E) of the Contract Compliance Regulations.

***INSTRUCTIONS:** Bidders must sign acknowledgement below and return acknowledgement to Awarding Agency along with bid proposal.

The undersigned acknowledges receiving and reading a copy of the "Notification to Bidders" form.

Signature

Date

On behalf of:

END OF SECTION

THE FOLLOWING PAGES ARE A SAMPLE COPY OF THE TOWN OF
GREENWICH CONTRACT FOR YOUR REVIEW. YOU MUST BE ABLE TO
SIGN THIS CONTRACT AND MEET THE NECESSARY INSURANCE AS
REQUIRED BY THE TOWN OF GREENWICH IN ORDER FOR YOUR
PROPOSAL TO BE CONSIDERED.

**State of Connecticut
Town of Greenwich
Contract**

Town Department: Greenwich Public Schools
Division:

Contract No. _____

Name and
Address
Of
Contractor

Account Name:

Account Code:
Total Amount
of Contract:

This Agreement made this _____ day of _____ 2024 between Town of Greenwich hereafter called the Town and _____ hereafter called the Contractor.

Witnessed as follows:

1. The contractor agrees to furnish materials and perform services as shown in specifications and contract documents hereto attached and made a part hereof, and consisting of numbered pages from 1 to _____.
2. The Town agrees to pay the price designated for such materials and services upon certification by the proper agent of the Town.
3. This contract shall not be valid until approved by the Town Counsel and countersigned by the Town Comptroller.

TOWN OF GREENWICH

By _____
Its Chief Financial & Administrative Officer

CONTRACTOR

By _____
Its

Approved as to legal sufficiency

Date _____

Assistant Town Counsel

I hereby certify that the estimated amount of this contract does not exceed the unencumbered balances of amounts duly appropriated and against which this contract is chargeable as indicated hereon.

Date _____

Comptroller

AGREEMENT CONTRACT NO. _ _ _

THIS AGREEMENT, executed this _____ day of _____ in the year Two Thousand Twenty Four (herein referred to as the "AGREEMENT"), by and between the Town of Greenwich, Connecticut, acting through Greenwich Public Schools hereunto duly authorized, "OWNER" and _____, whose principal office is located at _____, _____ acting herein by its, _____, duly authorized, "CONTRACTOR".

WITNESSETH, that the parties to these presents, each in consideration of the undertaking, promises and agreements on the part of the other herein contained, have undertaken, promised and agreed to do hereby undertake, promise and agree, the Owner for itself, its successors and assigns, and the Contractor for himself and his heirs, executors, administrators, successors and assigns, as follows:

1. DEFINITIONS:

Wherever the words hereinafter defined or pronouns used in their stead occur in the Contract Documents, they shall have the following meaning:

The word "Owner" shall mean the Town of Greenwich and shall include its authorized representative.

The word "Contractor" shall mean the person or organization identified as such in this Agreement and shall include his authorized representative.

The words "Contracting Officer or Agency" shall mean that official of the Town which awards the contract, executes the Agreement and is the Owner's authorized representative.

The Information for Bidders, the Contractor's Bid as accepted by the Owner, the Contract Conditions and Specifications and the General, Technical and Materials Specifications, the Drawings, and all addenda and amendments to any of the foregoing, collectively constitute the Contract Documents, and are sometimes herein referred to as the "Contract".

2. DESCRIPTION OF WORK:

This project consists of _____ per Bid No. _____ bid and exhibits B and C. All work must be completed by _____. This date may be extended by contract supplement form if a potential change order is required due to unforeseen circumstances, related errors and omissions in bid specifications. Such extensions are limited to a total of one year.

3. PAYMENT:

The Contractor shall be paid on a monthly basis after presentation of vouchers, and subject to acceptance and approval by the Town of Greenwich and by Dan Watson, Director of Facilities.

Such payments will be made by the Town of Greenwich monthly for all services actually rendered, and the acceptance by the Contractor of any such monthly payment shall be a release to the Town of all claims and all liability to the Contractor in connection with the contract, arising during the period for which payment is made. No payment, however, shall operate to release the Contractor or its sureties or insurers from any obligation under the Contract to be entered into or the Performance Bond or any insurance policies issued in connection with said contract.

4. PERFORMANCE MAINTENANCE AND PAYMENT BOND:

The Contractor shall, simultaneously with the signing of the Contract, furnish the Town the executed Performance, Maintenance and Payment Bond of a surety company authorized to do business in the State of Connecticut, and acceptable to the Town, in the sum of the full amount of the Contract obligation in the form provided by the Town. See Exhibit B.

THE ABOVE IS ONLY REQUIRED FOR CONTRACTS EXCEEDING \$100,000.00.

5. GUARANTEE:

The Contractor guarantees that the Work and services to be performed, furnished, used or installed in the construction of the same, shall be free from defects and flaws, and shall be performed and furnished in strict accordance with the Drawings, if any, Specifications, and other Contract Documents, that the strength of all parts of all manufactured equipment shall be adequate and as specified and that the performance test requirements of the Contract shall be fulfilled. This guarantee shall be for a period of one year from and after the date of completion and acceptance of the Work as stated in the final estimate. The Contractor shall repair, correct or replace as required, promptly and without charge, all work, equipment and material, or parts thereof, which fail to meet the above guarantee or which in any way fail to comply with or fail to be in strict accordance with the terms and provisions and requirements of the Contract during such one-year period, and also shall repair, correct, or replace all damage to the Work resulting from such failure.

6. DEFECTIVE WORK:

The inspection of the Work shall not relieve the Contractor of any of his obligations to perform and complete the Work as required by the Contract. Defective work shall be corrected and unsuitable materials, equipment apparatus and other items shall be replaced by the Contractor, notwithstanding that such work, materials, equipment, apparatus and other items may have been previously overlooked or accepted or estimated for payment. If the work or any part thereof shall be found defective at any time before the final

acceptance of the work, the Contractor shall forthwith make good such defect in a manner satisfactory to the Town; if any material, equipment, apparatus or other items brought upon the site for use or incorporation in the work, or selected for the same, is condemned by the Town as unsuitable or not in conformity with the Specifications or any of the other Contract Documents, the Contractor shall forthwith remove such materials, equipment, apparatus and other items from the site of the Work and shall at his own cost and expense make good and replace the same and any material furnished by the Town which shall be damaged or rendered defective by the handling or improper installation by the Contractor, his agents, servants, employees or subcontractors.

7. COMPLIANCE WITH LAWS:

The Contractor shall keep himself fully informed of all existing and future federal, state and local laws, ordinances, rules and regulations affecting those engaged or employed on the work, the materials and equipment used in the work or the conduct of the work, and of all orders, decrees and other requirements of bodies or tribunals having any jurisdiction or authority over the same. If any discrepancy or inconsistency is discovered in the Drawings, if any, Specifications or other Contract Documents in relation to any such law, ordinance, rule, regulation, order, decree or other requirement, the Contractor shall forthwith report the same to the Town in writing. The Contractor shall at all times observe and comply with, and cause all his agents, servants, employees and subcontractors to observe and comply with all such existing and future laws, ordinances, rules, regulations, orders, decrees and other requirements, and he shall protect, indemnify and save harmless the Town, its officers, agents, servants and employees from and against any and all claims, demands, suits proceedings, liabilities, judgments, penalties, losses, damages costs and expenses, including attorneys' fees, arising from or based upon any violation or claimed violation of any such law, ordinance, rule, regulation, order, decree or other requirement, whether committed by the Contractor or any of his agents, servants, employees or subcontractors.

8. INDEMNITY:

The Contractor shall indemnify and save harmless the Town and its officers, agents, servants and employees, from and against any and all claims, demands, suits, proceedings, liabilities, judgments, awards, losses, damages, costs and expenses, including attorneys' fees, on account of bodily injury, sickness, disease or death sustained by any person or persons or injury or damage to or destruction of any property, directly or indirectly arising out of, relating to or in connection with the Work, whether or not due or claimed to be due in whole or in part to the active, passive or concurrent negligence or fault of the Contractor, his officers, agents, servants or employees, any of his subcontractors, the Town any of his respective officers, agents, servants or employees and/or any other person or persons, and whether or not such claims, demands, suits or proceedings are just, unjust, groundless, false or fraudulent; and the Contractor shall and does hereby assume and agrees to pay for the defense of all such claims, demands, suits and proceedings; and provided that the Contractor shall not be required to indemnify the Town, its officers, agents, servants or employees against any such damages occasioned solely by acts or omissions of the Town other than supervisory acts or omissions of the Town in connection with the Work.

INDEMNITY AGAINST SUBCONTRACTORS' CLAIMS:

If any other contractor or any subcontractor of any such other contractor shall suffer or claim to have suffered loss, damage or delay by reason of the acts or omissions of the Contractor or of any of his subcontractors, the Contractor agrees to assume the defense against any such claim and to reimburse such other contractor or subcontractor for such loss or damage. The Contractor agrees to and does hereby indemnify and save harmless the Town from and against any and all claims by such other contractors or subcontractors, alleging such loss, damage or delay and from and against any and all claims, demands, suits, proceedings, liabilities, judgments, awards, losses, damages, costs and expenses including attorneys' fees, arising out of, relating to or resulting from such claims.

9. PATENTS:

The Contractor shall indemnify and save harmless the Town and all persons acting for or on behalf of the Town from all claims and liability of any nature or kind, and all damages, costs and expenses, including attorneys' fees, arising from or occasioned by an infringement or alleged infringement of any patents or patent rights on any invention, process, materials, equipment, article, or apparatus, or any part hereof, furnished and installed by the Contractor, or arising from or occasioned by the use or manufacture thereof, including their use by the Town.

10. CHANGES:

The Town, through its designated Agent, may make changes in the Work and in the Drawings, if any, and Specifications therefore by making alterations therein, additions, thereto or omissions there from. All work resulting from such changes shall be performed and furnished under and pursuant to the terms and conditions of the Contract. If such changes result in an increase or decrease in the Work to be done hereunder, or increase or decrease the quantities thereof, adjustment in compensation shall be made therefore. For eliminated or decreased work the Contractor shall allow the Town a reasonable credit as determined by the Parties. Except in an emergency endangering life or property, no change shall be made unless in pursuance of a written order from the Town authorizing the change, and no claim for additional compensation shall be valid unless the change is so ordered.

The Contractor agrees that he shall neither have nor assert any claim for or be entitled to any additional compensation for damages or for loss of anticipated profits on work that is eliminated.

11. CLAIMS FOR DAMAGES:

If the Contractor makes claim for any damages alleged to have been sustained by breach of contract or otherwise, he shall, within ten (10) days after occurrence of the alleged breach or within ten (10) days after such damages are alleged to have been sustained whichever date is the earlier, file with the Contracting Officer a written, itemized statement of the details of the alleged breach and the details and amount of the alleged damages. The Contractor agrees that unless such

statement is made and filed as so required, his claim for damages shall be deemed waived, invalid and unenforceable, and that he shall not be entitled to any compensation for any such alleged damages. Within ten (10) days after the timely filing of such statement, the Contracting Officer shall file with the appropriate department of the Town, one copy of the statement, and shall file with the Town and the Contractor his determination thereon. The Contractor shall not be entitled to claim any additional compensation for damages by reason of any direction, instruction, determination or decision of the Town or its agents, nor shall any such claims be considered, unless the Contractor shall have complied in all respects with the provisions of this paragraph.

12. ABANDONMENT OF THE WORK OR OTHER DEFAULT:

If the Work shall be abandoned, or any part thereof shall be sublet without previous written consent of the Town, or the Contract or any moneys payable hereunder shall be assigned otherwise than as herein specified, or if at any time the Contracting Officer shall be of the opinion, and shall so certify in writing, that the conditions herein specified as to rate of progress are not being complied with, or that the Work or any part thereof is being unnecessarily or unreasonably delayed, or that the Contractor has violated or is in default under any of the provisions of the Contract, or if the Contractor becomes bankrupt or insolvent or goes or is put into liquidation or dissolution, either voluntarily or involuntarily, or petitions for an arrangement or reorganization under the Bankruptcy Act, or makes a general assignment for the benefit of creditors or otherwise acknowledges insolvency, the happening of any of which shall be and constitute a default under the Contract, the Town may notify the Contractor in writing, with a copy of such notice mailed to the surety, to discontinue all Work or any part thereof; thereupon the Contractor shall discontinue such Work or such part thereof as the Town may designate; and the Town may, upon giving such notice, by Contract or otherwise as it may determine, complete the Work or such part thereof and charge the entire cost and expense of so completing the work. The Town shall be entitled to reimbursement from the Contractor and the Contractor agrees to pay to the Town any losses, damages, costs and expenses, including attorneys' fees, sustained or incurred by the Town by reason of any of the foregoing causes. For the purpose of such completion the Town may for itself or for any Contractors employed by the Town take possession of and use or cause to be used any and all materials, equipment, plant, machinery, appliances, tools, supplies and such other items of every description that may be found or located at the site of the Work.

All costs, expenses, losses, damages, attorneys' fees, and any and all other charges incurred by the Town under this subsection shall be charged against the Contractor and deducted and/or paid by the Town out of any moneys due and payable or to become due or payable under the Contract to the Contractor; in computing the amounts chargeable to the Contractor, the Town shall not be held to a basis of the lowest prices for which the completion of the Work or any part thereof might have been accomplished, but all sums actually paid or obligated therefore to effect its prompt completion shall be charged to and against the account of the Contractor. In case the costs, expenses, losses, damages, attorneys' fees and other charges together with all payments theretofore made to or for the account of the Contractor are less than the sum which would have been payable under the Contract if the Work had been properly performed and completed by the Contractor, the

Contractor shall be entitled to receive the difference, and, and in case such costs, expenses, losses, damages, attorneys' fees and other charges, together with all payments theretofore made to or for the account of the Contractor, shall exceed the said sum, the Contractor shall pay the amount of the excess to the Town.

13. LIENS:

If at any time any notices of lien or other legal process are filed for labor performed or materials or equipment manufactured, furnished, or delivered to or for the Work, the Contractor shall, at its own cost and expense, promptly discharge, remove or otherwise dispose of the same, and until such discharge, removal or disposition, the Town shall have the right to retain from any moneys payable hereunder an amount which, in its sole judgment, it deems necessary to satisfy such liens and pay the costs and expenses, including attorneys' fees, of defending any actions brought to enforce the same, or incurred in connection therewith or by reason thereof.

14. CLAIMS:

If at any time there be any evidence of any claims for which the Contractor is or may be liable or responsible hereunder, the Contractor shall promptly settle or otherwise dispose of the same, and until such claims are settled or disposed of, the Town may retain from any moneys which would otherwise be payable hereunder so much thereof as, in its sole judgment, it may deem necessary to settle or otherwise dispose of such claims and to pay the costs and expenses, including attorneys' fees, of defending any actions brought to enforce such claims or incurred in connection therewith or by reason thereof.

15. LIABILITY OF TOWN:

No person, firm or corporation, other than the Contractor, who signed this Contract as such, shall have any interest herein or rights hereunder. No claim shall be made or be valid either against the Town or any agent of the Town and neither the Town nor any agent of the Town shall be liable for or be held to pay any money, except as herein provided. The acceptance by the Contractor of the payment as fixed in the final estimate shall operate as and shall be a full and complete release of the Town and of every agent of the Town of and from any and all claims, demands, damages and liabilities of, by or to the Contractor for anything done or furnished for or arising out of or relating to or by reason of the Work or for or on account of any act or neglect of the Town or of any agent of the Town or of any other person, arising out of, relating to or by reason of the Work, except the claim against the Town for the unpaid balance, if any there be, of the amounts retained as herein provided.

16. PROVISIONS REQUIRED BY LAW DEEMED INSERTED:

Each and every provision of law and clause required by law to be inserted in the Contract shall be deemed to be inserted herein, and the Contract shall be read and enforced as though they were included herein. If through mistake or otherwise any such provision is not inserted, or is not correctly inserted, then upon the application of either party, the Contract shall forthwith be physically amended to make such insertion.

17. PERMITS:

The Contractor shall, at his own expense, take out and maintain all necessary permits from the State, Town, or other public authorities; shall give all notices required by law; and shall post all bonds and pay all fees and charges incident to the due and lawful prosecution of the Work.

18. NOT TO SUBLET OR ASSIGN:

The Contractor shall constantly give his personal attention to the faithful prosecution of the Work, shall keep the same under his personal control, shall not assign the Contract or sublet the Work or any part thereof without the previous written consent of the Town, and shall not assign any of the moneys payable under the Contract, or his claim thereto, unless by and with the like written consent of the Town and the surety on the Contract Bonds. Any assignment or subletting in violation hereof shall be void and unenforceable.

19. EMPLOY COMPETENT PEOPLE:

The Contractor shall employ only competent people on the Work and shall not employ people or means which may cause strikes, work stoppages and/or disturbances by workmen employed by the Contractor, any subcontractor, the Town, the Contracting Officer or any other contractor. Whenever the Contracting Officer notifies the Contractor in writing that in his opinion any person on the Work is incompetent, unfaithful, disorderly, or otherwise unsatisfactory or not employed in accordance with the provisions of the Contract, such person shall be discharged from the Work and shall not again be employed on it, except with the written consent of the Contracting Officer.

20. EMPLOY SUFFICIENT LABOR AND EQUIPMENT:

If in the sole judgment of the Contracting Officer the Contractor is not employing sufficient labor, plant, equipment or other means to complete the Work within the time specified, the Contracting Officer may, after giving written notice, require the Contractor to employ such additional labor, plant, equipment and other means as the Contracting Officer deems necessary to enable the Work to progress properly.

21. INTOXICATING LIQUORS:

The Contractor shall not sell and shall neither permit nor suffer the introduction or use of intoxicating liquors upon or about the Work.

22. ACCESS TO WORK:

The Town, the Contracting Officer, and their officers, agents, servants and employees may at any and all times and for any and all purposes, enter upon the Work and the site thereof and the premises used by the Contractor, and the Contractor shall at all times provide safe and proper facilities therefore.

23. EXAMINATION OF WORK:

The Contracting Officer shall be furnished by the Contractor with every reason able facility for examining and inspecting the Work and for ascertaining that the Work is being performed in accordance with the requirements and intent of the Contract, even to the extent of requiring the uncovering or taking down portions of finished work by the Contractor.

24. EXTRA WORK:

The Contractor shall perform any extra work (work in connection with the Contract but not provided for herein) when and as ordered in writing by the Contracting Officer, at the unit prices stipulated in the Contract for such work or, if none are so stipulated, either (a) at the price agreed upon before such work is commenced and named in the written order for such work, or (b) if the Contracting Officer so elects, for the reasonable cost of such work, as determined by the Contractor and approved by the Contracting Officer, plus a percentage of such cost, as may be agreed upon by Contract and Contracting Officer.

25. CHANGES NOT TO AFFECT BONDS:

It is distinctly agreed and understood that any changes made in the work or the Drawings or Specifications therefore (whether such changes increase or decrease the amount thereof or the time required for its performance) or any changes in the manner or time of payments made by the Town to the Contractor, or any other modifications of the Contract, shall in no way annul, release, diminish or affect the liability of the surety on the Contract Bonds given by the Contractor, it being the intent hereof that notwithstanding such changes the liability of the surety on said bonds continue and remain in full force and effect.

26. PRICES FOR WORK:

The Town shall pay and the Contractor shall receive the prices stipulated in the Bid made a part hereof as full compensation for everything performed and furnished and for all risks and obligations undertaken by the Contractor under and as required by the Contract.

27. MONEYS MAY BE RETAINED:

The Town may at any time retain from any moneys which would otherwise be payable hereunder so much thereof as the Town may deem necessary to complete the Work hereunder and to reimburse it for all costs, expenses, losses, damage and damages chargeable to the Contractor hereunder.

28. USE OR PARTIAL PAYMENT NOT ACCEPTANCE:

It is agreed that this is an entire contract for one whole and complete Work or result and that neither the Town's entrance upon or use of the Work or any part thereof nor

any partial payments by the Town shall constitute an acceptance of the Work or any part thereof before its entire completion and final acceptance.

29. NON-CONNECTICUT CONTRACTORS:

Pursuant to Connecticut General Statutes §12-430(7), as amended by Connecticut Public Act #11-61, Section 66, a nonresident contractor shall comply with the State of Connecticut's bonding requirements.

30. PAYMENT TO SUBCONTRACTORS:

As required by Section 49-41a of the Connecticut General Statutes, within thirty days after payment to the Contractor by the Town for work under this Contract, he shall pay any amounts due any subcontractor, whether for labor performed or materials furnished when such labor or materials has been included in a requisition submitted by such Contractor and paid by the Town.

31. INSURANCE:

Insurance coverage required as noted in "Exhibit A" attached.

32. PREVAILING WAGE RATES; CONSTRUCTION SAFETY AND HEALTH COURSE:

Except as noted below, the Contractor shall comply with the current provisions of Section 31-53 of the General Statutes of the State of Connecticut, a part of which is quoted as follows:

"The wages paid on an hourly basis to any person performing the work of any mechanic, laborer or worker on the work herein contracted to be done and the amount of payment or contribution paid or payable on behalf of each such person to any employee or welfare fund, as defined in subsection (h) of section 31-53 of the General Statutes, shall be at a rate equal to the rate customary or prevailing for the same work in the same trade or occupation in the town in which such public works project is being constructed. Any contractor who is not obligated by agreement to make payment or contribution on behalf of such persons to any such employee welfare fund shall pay to each mechanic, laborer or worker as part of such person's wages the amount of payment or contribution for such person's classification on each pay day."

All Contractors and subcontractors shall submit certified weekly payrolls, on forms furnished by the Town, for all contracts meeting the aforementioned monetary limits. The certified payrolls shall be submitted with the Contractor's monthly certificate for payment.

Section 31-55a of the General Statutes of the State of Connecticut provides that the prevailing wage rates applicable to any awarded contract or subcontract are subject to annual adjustments each July 1st for the duration of the project.

Each Contractor that is awarded a contract shall pay the annual adjusted prevailing wage rate that is in effect each July 1st, as posted by the Department of Labor. It is the Contractor's responsibility to obtain the annual adjusted prevailing wage rate increases directly from the Department of Labor's web site. The annual adjustments will be posted on the Department of Labor web page: www.ctdol.state.ct.us. For those without Internet access, contact the division listed below.

The Contractor shall also furnish proof with the weekly certified payroll for the first week each employee begins work that any person performing the work of a mechanic, laborer or worker has completed a course of at least ten (10) hours in duration in construction safety and health approved by the federal Occupational Safety and Health Administration in accordance with Connecticut General Statutes Section 31-53b and regulations adopted by the State of Connecticut Labor Commissioner.

The provisions of this section (32) shall not apply where the total cost of all work to be performed by all Contractors and subcontractors in connection with new construction of any public works project is less than four hundred thousand dollars (\$400,000) or where the total cost of all work to be performed by all contractors and subcontractors in connection with any remodeling, refinishing, refurbishing, rehabilitation, alteration or repair of any public works project is less than one hundred thousand dollars (\$100,000).

Questions can be directed to the Contract Compliance Unit, Wage and Workplace Standards Division, Connecticut Department of Labor, 200 Folly Brook Blvd., Wethersfield, CT 06109 at 860-263-6790.

33. GOVERNING LAW:

The laws of the State of Connecticut shall govern this Contract and any and all litigation related to this Contract. In the event of litigation related to this Contract, the exclusive forum shall be the State of Connecticut and the exclusive venue for such litigation shall be the Judicial District for Stamford/Norwalk at Stamford.

34. The Contractor is required to perform and submit to Greenwich Public Schools, Employee Background Checks as imposed by Section 2 of Public Act 16-67, which amended Conn. Gen. Stat. 10-222c.

IN WITNESS, WHEREOF, the parties of the AGREEMENT have hereunto set their hand and seals the day first above written.

TOWN OF GREENWICH, CONNECTICUT

BY _____
Benjamin Branyan

Chief Financial & Administrative Officer

Date: _____

THE CONTRACTOR

BY _____

Date: _____

Insurance Requirement Sheet

Insurance Requirements: Before starting and until final completion and acceptance of the work called for in the Contract and expiration of the guarantee period provided for in the Contract, the Contractor and its subcontractors, if any, shall procure and maintain insurance of the types and amounts checked in paragraphs A through F below for all Contract operations.

- ☒ A. General Liability, with minimum coverages for combined bodily injury and property damage liability of \$2,000,000 general aggregate, \$1,000,000 per occurrence including:
- ☒ 1. Commercial General Liability.
 - ☒ 2. Town as additional insured.
 - ☐ 3. Owners and Contractors Protective Liability (separate policy in the name of the Town).
- ☒ B. Comprehensive Automobile Liability, with minimum coverages of \$1,000,000 combined single limit for bodily injury and property damage, including, where applicable, coverage for any vehicle, all owned vehicles, scheduled vehicles, hired vehicles, non-owned vehicles and garage liability.
- ☒ C. Excess Liability, with minimum coverage of \$5,000,000 in umbrella form, or such other form as approved by Town Department Head and Risk Management Director.
- ☒ D. Workers' Compensation and Employer's Liability, with minimum coverages as provided by Connecticut State Statutes.
- ☐ E. Professional Liability (for design and other professionals for Errors and Omissions), with minimum coverage of \$1,000,000. If the policy is on a claims-made basis, coverage shall be continually renewed or extended for three (3) years after work is completed under the Contract.
- ☐ F. Other (Builder's Risk, etc.):_____.
- ☒ G. **CERTIFICATE HOLDER: TOWN OF GREENWICH
And GREENWICH BOARD OF EDUCATION. (Also fill in on ACORD Certificate of Insurance)
290 Greenwich Avenue, Greenwich, CT 06830.**

The **Acord certificate of insurance form** must be executed by your insurance agent/broker and returned to this office. Company name and address must conform on all documents including insurance documentation. It is required that the agent/broker note the individual insurance companies providing coverage, rather than the insurance group, on the Acord form. The Contract number (provided to the awarded Contractor), project name and a brief description must be inserted in the "Description of Operations" field. It must be confirmed on the Acord Form that the Town of Greenwich, The Greenwich Board of Education and Antinozzi Associates, PC are endorsed as additional insured by having the appropriate box checked off and stating such in the "Description of Operations" field. **A letter from the awarded vendor's agent/broker certifying that the Town of Greenwich and The Greenwich Board of Education as been endorsed onto the general liability policy as an additional insured is also mandatory.** This letter **must follow exactly the format provided by the Purchasing Department.** If the insurance coverage required is provided on more than one Acord certificate of insurance, then additional endorsement letters are also required. Contract development will begin upon receipt of complete, correct insurance documentation. The Contractor shall be responsible for maintaining the above insurance coverages in force to secure all of the Contractor's obligations under the Contract with an insurance company or companies with an AM Best Rating of A or better, licensed to write such insurance in Connecticut and acceptable to the Risk Manager, Town of Greenwich. For excess liability only, non-admitted insurers are acceptable, provided they are permitted to do business through Connecticut excess line brokers per listing on the current list of Licensed Insurance Companies, Approved Reinsurers, Surplus Lines Insurers and Risk Retention Groups issued by the State of Connecticut Insurance Department.

(SAMPLE ENDORSEMENT LETTER)

**AGENT/BROKER
(LETTERHEAD)**

(Date)

Eugene H. Watts, Senior Buyer
Purchasing Department
Town of Greenwich/Board of Education
290 Greenwich Avenue – Havemeyer Building
Greenwich, CT 06830

Re: Town of Greenwich/Greenwich Board of Education / **Contract #**
Project Name:

Dear Mr. Watts:

The undersigned hereby certifies as follows:

- (1) I am a duly licensed insurance agent under the laws of the State of **[insert State]** and an authorized representative of all companies affording coverage under the Acord form submitted herewith;
- (2) The Town of Greenwich, Greenwich Board of Education, and Antinozzi Associates, PC have been endorsed as an additional insured under the general liability policy no. [insert policy number], issued by **[insert company affording coverage] to [name of insured]**;
- (3) The general liability policy referenced in paragraph (2) above meets or exceeds the coverage in Commercial General Liability ISO form CG 00 01 10 01, including contractual liability;
- (4) The policies listed in the Acord form submitted to the Town of Greenwich in connection with the above-referenced contract have been issued to the insured in the amounts stated and for the periods indicated in the Acord form; and
- (5) The Town of Greenwich shall be given thirty (30) days prior written notice of cancellation, lapse or restrictive amendment (except ten days' notice of nonpayment) of the policies listed in the Acord form.

Sincerely,

Authorized Representative for all companies listed in the Acord form

<u>ACORD</u>		CERTIFICATE OF LIABILITY INSURANCE			
PRODUCER		THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER, THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.			
INSURED		<div style="text-align: center;">INSUREERS AFFORDING COVERAGE</div> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">INSURER A:</div> <div style="width: 45%;"></div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">INSURER B:</div> <div style="width: 45%;"></div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">INSURER C:</div> <div style="width: 45%;"></div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">INSURER D:</div> <div style="width: 45%;"></div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">INSURER E:</div> <div style="width: 45%;"></div> </div>			
COVERAGES					
THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED, NOTWITHSTANDING ANY REQUIREMENT, TERM OF CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.					
INS	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE	POLICY EXPIRATION	LIMITS
	GENERAL LIABILITY COMMERCIAL GENERAL LIABILITY ☐ CLAIMS MADE ☒ OCCUR ☐ ☐ GENERAL AGGREGATE LIMIT APPLIES ☐ POLICY ☐ PROJECT ☐ LOC				EACH OCCURENCE FIRE DAMAGE (Any one fire) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGRREGATE PRODUCTS-COMP/OP AGG
	AUTOMOBILE LIABILITY ☐ ANY AUTO ALL OWNED AUTOS ☐ SCHEDULED AUTOS HIRED AUTOS NON-OWNED AUTOS ☐ ☐				COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)
	GARAGE LIABILITY ☐ ANY AUTO ☐				AUTO ONLY-FA ACCIDENT OTHER THAN EA ACC AUTO ONLY- AGG
	EXCESS LIABILITY ☐ OCCUR ☐ CLAIMS MADE ☐ DEDUCTIBLE ☐ RETENTION \$				EACH OCCURRENCE AGGREGATE
	WORKERS COMPENSATION AND				WC OTH- E I EACH ACCIDENT E I DISEASE-FA EMPLOYEE E I DISEASE - POLICY LIMIT
	Professional Liability				
DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/EXCLUSIONS ADDED BY ENDORSEMENT/SPECIAL PROVISIONS Additional Insured: The Town of Greenwich, Greenwich Board of Education and Antinozzi Associates, PC are named as additional insured for Contract # ____ It is agreed by both parties to Contract No ____ that the Contractors insurance will be primary and non-contributory					
CERTIFICATE HOLDER		X ADDITIONAL INSURED; INSURER LETTER: ____		CANCELLATION	
Certificate Holder: Town of Greenwich and Greenwich Board of Education 101 Field Point Road Greenwich, CT 06830		SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING COMPANY WILL ENDEAVOR TO MAIL <u>30</u> DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT, BUT FAILURE TO DO SO SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE INSURER, ITS AGENTS OF REPRESENTATIONS			
		AUTHORIZED REPRESENTATIVE			

DOCUMENT 000485 – CONSENT OF SURETY

CONSENT OF SURETY

The Undersigned surety, being the surety which issued bonds No. _____ for the Town of Greenwich Contract No. ____ hereby consents to release of final payment and all retainages to the contractor- principal.

(Name of Surety)

By _____ Its

ACKNOWLEDGMENT

STATE OF

ss:

COUNTY OF

This is to certify the above signatory who executed this instrument was either known to me or satisfactorily proven to me to be the person whom he purports to be.

Notary Public

END OF SECTION

SECTION 000486 - AFFIDAVIT FOR FINAL PAYMENT

AFFIDAVIT FOR FINAL PAYMENT

The undersigned, being duly sworn, deposes and says:

1. That he is the _____ (Title) of the contractor in hereinafter referred to and is authorized to execute this affidavit on behalf of the contractor;
2. In connection with Contract # _____ for _____ (Project Title) it is represented that all payroll, bills for services, materials, supplies, equipment and other indebtedness have been paid or otherwise satisfied and that there are no outstanding claims against the undersigned by any sub-contractor or material supplier, or no outstanding claims to file a claim against the Town of Greenwich;
3. This affidavit is made at the request of the Town of Greenwich for the purpose of inducing final payment and knowing that it will rely upon the truth of the representation herein made.

Subscribed and sworn

to before me this _____ day of, 20____

Notary Public

(Type or print name person authorized to sign)

END OF SECTION

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Phased construction.
4. Owner-furnished products.
5. Access to site.
6. Coordination with occupants.
7. Work restrictions.
8. Specification and Drawing conventions.

1.3 PROJECT INFORMATION

- A. Project Identification: Julian Curtiss School, Phase I & II: Elevator & Accessibility Upgrades; Front Entrance & Main Office Security Upgrades.
 1. Project Location: 180 East Elm Street, Greenwich, CT, 06830
- B. Owner: Greenwich Public Schools, 290 Greenwich Avenue, Greenwich, CT 06830
 1. Building Committee Chair: William Kelly
 2. Superintendent: Dr. Toni Jones
- C. Architect: Antinozzi Associates, PC
- D. Architect's Consultants: Architect has retained the following design professionals who have prepared designated portions of the Contract Documents:
 1. Environmental: Hygenix, Division of Pennoni.
 2. Civil Engineering / Landscape Design: Stantec Consulting Services.
 3. Structural Engineering: e2 Engineers.
 4. Mechanical / Electrical / Plumbing / Fire Protection Engineering: Consulting Engineering Services, Inc. (CES).

- E. Web-Based Project Software: Project software administered by General Contractor will be used for purposes of managing communication and documents during the construction stage.

1. See Section 013100 "Project Management and Coordination." for requirements for establishing, administering and using web-based Project software.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents. A brief summary follows:

1. Julian Curtiss School was originally constructed in 1946 with limited additions installed in 1952. The building has been well maintained since that time, with limited upgrades to toilet rooms and building systems that generally do not impact the building's original character. This project combines several incremental improvements defined by the Owner by phase as noted below **(this does NOT imply phased construction other than what is needed to maintain a fully operational school during the school year)**.
 - a. Phase 1: Addition of a new elevator and a new shaft within the existing building. Areas immediately around the elevator will be modified and repaired, with new finishes added as noted.
 - b. Phase 1a: Minimal accessibility improvements to toilet rooms as noted. The building's toilet rooms were renovated recently; accessibility upgrades focus on doors and removal of fixtures for ADA clearances.
 - c. Phase 2: New ramps, stairs and landscaping will be added at the front entrance. A new accessible parking space will be added. The entrance vestibule and front office area will be reconfigured for accessibility and security.

- B. Type of Contract:

1. The project will be constructed under a single prime-contracting arrangement (General Contractor).

1.5 PHASED CONSTRUCTION

- A. As previously noted, the Owner's phases described in Part 1.4 will all be performed concurrently. In order to maintain continuous operation of the school outside of summer and other breaks, construction may be conducted in phases as directed by the General Contractor.

1. The General Contractor shall provide a proposed work schedule as part of the bid.
2. **It is the intent of the Owner to have the majority of work completed over the summer of 2025.**
3. Defining and organizing construction phases is the responsibility of the Contractor.

- B. Before commencing Work, submit an updated copy of Contractor's construction schedule showing the sequence, commencement and completion dates, based on coordination with Owner's personnel and school calendar.

1.6 OWNER-FURNISHED PRODUCTS

- A. Owner will furnish products where indicated. The Work includes receiving, unloading, handling, storing, protecting, and installing Owner-furnished products.

1.7 ACCESS TO SITE

- A. General: Contractor shall have use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- B. Use of Site: Limit use of Project site to Work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Limits: Confine construction operations to fence-enclosed work areas indicated by General Contractor.
 - 2. Driveways, Walkways and Entrances: Keep driveways loading areas, and entrances serving premises clear as required for site safety. Do not use these areas for parking or for storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- C. Condition of Existing Grounds and Building: Maintain portions of existing building, grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

1.8 COORDINATION WITH OCCUPANTS

- A. Full Owner Occupancy: The Owner will occupy the site and existing building during the entire construction period. Cooperate with the Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with the Owner's operations.
- B. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.
 - 1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
 - 2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy of work areas.
 - 3. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

1.9 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
 - 1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
 - 2. Comply with limitations of occupied existing building.
- B. On-Site Work Hours: Limit work in the existing building to working hours indicated by Greenwich Public Schools.
- C. Existing Utility Interruptions: Do not interrupt utilities serving adjacent facilities unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
 - 1. Notify Greenwich Public Schools not less than three days in advance of proposed utility interruptions.
 - 2. Obtain written permission from Greenwich Public Schools before proceeding with utility interruptions.
- D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption with Owner.
- E. Restricted Substances: Use of tobacco products and other controlled substances on Project site is not permitted.
- F. All Contractors' employees shall use a single means of access and egress, except in the case of emergency, to be designated by the Owner.
- G. Each Contractor and each Subcontractor shall require his employees, while on the job site, to wear, in a conspicuous location, a Photo I.D. button bearing the name of the Contractor. The buttons of each Contractor shall be numbered consecutively. An up-to- date list of all I.D. buttons, indicating the name and number for each employee, shall be furnished to the Owner.
- H. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.
 - 1. Maintain list of approved screened personnel with Owner's representative.

1.10 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications (including product notes and Specifications in the Drawings).
- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings.
 3. Note that Specifications are included in the Drawings for Civil, Landscape, Structural, Mechanical, Electrical, Plumbing and Communications. Architectural Drawings also contain specific product notes.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 011100 – MILESTONE SCHEDULE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes scheduling requirements.

1.3 MILESTONES AND MASTER SCHEDULE

- A. The following milestone schedule serves as a basis for bidding. A Master Schedule will be developed by the General Contractor in coordination with the Owner at a general meeting within 7 days of Letter of Intent to Award the Contracts. The Contractor's Master Schedule shall include all school closure periods for which work is planned, and will be incorporated into the Contract. Contractor will coordinate activities, forward submittals, deliver materials and provide necessary manpower to meet the Master Schedule based on the milestones listed below.

1.4 MILESTONE SCHEDULE

- A. 2024-25 Enabling Work Period: Work may occur when school is closed as coordinated with the Owner. Refer to attached school calendar for school closure periods prior to summer. In order to conform to overall schedule requirements, the Contractor shall mobilize for enabling work over school closure periods, which may include but are not limited to:
 - 1. Thanksgiving Recess: Thursday November 27, 2024 through Saturday, November 30, 2024.
 - 2. Holiday Recess: Saturday December 21, 2024 through Wednesday, January 1, 2025.
 - 3. Winter Recess: Saturday February 8, 2025 through Monday, February 17, 2025.
 - 4. Spring Recess: Saturday April 12, 2025 through Saturday April 19, 2025.
- B. 2025 Summer Work Period: The majority of the Work will occur over the summer of 2025. Work shall conclude prior to Friday, August 15, 2025, with any remaining work areas completely separated from operational portions of the school for occupancy beginning Monday August 18, 2025. Confirm return-to-school dates with the Owner.
 - 1. Summer Work Period Start Date: Thursday, June 26, 2025.
 - 2. Critical Milestone: The elevator shaft opening, supporting structure and associated roof work must be complete and the building made watertight prior to Friday, August 15, 2025. Any open shaft areas must be partitioned off and made safe with ample corridor space on the occupied building side.

3. Critical Substantial Completion Milestone: The Front Entrance and Main Office, along with all sitework, must be substantially complete and useable by staff and students prior to Friday, August 15, 2025.
- C. Elevator Completion: Substantial Completion of the Elevator prior to Friday, August 15, 2025 is highly desirable. If this is not feasible, provide an alternate schedule at Bid Time and coordinate with the Owner to complete the work during school closure periods as indicated.
- D. Work Periods after start of the 2025-26 School Year: Work may occur when school is closed as coordinated with the Owner. The school calendar for 2025-26 has not yet been released so exact dates must be confirmed with the Owner, but it may be assumed that school closure dates are similar to those in the attached 2024-25 school calendar.
 1. All work, including the elevator and punch list items, must be complete by the end of Winter Recess in February, 2026.

1.5 GENERAL SCHEDULE REQUIREMENTS

- A. Work shall be completed in accordance with the Contract Documents so that the Owner can occupy or use the Work or a portion thereof for its intended use. Building is fully occupied outside of school closure periods.
- B. If necessary, the Owner will allow the Contractor access to the building after regular school hours and on Saturdays at no additional cost for custodial O.T., only to complete all work necessary for Final Completion.
- C. The Owner and Architect will make the determination whether the project is substantially complete.
- D. ALL WORK must be checked, tested and fully operational, and punch list complete.
- E. ALL WORK REQUIRED BY ANY OF THE OWNER'S REPRESENTATIVES AND CONSULTANTS, INCLUDING THE ARCHITECT, ARCHITECT'S CONSULTANTS, OWNER'S ATTORNEYS, ETC., TO EXECUTE FINAL CLOSE-OUT OF CONTRACT AFTER 60 DAYS BEYOND MILESTONE DATES IF DETERMINED TO BE CAUSED BY CONTRACTOR, SHALL RESULT IN PAYMENT(S) TO THE OWNER'S REPRESENTATIVES AND CONSULTANTS, INCLUDING THE ARCHITECT, ARCHITECT'S CONSULTANTS, OWNER'S ATTORNEYS, ETC., IN THE FORM OF A CHANGE ORDER DEDUCT TO THE BASE CONTRACT.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011100

2024-25 Greenwich Public Schools District Calendar

AUGUST						
S	M	T	W	T	F	S
				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

7 Summer School Ends

26 First Day for All Teachers

27 Professional Learning Day (PLD)

28 Professional Learning Day (PLD)

29 Grade 6&9 Orientation (Early Release)

30 First Day for All Students

SEPTEMBER						
S	M	T	W	T	F	S
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					

2 Labor Day-Schools Closed

OCTOBER						
S	M	T	W	T	F	S
		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		

3 Rosh Hashanah - Schools Closed

14 Columbus Day - Schools Open

23 Teacher PLD - Early Release

NOVEMBER						
S	M	T	W	T	F	S
					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

5 Election Day - Schools Closed

11 Veterans Day - Schools Open

27 Early Release

28, 29 Thanksgiving Recess - Schools Closed

DECEMBER						
S	M	T	W	T	F	S
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				

2 Elementary Conferences - Early Release

3 Elementary Conferences - Early Release

4 Elementary Conferences - Evening

23 - 31 Holiday Recess - Schools Closed

JANUARY						
S	M	T	W	T	F	S
			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	

1 New Years Day - Schools Closed

2 School Resumes

20 MLK, Jr. Day - Schools Closed

FEBRUARY						
S	M	T	W	T	F	S
						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	

10-14 Winter Recess - Schools Closed

17 President's Day - Schools Closed

MARCH						
S	M	T	W	T	F	S
						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					

10 Teacher PLD - Schools Closed - K-8 Conferences

12 K-8 Conferences - Early Release

31 Eid al-Fitr - Schools Open

APRIL						
S	M	T	W	T	F	S
		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			

14-18 Spring Recess - Schools Closed

MAY						
S	M	T	W	T	F	S
				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

23 Early Release+

26 Memorial Day-Schools Closed

Note: There shall be no athletic games or activity competitions, projects, homework or major assignments the evening before or on recognized and religious holidays, and no instructional assignments required to be worked on during Thanksgiving, Holiday, Winter and Spring recesses.

* GHS Graduation will be held NO LATER than 6/19/2025, however, it could be held earlier, depending on the last day of school. The graduation date will be confirmed / set at the March BOE Business

JUNE						
S	M	T	W	T	F	S
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					

19 GHS Graduation* (Tentative)

20 Last Day for Grade 6&9 (Includes 5 Snow Days)**

23 Last Day for Students (Includes 5 Snow Days)**
Early Release

25 Last Day for Staff (Includes 5 Snow Days)**

JULY						
S	M	T	W	T	F	S
		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		

7 Summer School Begins (Ends 8/15/25)

180 Days / Students**187 Days / Teachers**

** If more snow / storm days are needed, they will be taken from either the remaining days in June or from the Spring Recess in April. Please plan accordingly.

SECTION 012200 - UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for unit prices.
- B. Related Sections:
 - 1. Division 01 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
 - 2. Division 01 Section "Quality Requirements" for general testing and inspecting requirements.

1.3 DEFINITIONS

- A. Unit price is a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES – GENERAL

- A. Refer to Bid Form for insertion of unit prices. Unit Prices listed below marked (ACBM) are coordinated with Asbestos-containing Building Material (ACBM) table in Section 028213, “Hazardous Materials Abatement;” refer to Section for additional information.

1. Unit Price 01: 1’ x 2’ Cork Ceiling Adhesive (ACBM)
 - a. Unit: Square Foot
2. Unit Price 02: Pipe Insulation Debris (ACBM). Associated mastic is not asbestos-containing.
 - a. Unit: Linear Foot
3. Unit Price 03: Kitchen Exhaust Duct (ACBM)
 - a. Unit: Linear Foot
4. Unit Price 04: Soft Coat Plaster Ceiling (ACBM).
 - a. Unit: Square Foot
5. Unit Price 05: Metal and Wood Fire Doors (ACBM). Interior of doors was not available for sampling.
 - a. Unit: Each door
6. Unit Price 06: Pipe Insulation at Wet Walls and other hidden locations (ACBM).
 - a. Unit: Linear Foot
7. Unit Price 07: Electrical Backer Board (ACBM).
 - a. Unit: Each Backer Board

END OF SECTION 012200

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if the Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
 - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternates into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Execute accepted alternates under the same conditions as other work of the Contract.
- C. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. Alternate No. 1: Provide vinyl composite tile VCT-1 in lieu of vinyl sheet flooring VSF-1.
 - 1. Refer to Finish Legend on sheet FI-901 for information specific to each product.
 - 2. Refer to Finish Plans for locations of VSF-1 per Base Bid.
- B. Alternate No. 2: ADD roof ladder to replace existing from Room 238 to roof.
 - 1. Refer to Specification Section 055000, "Metal Fabrications," for ladder requirements.
 - 2. Include safety panel to prevent access to ladder. Match existing.
- C. Alternate No. 3: Provide entry-resistant glass with 45-minute fire rating at door 101 along with associated sidelites and transom per Frame Type 2.
 - 1. Refer to Drawings.

END OF SECTION 012300

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Sections: Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Division 1 Section "Construction and Demolition Waste Management."
 - 2. Divisions 02 through 33 Sections for specific requirements and limitations for substitutions.

1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
 - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use CSI Form 13.1A.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.

- b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable specification section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
 - j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
 - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor through Construction Manager of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

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

1.6 PROCEDURES

- A. Coordination: Modify or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately upon discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

- a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
- b. Substitution request is fully documented and properly submitted.
- c. Requested substitution will not adversely affect Contractor's construction schedule.
- d. Requested substitution has received necessary approvals of authorities having jurisdiction.
- e. Requested substitution is compatible with other portions of the Work.
- f. Requested substitution has been coordinated with other portions of the Work.
- g. Requested substitution provides specified warranty.
- h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- i. **If a comparable product or substitution is proposed, the Contractor shall be solely responsible for verifying that the substitution does not impact the structural design, HVAC, electrical, plumbing or utility requirements, clearances, dimensions or layouts, building or fire code requirements or any other change in the original design. If the substitution does require a change in any of the items noted above or similar design change or physical changes, the Contractor shall be responsible for the cost of any redesign and for the additional construction costs associated with the changes due to the substitution.**

- B. Substitutions for Convenience: Architect will consider requests for substitution if received within 60 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

- a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
- b. Requested substitution does not require extensive revisions to the Contract Documents.
- c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
- d. Substitution request is fully documented and properly submitted.
- e. Requested substitution will not adversely affect Contractor's construction schedule.
- f. Requested substitution has received necessary approvals of authorities having jurisdiction.
- g. Requested substitution is compatible with other portions of the Work.
- h. Requested substitution has been coordinated with other portions of the Work.
- i. Requested substitution provides specified warranty.
- j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- k. **If a comparable product or substitution is proposed, the Contractor shall be solely responsible for verifying that the substitution does not impact the structural design, HVAC, electrical, plumbing or utility requirements, clearances, dimensions or layouts, building or fire code requirements or any other change in the original design. If the substitution does require a change in any of the items noted above or similar design change or physical changes, the contractor shall be responsible for the cost of any redesign and for the additional construction costs associated with the changes due to the substitution.**
- l. **If a Contractor does propose a substitution for convenience within 60 days of notice to proceed, the Architect shall be compensated directly by the Contractor for the Architect's time reviewing such a request.**

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500



SUBSTITUTION REQUEST

(After the Bidding/Negotiating Phase)

Project: _____ Substitution Request Number: _____

From: _____
To: _____ Date: _____

A/E Project Number: _____
Re: _____ Contract For: _____

Specification Title: _____ Description: _____
Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____
Manufacturer: _____ Address: _____ Phone: _____
Trade Name: _____ Model No.: _____
Installer: _____ Address: _____ Phone: _____

History: ☐ New product ☐ 1-4 years old ☐ 5-10 years old ☐ More than 10 years old

Differences between proposed substitution and specified product: _____

☐ Point-by-point comparative data attached — REQUIRED BY A/E

Reason for not providing specified item: _____

Similar Installation:

Project: _____ Architect: _____
Address: _____ Owner: _____
_____ Date Installed: _____

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

Savings to Owner for accepting substitution: _____ (\$ _____).

Proposed substitution changes Contract Time: ☐ No ☐ Yes [Add] [Deduct] _____ days.

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

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Sections include the following:
 - 1. Division 1 Section "Product Requirements" for administrative procedures for handling requests for substitutions made after Contract award.

1.3 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, within this specification.

1.4 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
 - 2. Within 5 days after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and

finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

- B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to Architect.
1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 4. Include costs of labor and supervision directly attributable to the change.
 5. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 6. Comply with requirements in Division 1 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.
- C. Proposal Request Form: Recommended form is AIA Document G709 for Proposal Requests.

1.5 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701 (or similar format).

1.6 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714 (or similar format). Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

23015

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ADA RENOVATIONS PHASE I & II
GREENWICH, CT**

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Sections include the following:
 - 1. Division 1 Section "Allowances" for procedural requirements governing handling and processing of allowances.
 - 2. Division 1 Section "Unit Prices" for administrative requirements governing use of unit prices.
 - 3. Division 1 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
 - 4. Division 1 Section "Construction Progress Documentation" for administrative requirements governing preparation and submittal of Contractor's Construction Schedule and Submittals Schedule.

1.3 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
 - 1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with Continuation Sheets.
 - b. Submittals Schedule.
 - 2. Submit the Schedule of Values to Architect at earliest possible date but no later than fifteen (15) days before the date scheduled for submittal of initial Applications for Payment.
 - 3. Subschedules: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values correlated with each phase of payment.

B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the Schedule of Values:
 - a. Project name and location.
 - b. Name of Architect.
 - c. Architect's project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.
 - b. Description of the Work.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that affect value.
 - g. Dollar value.
 - 1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.
4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. Include evidence of insurance or bonded warehousing if required.
6. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
8. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.

9. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The period covered by each Application for Payment starts on the first day of each calendar month and ends with the last day of the same month.
- C. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets as form for Applications for Payment.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
 1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
 2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- E. Transmittal: Submit 5 signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- F. Waivers of Mechanic's Lien: Commencing with the second Application for Payment, with each Application for Payment, submit waivers of mechanic's lien from every entity who is lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment. Waivers shall indicate partial release of lien with respect to that period of time covered by the preceding Application for Payment.
 1. Submit partial waivers on each item for amount requested, before deduction for retainage, on each item.
 2. When an application shows completion of an item, submit final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Waiver Delays: Submit each Application for Payment with Contractor's waiver of mechanic's lien for construction period covered by the application.

- a. Submit final Application for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 5. Waiver Forms: Submit waivers of lien on forms, and executed in a manner, acceptable to Owner.
- G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
 2. Schedule of Values.
 3. Contractor's Construction Schedule (preliminary if not final).
 4. Products list.
 5. Schedule of unit prices.
 6. Submittals Schedule (preliminary if not final).
 7. List of Contractor's staff assignments.
 8. List of Contractor's principal consultants.
 9. Copies of building permits.
 10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 11. Initial progress report.
 12. Report of preconstruction conference.
 13. Certificates of insurance and insurance policies.
 14. Performance and payment bonds.
 15. Data needed to acquire Owner's insurance.
 16. Initial settlement survey and damage report if required.
- H. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- I. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 3. Updated final statement, accounting for final changes to the Contract Sum.
 4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
 5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
 6. AIA Document G707, "Consent of Surety to Final Payment."
 7. Evidence that claims have been settled.

8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
9. Final, liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination drawings.
 - 3. Requests for Information (RFIs).
 - 4. Digital project management procedures.
 - 5. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.
- C. Related Requirements:
 - 1. Division 1 Section "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 2. Division 1 Section "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

- A. RFI: Request for Information. Request from Owner, General Contractor, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - 1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.

- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
1. Post copies of list in project meeting room, in temporary field office, in web-based Project software directory, and in prominent location in built facility. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.
1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its own operations with operations included in different Sections that depend on each other for proper installation, connection, and operation.
1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components with other contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
- C. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and scheduled activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's construction schedule.

2. Preparation of the schedule of values.
 3. Installation and removal of temporary facilities and controls.
 4. Delivery and processing of submittals.
 5. Progress meetings.
 6. Preinstallation conferences.
 7. Project closeout activities.
 8. Startup and adjustment of systems.
 9. Project closeout activities.
- E. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

1.6 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. Coordinate the addition of trade-specific information to coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
 - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 - f. Indicate required installation sequences.
 - g. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling, and wall systems, mechanical and electrical equipment, and related Work. Locate components within plenums to accommodate layout of light fixtures and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
4. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
5. Mechanical and Plumbing Work: Show the following:
 - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
 - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
 - c. Fire-rated enclosures around ductwork.
6. Electrical Work: Show the following:
 - a. Runs of vertical and horizontal conduit 1-1/4 inches (32 mm) in diameter and larger.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
 - c. Panel board, switch board, switchgear, transformer, busway, generator, and motor-control center locations.
 - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
7. Review: Architect will review coordination drawings to confirm that in general the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make suitable modifications and resubmit.
8. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 013300 "Submittal Procedures."

C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:

1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings (CAD).
2. File Submittal Format: Submit or post coordination drawing files using PDF format.
3. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.

1.7 REQUEST FOR INFORMATION (RFI)

- A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
 3. Communication between the General Contractor and the Architect prior to the issuance of RFIs is encouraged.
- B. Content of the RFI: The contractor shall clearly and concisely set forth the issue for which clarification or interpretation is sought and why a response is needed and when it is needed. In the Request for Information the contractor must set forth their own interpretation or understanding of the requirement along with reasons why they have reached such an understanding. Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
 2. Project number.
 3. Date.
 4. Name of Contractor.
 5. Name of Architect and General Contractor.
 6. RFI number, numbered sequentially.
 7. RFI subject.
 8. Specification Section number and title and related paragraphs, as appropriate.
 9. Drawing number and detail references, as appropriate.
 10. Field dimensions and conditions, as appropriate.
 11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.
 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Architect.
1. Attachments shall be electronic files in PDF format.
- D. Architect's and General Contractor's Action: The Architect will review all Requests for Information to determine whether they are Requests for Information within the contractual definition of this term. If the Architect determines that the document is not a Request for Information the documents will be returned to the contractor without review, for resubmittal on the proper form and in the proper manner in accordance with the terms of the contract. Inquires

that can be addressed with careful review of the Contract Documents will not be designated as an RFI and will be returned without response.

- E. Architect and General Contractor will review each RFI, determine action required, and respond. Responses to Requests for Information shall be issued within ten (10) working days of receipt of the request from the contractor for time sensitive issues for review by the Architect or one consultant. If a longer period of time is determined necessary by the Architect, the Architect will, within ten (10) working days of receipt of the request, notify the contractor of the anticipated response time. The ten (10) working days referred to herein will start on the date and time stamped received "In from Contractor" by the Architect and ends on the date and time stamped "Out to Contractor" by the Architect. If the contractor submits a Request for Information on a schedule activity with ten (10) working days or less of float on the current project schedule, the contractor shall not be entitled to any time extension due to the time it takes the Architect to respond to the request provided that the owner responds within the ten (10) working days set forth above.
1. The following Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect or General Contractor of additional information.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal if allowed by the Contract.
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect and General Contractor in writing within 10 days of receipt of the RFI response.
- F. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Use software log that is part of web-based Project software. Software log with not less than the following:
1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Architect and General Contractor.
 4. RFI number including RFIs that were returned without action or withdrawn.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Architect's and General Contractor's response was received.

8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.
- G. On receipt of Architect's and General Contractor's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect and General Contractor within seven days if Contractor disagrees with response.
- H. Responses from the Architect will not change any requirement of the contract documents unless so noted by the Owner in the response to the Request for Information. In the event the Contractor believes that a response to a Request for Information will cause a change to the requirements of the contract document the Contractor shall provide written notice to the Architect and Owner's Representative, in accordance with the requirements of the Changes article, stating that the Contractor considers the response to be a change to the requirements of the Contract. Failure to provide such written notice shall waive the contractor's right to seek additional time or cost under the Changes article of these General Conditions.

1.8 DIGITAL PROJECT MANAGEMENT PROCEDURES

- A. Use of Architect's Digital Data Files: Digital data files of Architect's CAD drawings will be provided by Architect for Contractor's use during construction.
1. Digital data files may be used by Contractor in preparing coordination drawings, Shop Drawings, and Project record Drawings.
 2. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
 3. Digital Drawing Software Program: Contract Drawings are available in AutoCad 2023.
 4. Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to Owner and Architect.
 - a. Subcontractors, and other parties granted access by Contractor to Architect's digital data files shall execute a data licensing agreement in the form of Agreement acceptable to Owner and Architect.
- B. Web-Based Project Software: Use General Contractor's web-based Project software site for purposes of hosting and managing Project communication and documentation until Final Completion.
1. Web-based Project software site includes, at a minimum, the following features:
 - a. Compilation of Project data, including Contractor, subcontractors, Architect, architect's consultants, Owner, and other entities involved in Project. Include names of individuals and contact information.
 - b. Access control for each entity for each workflow process, to determine entity's digital rights to create, modify, view, and print documents.
 - c. Document workflow planning, allowing customization of workflow between project entities.

- d. Creation, logging, tracking, and notification for Project communications required in other Specification Sections, including, but not limited to, RFIs, submittals, Minor Changes in the Work, Construction Change Directives, and Change Orders.
 - e. Track status of each Project communication in real time, and log time and date when responses are provided.
 - f. Procedures for handling PDFs or similar file formats, allowing markups by each entity. Provide security features to lock markups against changes once submitted.
 - g. Processing and tracking of payment applications.
 - h. Processing and tracking of contract modifications.
 - i. Creating and distributing meeting minutes.
 - j. Document management for Drawings, Specifications, and coordination drawings, including revision control.
 - k. Management of construction progress photographs.
 - l. Mobile device compatibility, including smartphones and tablets.
- 2. If required for use of software, provide up to ten web-based Project software user licenses for use of General Contractor, Owner, Architect, and Architect's consultants.
 - 3. At completion of Project, provide digital archive in format that is readable by common desktop software applications in format acceptable to Architect. Provide data in locked format to prevent further changes.
 - 4. Provide the following web-based Project software packages under their current published licensing agreements:
 - a. Software as determined by the General Contractor.
- C. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:
- 1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 - 2. Name file with submittal number or other unique identifier, including revision identifier. File name shall start with Specification Section number.
 - 3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

1.9 PROJECT MEETINGS

- A. General: General Contractor will schedule and conduct meetings and conferences at Project site unless otherwise indicated.
- 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times a minimum of 10 working days prior to meeting.
 - 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 - 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, General Contractor, and Architect, within three days of the meeting.

- B. Preconstruction Conference: General Contractor will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
1. Attendees: Authorized representatives of Owner, General Contractor, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Responsibilities and personnel assignments.
 - b. Tentative construction schedule.
 - c. Phasing.
 - d. Critical work sequencing and long lead items.
 - e. Designation of key personnel and their duties.
 - f. Lines of communications.
 - g. Use of web-based Project software.
 - h. Procedures for processing field decisions and Change Orders.
 - i. Procedures for RFIs.
 - j. Procedures for testing and inspecting.
 - k. Procedures for processing Applications for Payment.
 - l. Distribution of the Contract Documents.
 - m. Submittal procedures.
 - n. Preparation of Record Documents.
 - o. Use of the premises and existing building.
 - p. Work restrictions.
 - q. Working hours.
 - r. Owner's occupancy requirements.
 - s. Responsibility for temporary facilities and controls.
 - t. Procedures for moisture and mold control.
 - u. Procedures for disruptions and shutdowns.
 - v. Construction waste management and recycling.
 - w. Parking availability.
 - x. Office, work, and storage areas.
 - y. Equipment deliveries and priorities.
 - z. First aid.
 - aa. Security.
 - bb. Progress cleaning.
 3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other sections and when required for coordination with other construction.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect, General Contractor, of scheduled meeting dates.

2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Possible conflicts.
 - i. Compatibility requirements.
 - j. Time schedules.
 - k. Weather limitations.
 - l. Manufacturer's written instructions.
 - m. Warranty requirements.
 - n. Compatibility of materials.
 - o. Acceptability of substrates.
 - p. Temporary facilities and controls.
 - q. Space and access limitations.
 - r. Regulations of authorities having jurisdiction.
 - s. Testing and inspecting requirements.
 - t. Installation procedures.
 - u. Coordination with other work.
 - v. Required performance results.
 - w. Protection of adjacent work.
 - x. Protection of construction and personnel.
 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Project Closeout Conference: General Contractor will schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.
1. Conduct the conference to review requirements and responsibilities related to Project closeout.
 2. Attendees: Authorized representatives of Owner, General Contractor, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of Record Documents.

- b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Procedures for completing and archiving web-based Project software site data files.
 - d. Submittal of written warranties.
 - e. Requirements for completing sustainable design documentation.
 - f. Requirements for preparing operations and maintenance data.
 - g. Requirements for delivery of material samples, attic stock, and spare parts.
 - h. Requirements for demonstration and training.
 - i. Preparation of Contractor's punch list.
 - j. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - k. Submittal procedures.
 - l. Coordination of separate contracts.
 - m. Owner's partial occupancy requirements.
 - n. Responsibility for removing temporary facilities and controls.
4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- E. Progress Meetings: General Contractor will conduct progress meetings at every week intervals.
- 1. Coordinate dates of meetings with preparation of payment requests.
 - 2. Attendees: In addition to representatives of Owner, General Contractor, and Architect and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Status of sustainable design documentation.
 - 5) Deliveries.
 - 6) Off-site fabrication.
 - 7) Access.
 - 8) Site use.

- 9) Temporary facilities and controls.
 - 10) Progress cleaning.
 - 11) Quality and work standards.
 - 12) Status of correction of deficient items.
 - 13) Field observations.
 - 14) Status of RFIs.
 - 15) Status of Proposal Requests.
 - 16) Pending changes.
 - 17) Status of Change Orders.
 - 18) Pending claims and disputes.
 - 19) Documentation of information for payment requests.
4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
- a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Submittal schedule requirements.
 - 2. Administrative and procedural requirements for submittals.

- B. Related Requirements:

- 1. Division 1 Section "Project Management and Coordination" for submitting coordination drawings and subcontract list and for requirements for web-based Project software.
 - 2. Division 1 Section "Quality Requirements" for submitting test and inspection reports, and schedule of tests and inspections.
 - 3. Division 1 Section "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.
 - 4. Division 1 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
 - 5. Division 1 Section "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's and General Contractor's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's and General Contractor's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

1.4 SUBMITTAL SCHEDULE

- A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for

making corrections or revisions to submittals noted by Architect and General Contractor and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
4. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal Category: Action; informational.
 - d. Name of subcontractor.
 - e. Description of the Work covered.
 - f. Scheduled date for Architect's and General Contractor's final release or approval.
 - g. Scheduled dates for purchasing.
 - h. Scheduled date of fabrication.
 - i. Scheduled dates for installation.
 - j. Activity or event number.

1.5 SUBMITTAL FORMATS

A. Submittal Information: Include the following information in each submittal:

1. Project name.
2. Date.
3. Name of Architect.
4. Name of Contractor.
5. Name of firm or entity that prepared submittal.
6. Names of subcontractor, manufacturer, and supplier.
7. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier; and alphanumeric suffix for resubmittals.
8. Category and type of submittal.
9. Submittal purpose and description.
10. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
11. Drawing number and detail references, as appropriate.
12. Indication of full or partial submittal.
13. Location(s) where product is to be installed, as appropriate.

14. Other necessary identification.
15. Remarks.
16. Signature of transmitter.

- B. Options: Identify options requiring selection by Architect.
- C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect and General Contractor on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.
- D. PDF Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.
- E. Submittals for Web-Based Project Software: Prepare submittals as PDF files, or other format indicated by Project software website.

1.6 SUBMITTAL PROCEDURES

- A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
 1. Web-Based Project Software: Prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software site to fully identify submittal.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect and General Contractor reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals. Days listed below are business days, Monday through Friday.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. General Contractor will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 15 days for review of each resubmittal.
4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 20 days for initial review of each submittal. Provide for sequential review unless concurrent review is specifically permitted.
5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 days for review of each submittal. Submittal will be returned to General Contractor, through Architect, before being returned to Contractor.

- a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect and General Contractor.

D. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect's and General Contractor's action stamp.

E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, and authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's and General Contractor's action stamp.

1.7 SUBMITTAL REQUIREMENTS

A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.

- g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 - 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams that show factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 - 5. Submit Product Data before Shop Drawings, and before or concurrent with Samples.
- B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
- 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
- C. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other materials.
- 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 - 2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
 - a. Project name and submittal number.
 - b. Generic description of Sample.
 - c. Product name and name of manufacturer.
 - d. Sample source.
 - e. Number and title of applicable Specification Section.
 - f. Specification paragraph number and generic name of each item.
 - 3. Web-Based Project Software: Prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software site to fully identify submittal. Include photographs of samples.
 - 4. Disposition: Approved samples may be maintained by the Architect, except for those the Architect determines should be kept at the Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

- a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
- 5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect, through General Contractor, will return submittal with options selected.
- 6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit a single set of samples unless otherwise directed by the Architect.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit paired units that show approximate limits of variations.
- D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
 - 1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
 - 2. Manufacturer and product name, and model number if applicable.
 - 3. Number and name of room or space.
 - 4. Location within room or space.
- E. Qualification Data (acceptable to include with Product Data): Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- F. Design Data (acceptable to include with Product Data): Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if

applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.

G. Certificates (acceptable to include with Product Data):

1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.
2. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
4. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
5. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

H. Test and Research Reports (acceptable to include with Product Data):

1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - a. Name of evaluation organization.

- b. Date of evaluation.
- c. Time period when report is in effect.
- d. Product and manufacturers' names.
- e. Description of product.
- f. Test procedures and results.
- g. Limitations of use.

1.8 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are insufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file with engineering seal for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.
- C. BIM Incorporation: Incorporate delegated-design drawing and data files into BIM established for Project.
 - 1. Prepare delegated-design drawings in the following format: Same digital data software program, version, and operating system as original Drawings.

1.9 CONTRACTOR'S REVIEW

- A. Action Submittals and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamps and indication in web-based Project software. Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
 - 1. Architect will not review submittals received from Contractor that do not have Contractor's review and approval.

1.10 ARCHITECT'S AND GENERAL CONTRACTOR'S REVIEW

- A. Action Submittals: Architect and General Contractor will review each submittal, indicate corrections or revisions required, and return it.
1. PDF Submittals: Architect will indicate, via markup on each submittal, the appropriate action, as follows:
 - a. No Exceptions Taken.
 - b. Make Corrections Noted.
 - c. Rejected.
 - d. Revise & Resubmit.
 - e. Submit Specified Item.
 - f. No action taken/ For Record Only
 2. Paper Submittals are not permitted, except as follows:
 - a. Samples may be submitted with a paper transmittal provided the transmittal is duplicated on Web-Based Project Software with photos of the sample(s).
 3. Submittals by Web-Based Project Software: Architect and General Contractor will indicate, on Project software website, the appropriate action.
 - a. The following actions shall be available by indication on Project software website:
 - 1) No Exception Taken
 - 2) Make Corrections Noted
 - 3) Rejected
 - 4) Revise and Resubmit
 - 5) Submit Specified Item
 - 6) Make Corrections Noted; Revise and Resubmit for Record
 - 7) Make Corrections Noted; Submit Specified Item
 - 8) Reviewed for Record
 - 9) No Action Taken
 - 10) Void
- B. Informational Submittals: Architect and General Contractor will review each submittal and will not return it (No Action Taken in Web-Based Project Software) or will return it if it does not comply with requirements. Architect and General Contractor will forward each submittal to appropriate party.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect and General Contractor.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Architect and General Contractor will discard submittals received from sources other than Contractor.

- F. Architect will return submittals not required by the Contract Documents without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, Commissioning Authority, Construction Manager, or authorities having jurisdiction are not limited by provisions of this Section.
 - 4. Specific test and inspection requirements are not specified in this Section.
- C. Related Requirements:
 - 1. Division 1 Section "Allowances" for testing and inspection allowances.
 - 2. Divisions 02 through 49 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

- A. Experienced: When used with an entity or individual, "experienced" unless otherwise further described means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- B. Field Quality-Control Tests: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

- C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.
 - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- E. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- F. Source Quality-Control Tests: Tests and inspections that are performed at the source; for example, plant, mill, factory, or shop.
- G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- H. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- I. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect or Construction Manager.

1.4 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

1.5 CONFLICTING REQUIREMENTS

- A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements are specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent

requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for direction before proceeding.

- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.6 ACTION SUBMITTALS

- A. Delegated-Design Services Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit a statement signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

1.7 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Qualification Data: For Contractor's quality-control personnel.
- C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:
 - 1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
 - 2. Main wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.
- D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Entity responsible for performing tests and inspections.
 - 3. Description of test and inspection.
 - 4. Identification of applicable standards.
 - 5. Identification of test and inspection methods.
 - 6. Number of tests and inspections required.
 - 7. Time schedule or time span for tests and inspections.

8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

- F. Reports: Prepare and submit certified written reports and documents as specified.
- G. Permits, Licenses, and Certificates: For Owner's record, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents established for compliance with standards and regulations bearing on performance of the Work.

1.8 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's Construction Schedule.
- B. Quality-Control Personnel Qualifications: Engage qualified personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
1. Project quality-control manager shall not have other Project responsibilities.
- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
1. Contractor-performed tests and inspections including Subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections. Distinguish source quality-control tests and inspections from field quality-control tests and inspections.
 2. Special inspections required by authorities having jurisdiction and indicated on the Statement of Special Inspections.
 3. Owner-performed tests and inspections indicated in the Contract Documents.
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.9 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
1. Date of issue.
 2. Project title and number.
 3. Name, address, telephone number, and email address of testing agency.
 4. Dates and locations of samples and tests or inspections.
 5. Names of individuals making tests and inspections.
 6. Description of the Work and test and inspection method.
 7. Identification of product and Specification Section.
 8. Complete test or inspection data.
 9. Test and inspection results and an interpretation of test results.
 10. Record of temperature and weather conditions at time of sample taking and testing and inspection.
 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 12. Name and signature of laboratory inspector.
 13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, telephone number, and email address of technical representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.
 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, telephone number, and email address of factory-authorized service representative making report.
 2. Statement that equipment complies with requirements.
 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 4. Statement whether conditions, products, and installation will affect warranty.
 5. Other required items indicated in individual Specification Sections.

1.10 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.
- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
- H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
 - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - f. When testing is complete, remove test specimens and test assemblies, and laboratory mockups; do not reuse products on Project.
2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect and Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

1.11 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
 2. Payment for these services will be made from testing and inspection allowances, as authorized by Change Orders.
 3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.
 1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 2. Engage a qualified testing agency to perform quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.

4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- D. Testing Agency Responsibilities: Cooperate with Architect, Commissioning Authority, Construction Manager, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect, Commissioning Authority, Construction Manager, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform duties of Contractor.
- E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."
- F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- G. Associated Contractor Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.

6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspection equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's Construction Schedule. Update as the Work progresses.
1. Distribution: Distribute schedule to Owner, Architect, Commissioning Authority, Construction Manager, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.12 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, as indicated in the Statement of Special Inspections attached to this Section, and as follows:
1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
 2. Notifying Architect, Commissioning Authority, Construction Manager, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect and Commissioning Authority, through Construction Manager, with copy to Contractor and to authorities having jurisdiction.
 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
 - 1. Date test or inspection was conducted.
 - 2. Description of the Work tested or inspected.
 - 3. Date test or inspection results were transmitted to Architect.
 - 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's, Commissioning Authority's, and Construction Manager's reference during normal working hours.
 - 1. Submit log at Project closeout as part of Project Record Documents.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspection, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Division 1 Section "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Days": Business days, Monday through Friday.
- D. Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- E. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- F. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- G. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- H. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
- I. "Provide": Furnish and install, complete and ready for the intended use.
- J. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if

bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."
- B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
 - 1. AABC - Associated Air Balance Council; www.aabc.com.
 - 2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
 - 3. AAPFCO - Association of American Plant Food Control Officials; www.aapfco.org.
 - 4. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
 - 5. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
 - 6. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
 - 7. ABMA - American Boiler Manufacturers Association; www.abma.com.
 - 8. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org
 - 9. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
 - 10. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
 - 11. AF&PA - American Forest & Paper Association; www.afandpa.org.
 - 12. AGA - American Gas Association; www.aga.org.
 - 13. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
 - 14. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
 - 15. AI - Asphalt Institute; www.asphaltinstitute.org.
 - 16. AIA - American Institute of Architects (The); www.aia.org.
 - 17. AISC - American Institute of Steel Construction; www.aisc.org.
 - 18. AISI - American Iron and Steel Institute; www.steel.org.
 - 19. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
 - 20. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
 - 21. ANSI - American National Standards Institute; www.ansi.org.
 - 22. AOSA - Association of Official Seed Analysts, Inc.; www.aosaseed.com.
 - 23. APA - APA - The Engineered Wood Association; www.apawood.org.

24. APA - Architectural Precast Association; www.archprecast.org.
25. API - American Petroleum Institute; www.api.org.
26. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
27. ARI - American Refrigeration Institute; (See AHRI).
28. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
29. ASCE - American Society of Civil Engineers; www.asce.org.
30. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
31. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
32. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
33. ASSE - American Society of Safety Engineers (The); www.asse.org.
34. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
35. ASTM - ASTM International; www.astm.org.
36. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
37. AWEA - American Wind Energy Association; www.awea.org.
38. AWI - Architectural Woodwork Institute; www.awinet.org.
39. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
40. AWP - American Wood Protection Association; www.awpa.com.
41. AWS - American Welding Society; www.aws.org.
42. AWWA - American Water Works Association; www.awwa.org.
43. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
44. BIA - Brick Industry Association (The); www.gobrick.com.
45. BICSI - BICSI, Inc.; www.bicsi.org.
46. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.org.
47. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
48. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bissc.org.
49. CDA - Copper Development Association; www.copper.org.
50. CE - Conformite Europeenne; <http://ec.europa.eu/growth/single-market/ce-marking/>
51. CEA - Canadian Electricity Association; www.electricity.ca.
52. CEA - Consumer Electronics Association; www.ce.org.
53. CFFA - Chemical Fabrics and Film Association, Inc.; www.chemicalfabricsandfilm.com.
54. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
55. CGA - Compressed Gas Association; www.cganet.com.
56. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
57. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
58. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
59. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
60. CPA - Composite Panel Association; www.pbmdf.com.
61. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
62. CRRC - Cool Roof Rating Council; www.coolroofs.org.
63. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
64. CSA - CSA Group; www.csa.ca.
65. CSA - CSA International; (Formerly: IAS - International Approval Services); www.csa-international.org.
66. CSI - Construction Specifications Institute (The); www.csinet.org.

67. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
68. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
69. CWC - Composite Wood Council; (See CPA).
70. DAS – (Connecticut) Department of Administrative Services.
71. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
72. DHI - Door and Hardware Institute; www.dhi.org.
73. ECA - Electronic Components Association; (See ECIA).
74. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
75. ECIA - Electronic Components Industry Association; www.eciaonline.org.
76. EIA - Electronic Industries Alliance; (See TIA).
77. EIMA - EIFS Industry Members Association; www.eima.com.
78. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
79. ESD - ESD Association; (Electrostatic Discharge Association); www.esda.org.
80. ESTA - Entertainment Services and Technology Association; (See PLASA).
81. ETL - Intertek (See Intertek); www.intertek.com.
82. EVO - Efficiency Valuation Organization; www.evo-world.org.
83. FCI - Fluid Controls Institute; www.fluidcontrolsinstitute.org.
84. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
85. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
86. FM Approvals - FM Approvals LLC; www.fmglobal.com.
87. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
88. FRSA - Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.; www.floridarooft.com.
89. FSA - Fluid Sealing Association; www.fluidsealing.com.
90. FSC - Forest Stewardship Council U.S.; www.fscus.org.
91. GA - Gypsum Association; www.gypsum.org.
92. GANA - Glass Association of North America; www.glasswebsite.com.
93. GS - Green Seal; www.greenseal.org.
94. HI - Hydraulic Institute; www.pumps.org.
95. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
96. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
97. HPVA - Hardwood Plywood & Veneer Association; www.hpva.org.
98. HPW - H. P. White Laboratory, Inc.; www.hpwhite.com.
99. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.
100. IAS - International Accreditation Service; www.iasonline.org.
101. IAS - International Approval Services; (See CSA).
102. ICBO - International Conference of Building Officials; (See ICC).
103. ICC - International Code Council; www.iccsafe.org.
104. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
105. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
106. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
107. IEC - International Electrotechnical Commission; www.iec.ch.
108. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
109. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
110. IESNA - Illuminating Engineering Society of North America; (See IES).
111. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
112. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.

113. IGSHPA - International Ground Source Heat Pump Association;
www.igshpa.okstate.edu.
114. ILI - Indiana Limestone Institute of America, Inc.; www.iliai.com.
115. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA);
www.intertek.com.
116. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
117. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
118. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
119. ISO - International Organization for Standardization; www.iso.org.
120. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
121. ITU - International Telecommunication Union; www.itu.int/home.
122. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
123. LMA - Laminating Materials Association; (See CPA).
124. LPI - Lightning Protection Institute; www.lightning.org.
125. MBMA - Metal Building Manufacturers Association; www.mbma.com.
126. MCA - Metal Construction Association; www.metalconstruction.org.
127. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
128. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
129. MHIA - Material Handling Industry of America; www.mhia.org.
130. MIA - Marble Institute of America; www.marble-institute.com.
131. MMPA - Moulding & Millwork Producers Association; www.wmmpa.com.
132. MPI - Master Painters Institute; www.paintinfo.com.
133. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.;
www.mss-hq.org.
134. NAAMM - National Association of Architectural Metal Manufacturers;
www.naamm.org.
135. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
136. NADCA - National Air Duct Cleaners Association; www.nadca.com.
137. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
138. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
139. NBI - New Buildings Institute; www.newbuildings.org.
140. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
141. NCMA - National Concrete Masonry Association; www.ncma.org.
142. NEBB - National Environmental Balancing Bureau; www.nebb.org.
143. NECA - National Electrical Contractors Association; www.necanet.org.
144. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
145. NEMA - National Electrical Manufacturers Association; www.nema.org.
146. NETA - InterNational Electrical Testing Association; www.netaworld.org.
147. NFHS - National Federation of State High School Associations; www.nfhs.org.
148. NFPA - National Fire Protection Association; www.nfpa.org.
149. NFPA - NFPA International; (See NFPA).
150. NFRC - National Fenestration Rating Council; www.nfrc.org.
151. NHLA - National Hardwood Lumber Association; www.nhla.com.
152. NLGA - National Lumber Grades Authority; www.nlga.org.
153. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
154. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
155. NRCA - National Roofing Contractors Association; www.nrca.net.

156. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
157. NSF - NSF International; www.nsf.org.
158. NSPE - National Society of Professional Engineers; www.nspe.org.
159. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
160. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
161. NWFA - National Wood Flooring Association; www.nwfa.org.
162. OSCG & R – Office of School Construction Grants and Review.
163. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
164. PDI - Plumbing & Drainage Institute; www.pdionline.org.
165. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); <http://www.plasa.org>.
166. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
167. RFCI - Resilient Floor Covering Institute; www.rfci.com.
168. RIS - Redwood Inspection Service; www.redwoodinspection.com.
169. SAE - SAE International; www.sae.org.
170. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
171. SDI - Steel Deck Institute; www.sdi.org.
172. SDI - Steel Door Institute; www.steeldoor.org.
173. SEFA - Scientific Equipment and Furniture Association (The); www.sefalabs.com.
174. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
175. SIA - Security Industry Association; www.siaonline.org.
176. SJI - Steel Joist Institute; www.steeljoist.org.
177. SMA - Screen Manufacturers Association; www.smainfo.org.
178. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
179. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
180. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
181. SPIB - Southern Pine Inspection Bureau; www.spib.org.
182. SPRI - Single Ply Roofing Industry; www.spri.org.
183. SRCC - Solar Rating & Certification Corporation; www.solar-rating.org.
184. SSINA - Specialty Steel Industry of North America; www.ssina.com.
185. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
186. STI - Steel Tank Institute; www.steeltank.com.
187. SWI - Steel Window Institute; www.steelwindows.com.
188. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
189. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
190. TCNA - Tile Council of North America, Inc.; www.tileusa.com.
191. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
192. TIA - Telecommunications Industry Association (The); (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
193. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
194. TMS - The Masonry Society; www.masonrysociety.org.
195. TPI - Truss Plate Institute; www.tpinst.org.
196. TPI - Turfgrass Producers International; www.turfgrasssod.org.
197. TRI - Tile Roofing Institute; www.tilerroofing.org.
198. UL - Underwriters Laboratories Inc.; <http://www.ul.com>.
199. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.

200. USAV - USA Volleyball; www.usavolleyball.org.
201. USGBC - U.S. Green Building Council; www.usgbc.org.
202. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
203. WA - Wallcoverings Association; www.wallcoverings.org
204. WASTEC - Waste Equipment Technology Association; www.wastec.org.
205. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
206. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
207. WDMA - Window & Door Manufacturers Association; www.wdma.com.
208. WI - Woodwork Institute; www.wicnet.org.
209. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
210. WWPA - Western Wood Products Association; www.wwpa.org.

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. DIN - Deutsches Institut fur Normung e.V.; www.din.de.
2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
3. ICC - International Code Council; www.iccsafe.org.
4. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.

1. COE - Army Corps of Engineers; www.usace.army.mil.
2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
4. DOD - Department of Defense; www.quicksearch.dla.mil.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
8. FG - Federal Government Publications; www.gpo.gov/fdsys.
9. GSA - General Services Administration; www.gsa.gov.
10. HUD - Department of Housing and Urban Development; www.hud.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; www.eetd.lbl.gov.
12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
14. TRB - Transportation Research Board; National Cooperative Highway Research Program; The National Academies; www.trb.org.
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDOJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
18. USP - U.S. Pharmacopeial Convention; www.usp.org.
19. USPS - United States Postal Service; www.usps.com.

- E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.gpo.gov/fdsys.
 2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; www.quicksearch.dla.mil.
 3. DSCC - Defense Supply Center Columbus; (See FS).
 4. FED-STD - Federal Standard; (See FS).
 5. FS - Federal Specification; Available from DLA Document Services; www.quicksearch.dla.mil.
 - a. Available from Defense Standardization Program; www.dsp.dla.mil.
 - b. Available from General Services Administration; www.gsa.gov.
 - c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org/ccb.
 6. MILSPEC - Military Specification and Standards; (See DOD).
 7. USAB - United States Access Board; www.access-board.gov.
 8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).
- F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
1. CBHF; State of California; Department of Consumer Affairs; Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
 2. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
 3. CDHS; California Department of Health Services; (See CDPH).
 4. CDPH; California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
 5. CPUC; California Public Utilities Commission; www.cpuc.ca.gov.
 6. SCAQMD; South Coast Air Quality Management District; www.aqmd.gov.
 7. TFS; Texas A&M Forest Service; Sustainable Forestry and Economic Development; www.txforestservation.tamu.edu.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
 - 1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

1.2 USE CHARGES

- A. Installation, removal, and use charges for temporary facilities to be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.
- B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use with metering. Provide connections and extensions of services and metering as required for construction operations.
- C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use with metering. Provide connections and extensions of services and metering as required for construction operations.

1.3 INFORMATIONAL SUBMITTALS

- A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.
- B. Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typesets, graphic elements, and message content.
- C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- D. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold. Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.

1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and requirements for replacing water-damaged Work.
 2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
 3. Indicate methods to be used to avoid trapping water in finished work.
- E. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Include the following:
1. Locations of dust-control partitions at each phase of work.
 2. HVAC system isolation schematic drawing.
 3. Location of proposed air-filtration system discharge.
 4. Waste-handling procedures.
 5. Other dust-control measures.
- F. Noise and Vibration Control Plan: Identify construction activities that may impact the occupancy and use of existing spaces within the building or adjacent existing buildings, whether occupied by others, or occupied by Owner. Include the following:
1. Methods used to meet the goals and requirements of Owner.
 2. Concrete cutting method(s) to be used.
 3. Location of construction devices on the site.
 4. Show compliance with the use and maintenance of quieted construction devices for the duration of the Project.
 5. Indicate activities that may disturb building occupants and that are planned to be performed during non-standard working hours as coordinated with Owner.

1.4 QUALITY ASSURANCE

- A. Accessible Temporary Egress: Comply with applicable provisions in the DOJ's "2010 ADA Standards for Accessible Design" and ICC A117.1.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Portable Chain-Link Fencing: Minimum 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top and bottom rails. Provide galvanized-steel bases for supporting posts.
- B. Polyethylene Sheet for dust control: Reinforced, fire-resistive sheet, 10-mil (0.25-mm) minimum thickness, with flame-spread rating of 15 or less in accordance with ASTM E84 and passing NFPA 701 Test Method 2.

- C. Dust-Control Adhesive-Surface Walk-Off Mats: Provide mats, minimum 36 by 60 inches (914 by 1524 mm).

2.2 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment:
 - 1. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 13 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Section 017700 "Closeout Procedures."
- C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

- A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
 - 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

3.2 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
 - 1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.
- C. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
 - 1. Prior to commencing work, isolate the HVAC system in area where work is to be performed.

- a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
 - b. Maintain negative air pressure within work area, using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
 3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

3.3 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Water Service:
 1. Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- C. Sanitary Facilities: Provide temporary toilets, wash facilities, safety shower and eyewash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
 1. Use of Permanent Toilets: Use of Owner's existing or new toilet facilities is not permitted.
- D. Electric Power Service:
 1. Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
- E. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

3.4 SUPPORT FACILITIES INSTALLATION

- A. Comply with the following:

1. Provide construction for temporary field offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines that is noncombustible in accordance with ASTM E136. Comply with NFPA 241.
 2. Utilize designated area within existing building for temporary field offices if acceptable to Owner.
 3. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Traffic Controls: Comply with requirements of authorities having jurisdiction.
1. Protect existing site improvements to remain, including curbs, pavement, and utilities.
 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- C. Waste Disposal Facilities:
1. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."
 2. Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."
- D. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
- E. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.
1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas, so no evidence remains of correction work.
- F. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Section 011000 "Summary."
- C. Temporary Erosion and Sedimentation Control:
1. Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, in accordance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
 - a. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.
 - b. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
 - c. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
 - d. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.
- D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- E. Tree and Plant Protection:
1. Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- F. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals, so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using materials approved by authorities having jurisdiction.
- G. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people from easily entering work area except by entrance gates.
1. Extent of Fence: As required to accommodate construction operations.
 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel.
- H. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.
- I. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

- J. Temporary Egress: Provide temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction. Provide signage directing occupants to temporary egress.
- K. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.
 - 1. Construct dustproof partitions with gypsum wallboard, with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.
 - 2. Construct dustproof partitions with two layers of 6-mil (0.14-mm) polyethylene sheet on each side. Cover floor with two layers of 6-mil (0.14-mm) polyethylene sheet, extending sheets 18 inches (460 mm) up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant-treated plywood.
 - a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches (1219 mm) between doors. Maintain water-dampened foot mats in vestibule.
 - 3. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
 - 4. Insulate partitions to control noise transmission to occupied areas.
 - 5. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
 - 6. Protect air-handling equipment.
 - 7. Provide walk-off mats at each entrance through temporary partition.
- L. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
 - 1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
 - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition in accordance with requirements of authorities having jurisdiction.
 - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
 - 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign, stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.6 MOISTURE AND MOLD CONTROL

- A. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
 - 1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 - 2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.

3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
 - a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective and require replacing.
 - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
 - c. Remove and replace materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.7 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
 - 1. Division 1 Section "Alternates" for products selected under an alternate.
 - 2. Division 1 Section "Substitution Procedures" for requests for substitutions.
 - 3. Division 1 Section "References" for applicable industry standards for products specified.
 - 4. Division 1 Section "Closeout Procedures."

1.3 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved by Architect through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual

characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification.

- C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications. Submit a comparable product request, if applicable.

1.4 ACTION SUBMITTALS

- A. Comparable Product Request Submittal: Submit request for consideration of each comparable product. Identify basis-of-design product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
 - 2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a comparable product request. Architect will notify Contractor through Construction Manager of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
 - a. Form of Architect's Approval of Submittal: As specified in Section 013300 "Submittal Procedures."
 - b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
 - 1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
 - 2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.
- B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.

1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is not conspicuous.
2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:
 - a. Name of product and manufacturer.
 - b. Model and serial number.
 - c. Capacity.
 - d. Speed.
 - e. Ratings.
3. See individual identification sections in Divisions 22, 23, and 26 (in M/E/P Drawings) for additional identification requirements.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.
- C. Storage:
 1. Store products to allow for inspection and measurement of quantity or counting of units.
 2. Store materials in a manner that will not endanger Project structure.
 3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
 4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
 5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
 6. Protect stored products from damage and liquids from freezing.
 7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
 3. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 3. Owner reserves the right to limit selection to products with warranties meeting requirements of the Contract Documents.
 4. Where products are accompanied by the term "as selected," Architect will make selection.
 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
 6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

- a. Submit additional documentation required by Architect through Construction Manager in order to establish equivalency of proposed products. Evaluation of "or equal" product status is by the Architect, whose determination is final.

B. Product Selection Procedures:

1. Sole Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
 - a. **If a comparable product or substitution is proposed, the Contractor shall be solely responsible for verifying that the substitution does not impact the structural design, HVAC, electrical, plumbing or utility requirements, clearances, dimensions or layouts, building or fire code requirements or any other change in the original design. If the substitution does require a change in any of the items noted above or similar design change or physical changes, the contractor shall be responsible for the cost of any redesign and for the additional construction costs associated with the changes due to the substitution.**
2. Sole Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
 - a. **If a comparable product or substitution is proposed, the Contractor shall be solely responsible for verifying that the substitution does not impact the structural design, HVAC, electrical, plumbing or utility requirements, clearances, dimensions or layouts, building or fire code requirements or any other change in the original design. If the substitution does require a change in any of the items noted above or similar design change or physical changes, the Contractor shall be responsible for the cost of any redesign and for the additional construction costs associated with the changes due to the substitution.**
3. List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered during the bid period.
 - a. **If a product selected from the list of names is other than the Basis of Design indicated OR IT IS A COMPARABLE PRODUCT, the Contractor shall be solely responsible for verifying that the product does not impact the structural design, HVAC, electrical, plumbing or utility requirements, clearances, dimensions or layouts, building or fire code requirements or any other change in the original design. If the product does require a change in any of the items noted above or similar design change or physical changes, the contractor shall be responsible for the cost of any redesign and for the additional construction costs associated with the changes due to not providing the Basis of Design product.**

4. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, which complies with requirements.
 - a. Non-limited list of products is indicated by the phrase: "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following: ..."
5. List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions will be considered during the bid period.
 - a. **If a manufacturer selected from the list of names is other than the Basis of Design indicated OR IT IS A COMPARABLE PRODUCT, the Contractor shall be solely responsible for verifying that the product does not impact the structural design, HVAC, electrical, plumbing or utility requirements, clearances, dimensions or layouts, building or fire code requirements or any other change in the original design. If the manufacturer does require a change in any of the items noted above or similar design change or physical changes, the contractor shall be responsible for the cost of any redesign and for the additional construction costs associated with the changes due to not providing the Basis of Design manufacturer.**
6. Non-Limited List of Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, which complies with requirements.
 - a. Non-limited list of manufacturers is indicated by the phrase: "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following: ..."
7. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
 - a. **If a comparable product or substitution is proposed, the Contractor shall be solely responsible for verifying that the substitution does not impact the structural design, HVAC, electrical, plumbing or utility requirements, clearances, dimensions or layouts, building or fire code requirements or any other change in the original design. If the substitution does require a change in any of the items noted above or similar design change or physical changes, the contractor shall be responsible for the cost of any redesign and for the additional construction costs associated with the changes due to the substitution.**

- C. Visual Matching Specification: Where Specifications require "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Division 1 Section "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration of Comparable Products: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant product qualities include attributes such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements. **If a comparable product or substitution is proposed, the Contractor shall be solely responsible for verifying that the substitution does not impact the structural design, HVAC, electrical, plumbing or utility requirements, clearances, dimensions or layouts, building or fire code requirements or any other change in the original design. If the substitution does require a change in any of the items noted above or similar design change or physical changes, the contractor shall be responsible for the cost of any redesign and for the additional construction costs associated with the changes due to the substitution.**
 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 3. Evidence that proposed product provides specified warranty.
 4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
 5. Samples, if requested.
 6. **If a Contractor proposes using a comparable product for an item that only listed one product or manufacturer, the Architect will consider the request in the bidding period and during the scope reviews after the bidding period before award of contract at no cost to the Contractor. If the request is made after award of contract, the Architect shall be compensated directly by the Contractor for the Architect's time reviewing the proposal.**
 7. **If a Contractor proposes using a comparable product for an item that listed at least three products or manufacturers, the Architect will consider the request in the**

bidding period at no cost to the Contractor. If the request is made after the bidding period, the Architect shall be compensated directly by the Contractor for the Architect's time reviewing the proposal.

- B. Submittal Requirements: Approval by the Architect of Contractor's request for use of comparable product is not intended to satisfy other submittal requirements. Comply with specified submittal requirements.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Cutting and patching.
 - 5. Coordination of Owner-installed products.
 - 6. Progress cleaning.
 - 7. Starting and adjusting.
 - 8. Protection of installed construction.
 - 9. Correction of the Work.
- B. Related Requirements:
 - 1. Division 1 Section "Summary" for limits on use of Project site.
 - 2. Division 1 Section "Project Management and Coordination."
 - 3. Division 1 Section "Submittal Procedures" for submitting surveys.
 - 4. Division 1 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, replacing defective work, and final cleaning.
 - 5. Division 1 Section "Selective Demolition" for demolition and removal of selected portions of the building.
 - 6. Division 7 Section "Penetration Firestopping" for patching penetrations in fire-rated construction.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

1.4 PREINSTALLATION MEETINGS

- A. Cutting and Patching Conference: Conduct conference at Project site.
1. Prior to submitting cutting and patching plan, review extent of cutting and patching anticipated and examine procedures for ensuring satisfactory result from cutting and patching work. Require representatives of each entity directly concerned with cutting and patching to attend, including the following:
 - a. Contractor's superintendent.
 - b. Trade supervisor responsible for cutting operations.
 - c. Trade supervisor(s) responsible for patching of each type of substrate.
 - d. Mechanical, electrical, and utilities subcontractors' supervisors, to the extent each trade is affecting by cutting and patching operations.
 2. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For land surveyor and professional engineer.
- B. Certificates: Submit certificate signed by land surveyor or professional engineer certifying that location and elevation of improvements comply with requirements.
- C. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
 3. Products: List products to be used for patching and firms or entities that will perform patching work.
 4. Dates: Indicate when cutting and patching will be performed.
 5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
 - a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.
- D. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.
- E. Certified Surveys (work area only): Submit two copies signed by land surveyor or professional engineer.

- F. Final Property Survey (work area only): Class A-2 property survey, class T-2 topographic survey. Submit electronically in CAD and pdf format.

1.6 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect and Structural Engineer before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:
 - a. Primary operational systems and equipment.
 - b. Fire separation assemblies.
 - c. Air or smoke barriers.
 - d. Fire-suppression systems.
 - e. Plumbing piping systems.
 - f. Mechanical systems piping and ducts.
 - g. Control systems.
 - h. Communication systems.
 - i. Fire-detection and -alarm systems.
 - j. Conveying systems.
 - k. Electrical wiring systems.
 - l. Operating systems of special construction.
 3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
 - a. Water, moisture, or vapor barriers.
 - b. Membranes and flashings.
 - c. Exterior curtain-wall construction.
 - d. Sprayed fire-resistive material.
 - e. Equipment supports.
 - f. Piping, ductwork, vessels, and equipment.
 - g. Noise- and vibration-control elements and systems.

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
 1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with sustainable design requirements.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services; and other utilities.
 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
1. Description of the Work.
 2. List of detrimental conditions, including substrates.
 3. List of unacceptable installation tolerances.
 4. Recommended corrections.
- D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Division 1 Section "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect and Construction Manager promptly.
- B. General: Engage a land surveyor or professional engineer to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 2. Establish limits on use of Project site.
 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 4. Inform installers of lines and levels to which they must comply.
 5. Check the location, level and plumb, of every major element as the Work progresses.
 6. Notify Architect and Construction Manager when deviations from required lines and levels exceed allowable tolerances.
 7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect and Construction Manager.

3.4 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
1. Make vertical work plumb and make horizontal work level.
 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
 4. Maintain minimum headroom clearance of 96 inches (2440 mm) in occupied spaces and 90 inches (2300 mm) in unoccupied spaces.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

- F. Tools and Equipment: Where possible, select tools or equipment that minimize production of excessive noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 - 2. Allow for building movement, including thermal expansion and contraction.
 - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- J. Repair or remove and replace damaged, defective, or nonconforming Work.
 - 1. Comply with Section 017700 "Closeout Procedures" for repairing or removing and replacing defective Work.

3.5 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 011000 "Summary."
- F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.
- G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
 - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 6. Proceed with patching after construction operations requiring cutting are complete.
- H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 - 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final

paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.6 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C). Empty dumpsters at the end of each work week at a minimum.
 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Use containers intended for holding waste materials of type to be stored.
 4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
1. Remove liquid spills promptly.
 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Division 1 Section "Construction Waste Management and Disposal."
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 STARTING AND ADJUSTING

- A. Coordinate startup and adjusting of equipment and operating components with requirements in Division 1 Section "General Commissioning Requirements."
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Manufacturer's Field Service: Comply with qualification requirements in Division 1 Section "Quality Requirements."

3.8 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.
- C. Comply with manufacturer's written instructions for temperature and relative humidity

3.9 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Disposing of nonhazardous demolition and construction waste.
- B. Related Requirements:
 - 1. Division 1 Section "Project Management and Coordination."
 - 2. Division 4 Section "Unit Masonry" for disposal requirements for masonry waste.

1.3 DEFINITIONS

- A. Construction Waste: Building, structure, and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building, structure, and site improvement materials resulting from demolition operations.
- C. Disposal: Removal of demolition or construction waste and subsequent salvage, sale, recycling, or deposit in landfill, incinerator acceptable to authorities having jurisdiction, or designated spoil areas on Owner's property.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition and construction waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
 - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 REQUIREMENTS FOR CONSTRUCTION WASTE MANAGEMENT

- A. Overview: Prepare and submit a Construction Waste Management Plan (CWM) to the Owner and Architect for approval. The CWM Plan shall outline the provisions to be implemented to recycle and salvage demolition and construction waste generated during the project. The end-of-project recycling rate shall equal, at minimum, 75% (by weight) of the total waste from construction, demolition, and land clearing activities.
- B. Upon approval of the CWM Plan by the Owner and Architect, it shall be implemented throughout the duration of the project, and documented in accordance with the Submittal Requirements of this Specification. Further Construction Waste Management requirements are as follows.
- C. Construction Waste Management Plan: The Construction Waste Management Plan shall include, but not be limited to, the following components:
 - 1. Listing of Targeted Materials: Develop a list of the waste materials from the Project that will be targeted for reuse, salvage, or recycling. The following materials shall be accounted for (materials that will not be recycled shall be indicated as such):
 - a. Cardboard, paper, packaging
 - b. Clean dimensional wood, palette wood
 - c. Beverage containers
 - d. Concrete
 - e. Bricks
 - f. Concrete Masonry Units (CMU)
 - g. Asphalt
 - h. Metals from banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized sheet steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
 - i. Drywall
 - j. Carpet and pad
 - k. Paint
 - l. Asphalt roofing shingles if applicable for any existing building demolition
 - m. Rigid Foam
 - n. Glass
 - o. Plastics
 - 2. Landfill Information: Provide the name of the landfill(s) where trash will be disposed of and the applicable landfill tipping fee(s).
 - 3. *Sorting Method*: Provide a description of the proposed means of sorting and transporting the recyclable materials (whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site for off-site sorting).
 - 5. Field Conditions: Include provisions in the Construction Waste Management Plan for addressing conditions in the field that do not adhere to the CWM Plan, including provisions to implement a stop work order, or to rectify non-compliant conditions.
 - 6. Recycling facilities: Provide the name of the recycling facilities(s) where materials will be sent for recycling, how it will be recycled, and the applicable fee(s).

7. Additional Information: Include any additional information deemed relevant to describe the scope and intent of the CWM Plan to the Owner and Architect.
- D. Subcontractor Requirements: Construction Waste Management and recycling requirements shall be incorporated into all Subcontractor's contracts.

1.6 ACTION SUBMITTALS

- A. Waste Management Plan: Submit plan within 30 days of date established for the Notice to Proceed.
- C. Record and document the total weight (in tons) of all demolition and construction waste materials recycled or salvaged. Monthly Waste Management Reporting Forms shall be used as the basis for determining the total amount of waste recycled or salvaged for the project. The monthly reporting forms shall specify:
 1. The number of dumpsters or other containers of recycled or salvaged materials for that month;
 2. The volume (in cubic yards) of each dumpster or container of recycled or salvaged materials for that month;
 3. The type of recycled or salvaged material contained in each dumpster or container; and
 4. The weight of the recycled or salvaged material in each dumpster or container. If the weight of the material is not directly measured for each dumpster or container, the Solid Waste Conversion Factors listed for landfill waste (see above) shall be used, where applicable, to convert the volume of material to weight. For materials not contained in the Solid Waste Conversion Factors above (e.g. glass), propose a conversion factor for review by the Owner and Architect.
- D. In addition, provide the name of the receiving facilities/companies that will be purchasing or accepting the recycled or salvaged materials. Receipts or other proof of facility reception of materials is required.
- E. For materials separated for recycling off-site, establish a method for tracking the weight of the recycled material. The method shall be included in the CWM Plan for the Owner's and Architect's review and approval.
- F. Calculate the end-of-project recycling rate percentage by dividing the recycled and salvaged waste (in tons) by the total waste generated (recycled, salvaged, and landfilled waste – also in tons), and multiplying by 100.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.8 QUALITY ASSURANCE

- A. Waste Management Coordinator Qualifications: Experienced firm, or individual employed and assigned by General Contractor, with a record of successful waste management coordination of projects with similar requirements. Superintendent may serve as Waste Management Coordinator.
- B. Refrigerant Recovery Technician Qualifications: Universal certified by EPA-approved certification program.
- C. Regulatory Requirements: Comply with transportation and disposal regulations of authorities having jurisdiction.
- D. Waste Management Conference(s): Conduct conference(s) at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:
 - 1. Review and discuss waste management plan including responsibilities of each contractor and waste management coordinator.
 - 2. Review requirements for documenting quantities of each type of waste and its disposition.
 - 3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 - 4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 - 5. Review waste management requirements for each trade.

1.9 WASTE MANAGEMENT PLAN

- A. General: Prepare and submit a Construction Waste Management Plan (CWM) to the Owner and Architect for approval. The CWM Plan shall outline the provisions to be implemented to recycle and salvage demolition and construction waste generated during the project. The end-of-project recycling rate shall equal, at minimum, 75% (by weight) of the total waste from construction, demolition, and land clearing activities.
- B. Upon approval of the CWM Plan by the Owner and Architect, it shall be implemented throughout the duration of the project, and documented in accordance with the Submittal Requirements of this Specification. Further Construction Waste Management requirements are as follows.
- C. Construction Waste Management Plan: The Construction Waste Management Plan shall include, but not be limited to, the following components:
 - 1. Listing of Targeted Materials: Develop a list of the waste materials from the Project that will be targeted for reuse, salvage, or recycling. The following materials shall be accounted for (materials that will not be recycled shall be indicated as such):
 - a. Cardboard, paper, packaging
 - b. Clean dimensional wood, palette wood

- c. Beverage containers
 - d. Concrete
 - e. Bricks
 - f. Concrete Masonry Units (CMU)
 - g. Asphalt
 - h. Metals from banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized sheet steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
 - i. Drywall
 - j. Carpet and pad
 - k. Paint
 - l. Asphalt roofing shingles if applicable for any existing building demolition
 - m. Rigid Foam
 - n. Glass
 - o. Plastics
- D. Landfill Information: Provide the name of the landfill(s) where trash will be dis-posed of and the applicable landfill tipping fee(s).
- F. Sorting Method: Provide a description of the proposed means of sorting and trans-orting the recyclable materials (whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site for off-site sorting).
- G. Packaging Waste: Provide an estimate of packaging materials generated, and note whether suppliers will eliminate or take back packaging.
- H. Field Conditions: Include provisions in the Construction Waste Management Plan for addressing conditions in the field that do not adhere to the CWM Plan, in-cluding provisions to implement a stop work order, or to rectify non-compliant con-ditions.
- I. Recycling facilities: Provide the name of the recycling facilities(s) where materials will be sent for recycling, how it will be recycled, and the applicable fee(s).
- J. Additional Information: Include any additional information deemed relevant to describe the scope and intent of the CWM Plan to the Owner and Architect.
- K. Subcontractor Requirements: Construction Waste Management and recycling requirements shall be incorporated into all Subcontractor's contracts.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
- B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.
- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
 - 1. Distribute waste management plan to everyone concerned within three days of submittal return.
 - 2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged and recycled.
 - 2. Comply with Construction Manager's requirements for controlling dust and dirt, environmental protection, and noise control.

3.2 WASTE MANAGEMENT MEETINGS

- A. Conduct Construction Waste Management meetings. Meetings shall include Subcontractors affected by the CWM Plan. At a minimum, waste management goals and issues shall be discussed at the following meetings:
 - 1. Pre-bid meeting.
 - 2. Pre-construction meeting.
 - 3. Regular job-site meetings.

3.3 MONTHLY WASTE MANAGEMENT REPORTING FORMS

- A. Monthly Waste Management Reporting Forms shall be submitted to the Owner and Architect for review throughout the duration of the project.

END OF SECTION 017419

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final completion procedures.
 - 3. Warranties.
 - 4. Final cleaning.
 - 5. Repair of the Work.
- B. Related Requirements:
 - 1. Division 1 Section "Operation and Maintenance Data" for additional operation and maintenance manual requirements.
 - 2. Division 1 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
 - 3. Division 1 Section "Demonstration and Training" for requirements to train the Owner's maintenance personnel to adjust, operate, and maintain products, equipment, and systems.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of cleaning agent.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at final completion.

1.4 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.
- C. Field Report: For pest control inspection.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Construction Manager. Label with manufacturer's name and model number.
 - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Construction Manager's signature for receipt of submittals.
 5. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Advise Owner of pending insurance changeover requirements.
 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 3. Complete startup and testing of systems and equipment.
 4. Perform preventive maintenance on equipment used prior to Substantial Completion.
 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Division 1 Section "Demonstration and Training."
 6. Advise Owner of changeover in utility services.

7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
 8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 9. Complete final cleaning requirements.
 10. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 2. Results of completed inspection will form the basis of requirements for final completion.

1.7 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:
1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
 2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 4. Submit pest-control final inspection report.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
 3. Include the following information at the top of each page:
 - a. Project name
 - b. State project no.
 - c. Date.
 - d. Name of Architect and Construction Manager.
 - e. Name of Contractor.
 - f. Page number.
 4. Submit list of incomplete items in the following format:
 - a. MS Excel electronic file. Architect, through Construction Manager, will return annotated file.

1.9 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
- D. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
1. Submit by uploading to web-based project software site.
- E. Warranties in Paper Form:
1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.

2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
- F. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are not planted, mulched, or paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.

- f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Sweep concrete floors broom clean in unoccupied spaces.
 - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
 - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - k. Remove labels that are not permanent.
 - l. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
 - p. Clean luminaires, lamps, globes, and reflectors to function with full efficiency.
 - q. Leave Project clean and ready for occupancy.
- C. Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls." Prepare written report.
- D. Construction Waste Disposal: Comply with waste disposal requirements Section 017419 "Construction Waste Management and Disposal."

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair, or remove and replace, defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
- 1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
 - 2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.

- a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory manuals.
 - 2. Emergency manuals.
 - 3. Systems and equipment operation manuals.
 - 4. Systems and equipment maintenance manuals.
 - 5. Product maintenance manuals.
- B. Related Requirements:
 - 1. Division 1 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
 - 2. Division 1 Section "Closeout Procedures."

1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

- A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Architect will comment on whether content of operation and maintenance submittals is acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

- B. Format: Submit operation and maintenance manuals in the following format:
 - 1. Submit by uploading to web-based project software site. Enable reviewer comments on draft submittals.
 - 2. Submit three paper copies for Owner's records unless Owner requests electronic copies instead. Submittal to Architect shall be electronic.
- C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.
 - 1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.
- E. Comply with Division 1 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

1.5 FORMAT OF OPERATION AND MAINTENANCE MANUALS

- A. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
 - 1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 - 2. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- B. Manuals, Paper Copy: Submit manuals in the form of hard-copy, bound and labeled volumes for the Owner's use and reference (unless Owner requests electronic files only).
 - 1. Binders: Heavy-duty, three-ring, vinyl-covered, post-type binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.

- b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.
2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment. Enclose title pages and directories in clear plastic sleeves.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch (215-by-280-mm) white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

1.6 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization of Manuals: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 1. Title page.
 2. Table of contents.
 3. Manual contents.
- B. Title Page: Include the following information:
 1. Subject matter included in manual.
 2. Name and address of Project.
 3. Name and address of Owner.
 4. Date of submittal.
 5. Name and contact information for Contractor.
 6. Name and contact information for Construction Manager.
 7. Name and contact information for Architect.
 8. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
 9. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

1.7 EMERGENCY MANUALS

- A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- B. Content: Organize manual into a separate section for each of the following:
 1. Type of emergency.
 2. Emergency instructions.
 3. Emergency procedures.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:
 1. Instructions on stopping.
 2. Shutdown instructions for each type of emergency.
 3. Operating instructions for conditions outside normal operating limits.
 4. Required sequences for electric or electronic systems.
 5. Special operating instructions and procedures.

1.8 SYSTEMS AND EQUIPMENT OPERATION MANUALS

- A. Systems and Equipment Operation Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures.
 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.

2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- B. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 2. Performance and design criteria if Contractor has delegated design responsibility.
 3. Operating standards.
 4. Operating procedures.
 5. Operating logs.
 6. Wiring diagrams.
 7. Control diagrams.
 8. Piped system diagrams.
 9. Precautions against improper use.
 10. License requirements including inspection and renewal dates.
- C. Descriptions: Include the following:
1. Product name and model number. Use designations for products indicated on Contract Documents.
 2. Manufacturer's name.
 3. Equipment identification with serial number of each component.
 4. Equipment function.
 5. Operating characteristics.
 6. Limiting conditions.
 7. Performance curves.
 8. Engineering data and tests.
 9. Complete nomenclature and number of replacement parts.
- D. Operating Procedures: Include the following, as applicable:
1. Startup procedures.
 2. Equipment or system break-in procedures.
 3. Routine and normal operating instructions.
 4. Regulation and control procedures.
 5. Instructions on stopping.
 6. Normal shutdown instructions.
 7. Seasonal and weekend operating instructions.
 8. Required sequences for electric or electronic systems.
 9. Special operating instructions and procedures.
- E. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- F. Piped Systems: Diagram piping as installed, and identify color coding where required for identification.

1.9 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.
1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- B. Content: For each system, subsystems, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds as described below.
- C. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- D. Manufacturers' Maintenance Documentation: Include the following information for each component part or piece of equipment:
1. Standard maintenance instructions and bulletins; include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - a. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 3. Identification and nomenclature of parts and components.
 4. List of items recommended to be stocked as spare parts.
- E. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.
 2. Troubleshooting guide.
 3. Precautions against improper maintenance.
 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 5. Aligning, adjusting, and checking instructions.
 6. Demonstration and training video recording, if available.

- F. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
 - 1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 - 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- G. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- H. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- I. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.
- J. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
 - 1. Do not use original project record documents as part of maintenance manuals.

1.10 PRODUCT MAINTENANCE MANUALS

- A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- C. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- D. Product Information: Include the following, as applicable:
 - 1. Product name and model number.
 - 2. Manufacturer's name.
 - 3. Color, pattern, and texture.
 - 4. Material and chemical composition.

5. Reordering information for specially manufactured products.
- E. Maintenance Procedures: Include manufacturer's written recommendations and the following:
1. Inspection procedures.
 2. Types of cleaning agents to be used and methods of cleaning.
 3. List of cleaning agents and methods of cleaning detrimental to product.
 4. Schedule for routine cleaning and maintenance.
 5. Repair instructions.
- F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.
 - 3. Record Product Data.
 - 4. Miscellaneous record submittals.
- B. Related Requirements:
 - 1. Division 1 Section "Closeout Procedures" for general closeout procedures.
 - 2. Division 1 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit copies of record Drawings as follows:
 - a. Initial Submittal:
 - 1) Submit PDF electronic files of scanned record prints and, if requested by Owner, one of file prints.
 - b. Final Submittal:
 - 1) Submit PDF electronic files of scanned record prints and, if requested by Owner, three set(s) of prints.
 - 2) Include each drawing, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit three paper copies and annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.

- C. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit one paper copy and annotated PDF electronic files and directories of each submittal.
- D. Reports: Submit written report weekly indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

1.4 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
 - 1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
 - e. Cross-reference record prints to corresponding photographic documentation.
 - 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Construction Change Directive.
 - k. Details not on the original Contract Drawings.
 - l. Field records for variable and concealed conditions.
 - m. Record information on the Work that is shown only schematically.
 - 3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
 - 4. Mark important additional information that was either shown schematically or omitted from original Drawings.
 - 5. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

- B. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
 2. Consult Architect and General Contractor for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.
- C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. Format: Annotated PDF electronic file with comment function enabled.
 3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
 4. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect and General Contractor.
 - e. Name of Contractor.

1.5 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
 5. Note related Change Orders, record Product Data, and record Drawings where applicable.
- B. Format: Submit record Specifications as annotated PDF electronic file.

1.6 RECORD PRODUCT DATA

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.
- B. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 - 3. Note related Change Orders, record Specifications, and record Drawings where applicable.
- C. Format: Submit record Product Data as annotated PDF electronic file.
 - 1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

1.7 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B. Format: Submit miscellaneous record submittals as PDF electronic file.
 - 1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

1.8 MAINTENANCE OF RECORD DOCUMENTS

- A. Maintenance of Record Documents: Store record documents in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss (ideally electronic). Provide access to project record documents for Architect's and General Contractor's reference during normal working hours.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 017839

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Demolition and removal of selected portions of building or structure.
- 2. Demolition and removal of selected site elements.
- 3. Salvage of existing items to be reused or recycled.

B. Related Requirements:

- 1. Section 011000 "Summary" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.
- 2. Division 1 Section "Construction and Demolition Waste Management."
- 3. Division 1 Section "Temporary Facilities and Controls" for temporary construction and environmental-protection measures for selective demolition operations.
- 4. Division 1 Section "Execution" for cutting and patching procedures for selective demolition operations.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and store, unless item is specifically designated for return to Owner.
- C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.
- E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
 - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at Project Site.
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review structural load limitations of existing structure.
 - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
 - 5. Review areas where existing construction is to remain and requires protection.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Engineering Survey: Submit engineering survey of condition of building.
- C. Stamped shoring layout drawings prepared by the General Contractor's Professional Engineer, indicating location, method and design loads for the temporary shoring system utilized.
- D. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and for noise control. Indicate proposed locations and construction of barriers.
- E. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations, if any, are uninterrupted.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
 - 4. Use of elevator and stairs.
 - 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

- F. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations.
- G. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.7 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.

1.8 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.9 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: Present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
 - 1. Hazardous material remediation is specified elsewhere in the Contract Documents.
 - 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
 - 3. Contractor will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.
- E. Historic Areas: Demolition and hauling equipment and other materials shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, including temporary protection, by 12 inches or more.
- F. Storage or sale of removed items or materials on-site is not permitted.

- G. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

- 1. Maintain fire-protection facilities in service during selective demolition operations.

1.10 COORDINATION

- A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
 - 1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
- D. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.
- E. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

3.2 PREPARATION

- A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
 - 2. Arrange to shut off utilities with utility companies.
 - 3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components unless otherwise indicated.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
 - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
 - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.4 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.

3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 1 Section "Temporary Facilities and Controls."
- B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
1. Strengthen or add new supports when required during progress of selective demolition.
- C. Remove temporary barricades and protections where hazards no longer exist.

3.5 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 5. Maintain fire watch during and for at least 4 hours after flame-cutting operations.
 6. Maintain adequate ventilation when using cutting torches.
 7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 10. Dispose of demolished items and materials promptly. Comply with requirements in Division 1 Section "Construction Waste Management and Disposal."
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

- C. Work in Historic Areas: Selective demolition may be performed only in areas of Project that are not designated as historic. In historic spaces, areas, and rooms, or on historic surfaces, the terms "demolish" or "remove" shall mean historic "removal" or "dismantling" as specified in Section 024296 "Historic Removal and Dismantling."
- D. Removed and Salvaged Items:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers.
 - 3. Store items in a secure area until delivery to Owner.
 - 4. Protect items from damage during transport and storage.
- E. Removed and Reinstalled Items:
 - 1. Clean and repair items to functional condition adequate for intended reuse.
 - 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 - 3. Protect items from damage during transport and storage.
 - 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- F. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition, cleaned, and reinstalled in their original locations after selective demolition operations are complete.

3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to full depth junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.
- B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.
- C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.
- D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.
- E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.
- F. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight. See Division 7 Section "EPDM Roofing" for new roofing requirements.

1. Remove existing roof membrane, flashings, copings, and roof accessories.
2. Remove existing roofing system down to substrate.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and recycle or dispose of them according to Division 1 Section "Construction Waste Management and Disposal."
 1. Do not allow demolished materials to accumulate on-site.
 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 4. Comply with requirements specified in Division 1 Section "Construction Waste Management and Disposal."
- B. Burning: Do not burn demolished materials.

3.8 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119



ENVIRONMENTAL BUILDING SURVEY REPORT

INSPECTION SITE: Project #ANTIA24004
Julian Curtis School
180 East Elm Street
Greenwich, CT 06830

CLIENT: **ANTINOZZI ASSOCIATES**
ARCHITECTURE & INTERIORS
Lisa Yates, AIA, LEED AP
Associate | Senior Project Manager
LYates@antinozzi.com

INSPECTOR: James Twitchell
CT Asbestos Inspector/Mgmt Planner Lic #241
CT Lead Inspector Lic #1822

INSPECTION DATES: July 11, 2024 & July 26, 2024

SITE INFORMATION: School Building

BACKGROUND

The building at the above referenced location is slated for renovations. Antinozzi Associates, for Greenwich Public Schools, hired HYGENIX Division of Pennoni (HDP) Inc. to document the presence of asbestos-containing materials, lead containing painted surfaces, and PCB containing building materials. In addition, the report describes the presence of other potentially hazardous materials and universal wastes, including but not limited to fluorescent lamps, thermostats, and storage batteries.

LIMITATIONS

1. The inspection was limited to the areas identified on the attached drawings in Appendix A and above the first-floor ceilings.
2. The building is currently an occupied school. Destructive sampling was limited to areas and size that could be properly repaired. Hidden and/or inaccessible materials may be present. Any materials not identified in the inventory of asbestos containing or non-asbestos containing materials that are uncovered must be assumed to be asbestos containing until they are sampled and proven to be otherwise.

Asbestos Sampling Protocol

The asbestos inspection and sampling were carried out in accordance with guidelines published in the Asbestos Hazard and Emergency Response Act (AHERA, 40CFR763, Subpart E).

During the inspections of accessible spaces, the inspectors identified "functional spaces or building systems" (e.g. dwelling spaces, storage rooms, boiler rooms, roof systems, heating systems, etc.), and categorized the construction materials within functional spaces and/or system as "homogeneous", based on uniformity in color, age, texture and use. The inspector then compiled a list of building materials suspected to contain asbestos,

and recorded the condition, location and approximate quantity of homogeneous, suspect materials and compared it to available inspection reports and management plans.

From each homogeneous area or building system, the inspectors collected representative "bulk" samples of construction materials suspected to contain asbestos that had not been previously sampled. Sampling was carried out in accordance with the regulatory protocols included in the Asbestos Hazard and Emergency Response Act (AHERA). Table 1 lists the minimum number of samples of each homogeneous material required by the AHERA inspection protocol:

TABLE 1 - AHERA SAMPLING STANDARDS

<u>Homogeneous Material Type</u>		<u>Minimum Number of Samples</u>
Thermal System Insulation		3 Samples
Miscellaneous Materials		2 Samples
Surfacing Materials	< 1000 Sq Ft	3 Samples
	1000-5000 Sq Ft	5 Samples
	> 5000 Sq Ft	7 Samples

Samples of suspect materials were analyzed at AmeriSci New York by polarized light microscopy (PLM) in accordance with EPA procedures. The National Voluntary Laboratory Approval Program (NVLAP) accredits AmeriSci New York to perform bulk asbestos analysis.

Interpretation of Asbestos Test Results

The regulations of CT Department of Public Health and the US EPA define *asbestos containing materials* (ACM's) as materials containing greater than 1% asbestos. If one or more bulk samples of a homogeneous material are found to contain greater than 1% asbestos, then all the homogeneous material is classified as ACM.

Prior to demolition or renovation, asbestos containing building materials or assumed asbestos containing building materials should be removed by a licensed asbestos abatement contractor in accordance with the Connecticut Standards for Asbestos Abatement. For compliance with OSHA requirements, building materials containing any measurable content of asbestos should be handled in a manner that will minimize worker exposure to airborne asbestos.

XRF Lead Paint Sampling Protocol

To determine whether painted surfaces, in the areas to be renovated, have lead containing paint, a pre-renovation lead paint survey was conducted. The lead content of the paint on building components was analyzed at the site using a SciAps X-550 Pb HUD/EPA Lead Paint Analyzer, Serial # X550-02817.

The SciAps analyzer is a screening device capable of measuring the lead content of surfaces covered with multiple layers of paint. The SciAps X-550 readings are not affected by the composition of the substrate materials. Each time the SciAps X-550 is turned on, an electronic calibration is automatically performed. Prior to testing and periodically throughout the survey, the calibration of the analyzer is checked on a surface with a known lead concentration.

Protocols for the assessment of lead in paint are outlined in guidelines published by the US Department of Housing and Urban Development (HUD) and in regulations enforced by Connecticut Department of Public Health

(CT-DPH). In accordance with these protocols, the results of testing with the SciAps X-550 may be interpreted as follows:

Toxic Levels of Lead = Readings greater than or equal to 1.0 mg/cm²*

*Note: OSHA does not currently define a threshold level of lead in paint, which may cause exposure above the action level (AL) and/or permissible exposure limit (PEL). OSHA requires exposure monitoring and steps to prevent worker exposure from exceeding the PEL whenever paint containing any detectable amount of lead is disturbed.

PCB Sampling Protocol

The inspectors from HYGENIX Division of Pennoni performed a visual investigation of the different suspect building materials that will be disturbed during the upcoming building renovation for polychlorinated biphenyls (PCBs). PCB investigations were added to pre-renovation and demolition inspections in 2009 due to changes in the Federal and State regulations which require building Owners to determine if polychlorinated biphenyls (PCBs) are present in suspect materials prior to disposal/disturbance.

In place of sampling, suspect building materials will be assumed to be PCB containing materials and classified as PCB Bulk Product Waste.

Universal Waste Survey Protocol

Visual inventories were conducted to compile lists of universal wastes that should be segregated from the construction and demolition waste. US EPA's Universal Waste requirements are described in Title 40 Part 273 of the Code of Federal Regulations. The EPA requirements apply to the handling and disposal of four categories of waste: batteries, pesticides, mercury-containing equipment, and lamps. Connecticut's Universal Waste requirements are found in Section 22a-449(c)-113 of the Regulations of Connecticut State Agencies. The CT Universal Waste requirements include used electronics in addition to the four categories of Universal Waste regulated by EPA.

INSPECTION SAMPLE RESULTS

Asbestos Containing Building Materials

A copy of PLM asbestos analysis report found in Appendix B.

JULIAN CURTIS SCHOOL, GREENWICH, CT ASBESTOS CONTAINING BUILDING MATERIAL (ACBM) Listed below are materials analyzed by polarized light microscopy and found to contain >1% asbestos and/or <1% asbestos			
Asbestos Material	Location	Estimated Quantity	Comments
1'x2' Cork Ceiling Adhesive	Basement	500 SF	There is more caulk and adhesive in the basement. The quantity provided reflects the area to be renovated.
Pipe Insulation Debris	Basement @ Wall Penetration Near Incinerator	<3 LF	The mastic is not asbestos containing

Exhaust Duct Panel Insulation	Kitchen Exhaust Duct	<3 LF	The insulation is present on a small panel access into the duct. Additional insulation may be present in other locations.
Soft Coat Plaster Ceiling	Entry Lobby, Under Crown Molding	80 SF	The remaining ceiling is sealed with foam along the edge of the crown molding,
Metal & Wood Fire Doors	Most Rooms	12 units	The interior of these doors was not accessible for sampling.
Pipe Insulation	Wet Walls & Other Hidden Locations	288 LF	There are 12 wet walls that may get disturbed during renovations. It is assumed 24 linear feet per wet wall.
Electrical Backer Board	Custodial Closets	4 units	The material is assumed to be asbestos containing.

JULIAN CURTIS SCHOOL, GREENWICH, CT NOT ASBESTOS CONTAINING BUILDING MATERIAL (ACBM) Includes materials analyzed by polarized light microscopy and found to contain $\leq 1\%$ asbestos	
Sheet Rock	Joint Compound
Incinerator Insulation	Incinerator Exterior Brick Mortar
Fiberglass Pipe Insulation Jacket	Old Wire Insulation
3" Black Cove Base – Adhesive	6" Black Cove Base – Adhesive
Plaster (White Coat)	Plaster (Gray Coat)
2x4 Smooth Pattern Ceiling Tile	2x4 Left Right Pattern Ceiling Tile
2x2 Pinhole Pattern Ceiling Tile	Main Entry Patterned Ceiling Tile
12x12 Blue Speckled Floor Tile & Adhesive	12x12 Dark Blue Floor Tile & Adhesive
Gray Flooring Under Tiles	Bathroom White Caulk
Kitchen & Cafeteria Ceramic Glue	Kitchen & Cafeteria Ceramic Grout
Custodial Closets Ceramic Cove Adhesive	Custodial Closet Ceramic Cove Grout
Custodial Closet Ceramic Wall Grout	Custodial Closet Ceramic Wall Adhesive
Custodial Closet Vinyl Wall Glue	Old Ceramic Floor Grout
Old Ceramic Floor Mortar	New Bathrooms – Poured Flooring
Front Door Putty/Glazing	Front Door Caulk
Exterior Sidewalk Black Spacers	Roof Field – Bottom Layer (Flat Roof w/ Hatch)
Roof Perimeter – Top Layer (Flat Roof w/ Hatch)	Roof Perimeter – Bottom Layer (Flat Roof w/ Hatch)

Lead Sample Results

A copy of the XRF Data is found in Appendix C.

A total of three hundred twenty-two (322) readings were recorded by the XRF analyzer. Of these, eight (8) readings were for calibration purposes, and forty-six (46) readings were identified as containing **"toxic levels of lead"**. "Null" readings are readings that were not successfully completed when sampling and are not complete. (Reminder: Every single surface in the building was not tested. Additional lead paint may be present on the interior or exterior painted surfaces that were not tested.) The following surfaces were identified as lead:

- 2nd floor white painted closet door components.
- Bathroom painted door jambs.
- Painted metal stair components.
- Basement painted concrete floor

PCB Sample Results

JULIAN CURTIS SCHOOL, GREENWICH, CT		
ASSUMED POLYCHLORINATED BIPHENYLS CONTAINING BUILDING MATERIAL (PCBs)		
Listed below is the inventory of the assumed PCB containing materials identified in the renovation areas.		
Painted Plaster Walls	Painted Plaster Ceilings	Painted Sheet Rock Walls
Painted Sheet Rock Ceilings	Painted CMU Block	Painted Concrete Floors
Entry Door Putty/Glazing	Entry Door Caulk	

Assumed PCB Bulk Product Waste is covered under the USA EPA Region I PCB division's jurisdiction and by the State of Connecticut in accordance with CT RCSA 22a-463 – 469.

Universal Waste

JULIAN CURTIS SCHOOL, GREENWICH, CT		
UNIVERSAL WASTE		
Listed below are Universal Waste Materials observed during site inspection		
Lower-Level Renovation Areas	Batteries	Emergency lamps/exit signs with batteries (1 location)
	Fluorescent Lamps	Fluorescent fixtures (1)
	Other	Door closers w/ oil (2)
	Other	Smoke detector (1)
Area 2 (Kitchen, Custodial, & Storage)	Batteries	Emergency lamps/exit signs with batteries (4) Storage room batteries (4)
	Fluorescent Lamps	Fluorescent fixtures (13)
	Other	Door closers w/ oil (4)
	Other	Smoke detectors (6)
	Other	Fire strobes (2)
Area 3 (1 st Floor Bathrooms & IT)	Batteries	IT room batteries (2)
	Fluorescent Lamps	Fluorescent fixtures (24)
	Other	Door closers w/ oil (6)
	Other	Smoke detectors (9)
	Other	Fire strobes (4)

	Other	AC Units (2)
Area 4 (Main Office, Principal, & Entry)	Batteries	Emergency lamps/exit signs with batteries (2)
	Fluorescent Lamps	Fluorescent fixtures (12)
	Other	Door closers w/ oil (6)
	Other	Smoke detectors (4)
	Other	Fire strobes (3)
	Other	Unit ventilator motor & capacitor (2)
Area 5 (2 nd Floor Copy Rm, Bath & Custodial))	Batteries	Emergency lamps/exit signs with batteries (2)
	Fluorescent Lamps	Fluorescent fixtures (13)
	Other	Door closers w/ oil (3)
	Other	Smoke detectors (5)
	Other	AC units (2)
Area 6 (2 nd Floor Bathrooms & Computer Rm)	Batteries	Emergency lamps/exit signs with batteries (1)
	Fluorescent Lamps	Fluorescent fixtures (21)
	Other	Door closers w/ oil (4)
	Other	Smoke detectors (5)
	Other	Fire strobes (3)
	Other	AC units (1)

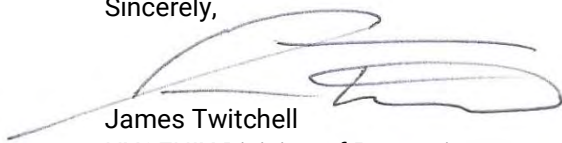
LIMITATIONS

The staff of HYGENIX Division of Pennoni (HDP) has performed its services, within the limits prescribed by our clients, with the usual thoroughness and competence of the industrial hygiene profession.

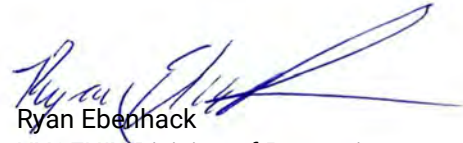
The findings in this report are based upon observations and information available to the inspector during the time of the rendering of the services as described in this report and are based on procedures currently required by applicable laws, regulations, and ordinances. HDP cannot be responsible for conditions or materials the inspector did not observe due to lack of access or was not otherwise reasonably observable. The conclusions in this report are professional opinions based solely upon these findings. The findings and conclusions are intended exclusively for the purpose outlined herein within the scope of work and at the site location and project indicated.

This report is for the sole use of the client. The scope of work performed in execution of this inspection may not be appropriate to satisfy the needs of other users and any reuse of this document or the findings, conclusions, or recommendations presented herein is at the sole risk of said user.

Sincerely,



James Twitchell
HYGENIX Division of Pennoni
Senior Industrial Hygienist / Office Director



Ryan Ebenhack
HYGENIX Division of Pennoni
Staff Industrial Hygienist

APPENDIX A

Inspection Limitation Site Sketch

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ANTINOZZI ASSOCIATES, P.C.
271 Fairfield Avenue
Bridgeport, Connecticut 06604
Tel: (203) 377-1300
Fax: (203) 378-3002 www.antinozzi.com

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CERTIFICATION

PRELIMINARY
APRIL 30, 2024
NOT FOR CONSTRUCTION

CORRELATIVE:

REVISION:	DATE	DESCRIPTION
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JULIAN CURTISS SCHOOL
PHASED RENOVATIONS
GREENWICH PUBLIC SCHOOLS
108 EAST ELM STREET
GREENWICH, CONNECTICUT 06830

INSPECTION
BOUNDARIES

SCALE:	DRAWN BY:	REVIEWED BY:
AS NOTED		
DRAWING NO.:		
DATE:	JOB NUMBER:	
MAY XX, 2024	23015	



BASEMENT ABATEMENT PLAN
SCALE: 1/8" = 1'-0"

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APRIL 30, 2024
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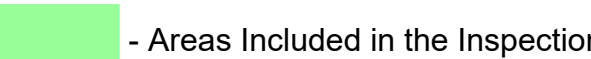
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PHASED RENOVATIONS
GREENWICH PUBLIC SCHOOLS
108 EAST ELM STREET
GREENWICH, CONNECTICUT 06830

INSPECTION
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MAY XX, 2024	23015	



FIRST FLOOR ABATEMENT PLAN

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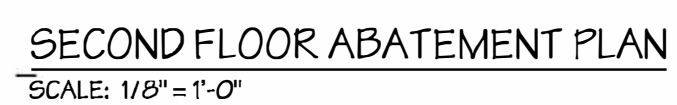
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REVISIONS:

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INSPECTION
BOUNDARIES

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CONSULTANT:

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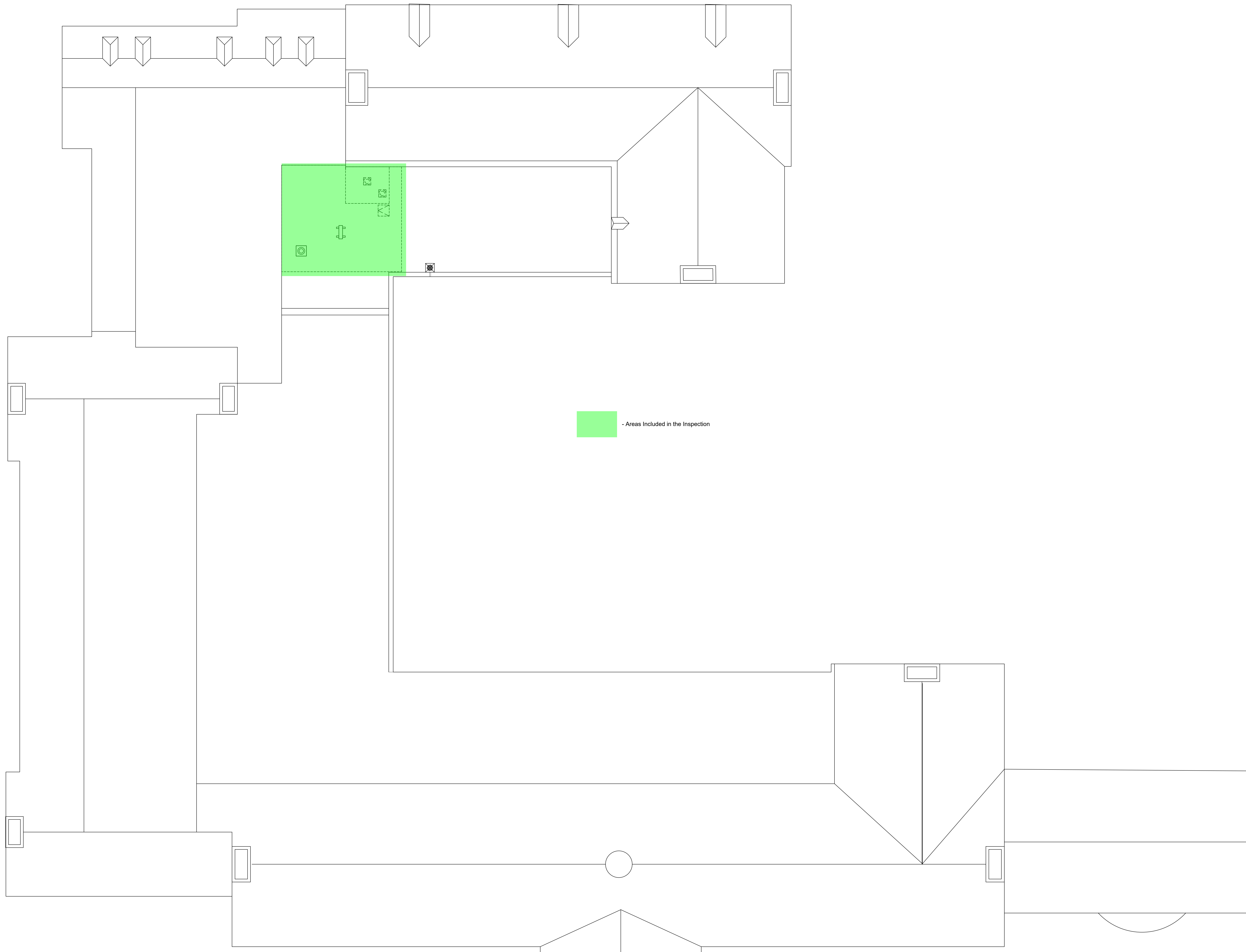
Accessibility Upgrades: Elevator, Entrance, Front Office
GREENWICH PUBLIC SCHOOLS

180 EAST ELM STREET
GREENWICH, CONNECTICUT 06830

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DATE:	JULY 17, 2024	JOB NUMBER:	23015
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OVERALL ROOF ABATEMENT PLAN
SCALE: 1/8" = 1'-0"

APPENDIX B

PLM Asbestos Analysis Reports

**AmeriSci New York**

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

PLM Bulk Asbestos Report

Hygenix Division of Pennoni
Attn: Robert Brown
49 Woodside Street

Stamford, CT 06902

Date Received 07/16/24 **AmeriSci Job #** 224072622
Date Examined 07/18/24 **P.O. #**
Page 1 **of** 16
RE: ANTIA24004; Julian Curtis School; Greenwich, CT

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
JCS-01 1 Location: Custodial Closet 1st - Ceramic Cove Adhesive Analyst Description: Tan, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%	224072622-01	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
JCS-02 1 Location: Custodial Closet 2nd - Ceramic Cove Adhesive Analyst Description: Tan, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%	224072622-02	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
JCS-03 2 Location: Custodial Closet 1st - Ceramic Cove Grout Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%	224072622-03	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
JCS-04 2 Location: Custodial Closet 2nd - Ceramic Cove Grout Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%	224072622-04	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
JCS-05 3 Location: Main Office - Sheet Rock Analyst Description: White/Brown, Homogeneous, Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose 40%, Fibrous glass Trace, Non-fibrous 60%	224072622-05	No	NAD (by CVES) by Emeline M. Frix on 07/18/24

Client Name: Hygenix Division of Pennoni

PLM Bulk Asbestos Report

ANTIA24004; Julian Curtis School; Greenwich, CT

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
JCS-06 3 Location: 2nd Floor Copy - Sheet Rock	224072622-06	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: White, Homogeneous, Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose 2%, Fibrous glass Trace, Non-fibrous 98%			
JCS-07 3 Location: 2nd Floor Room Of Copy - Sheet Rock	224072622-07	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: White, Homogeneous, Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose 2%, Fibrous glass Trace, Non-fibrous 98%			
JCS-08 4 Location: Main Office - Joint Compound	224072622-08	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-09 4 Location: 2nd Floor Copy - Joint Compound	224072622-09	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-10 4 Location: 2nd Floor Room Of Copy - Joint Compound	224072622-10	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-11 5 Location: Area 1 - Incinerator - Interior	224072622-11	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Black/Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			

PLM Bulk Asbestos Report

ANTIA24004; Julian Curtis School; Greenwich, CT

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
JCS-12 5 Location: Area 1 - Incinerator - Interior	224072622-12	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Black, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-13 5 Location: Area 1 - Incinerator - Interior	224072622-13	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Black, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-14 6 Location: Area 1 - Incinerator - Exterior Mortar	224072622-14	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-15 6 Location: Area 1 - Incinerator - Exterior Mortar	224072622-15	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-16 6 Location: Area 1 - Incinerator - Exterior Mortar	224072622-16	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-17 7 Location: Area 1 - Fiberglass Pipe Jacket	224072622-17	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Silver/White, Homogeneous, Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose 80%, Fibrous glass 5%, Non-fibrous 15%			

Client Name: Hygenix Division of Pennoni

PLM Bulk Asbestos Report

ANTIA24004; Julian Curtis School; Greenwich, CT

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
JCS-18 7	224072622-18 Location: Area 1 - Fiberglass Pipe Jacket	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Silver/White, Homogeneous, Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose 55%, Fibrous glass 5%, Non-fibrous 40%			
JCS-19 7	224072622-19 Location: Area 1 - Fiberglass Pipe Jacket	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Silver/White, Homogeneous, Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose 80%, Fibrous glass 5%, Non-fibrous 15%			
JCS-20 8	224072622-20 Location: Area 1 - 1' x 2' Cork CT	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Brown, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-21 8	224072622-21 Location: Area 1 - 1' x 2' Cork CT	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Brown, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-22 9	224072622-22 Location: Area 1 - Cork CT Adhesive	Yes	5% (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Black/Tan, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Chrysotile 5.0 % Other Material: Non-fibrous 95%			
JCS-23 9	224072622-23 Location: Area 1 - Cork CT Adhesive		NA/PS
Analyst Description: Bulk Material Asbestos Types: Other Material:			

Client Name: Hygenix Division of Pennoni

PLM Bulk Asbestos Report

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Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
JCS-24 10	224072622-24 Location: Area 1 - Penetration In Wall @ Incinerator - Insulation Debris	Yes	40% (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: White, Homogeneous, Fibrous, Bulk Material Asbestos Types: Chrysotile 30.0 %, Amosite 10.0 % Other Material: Non-fibrous 60%			
JCS-25 11	224072622-25 Location: Area 1 - Penetration @ Crawl Space Entrance - Insulation Residue	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: White/Brown, Homogeneous, Fibrous, Bulk Material Asbestos Types: Other Material: Fibrous glass 10%, Non-fibrous 90%			
JCS-26 12	224072622-26 Location: Kitchen Office - Ceramic Glue	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Tan, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-27 12	224072622-27 Location: Kitchen / Cafeteria - Ceramic Glue	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Tan, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-28 13	224072622-28 Location: Kitchen Office - Ceramic Grout	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-29 13	224072622-29 Location: Kitchen / Cafeteria - Ceramic Grout	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			

Client Name: Hygenix Division of Pennoni

PLM Bulk Asbestos Report

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Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
JCS-30 14	224072622-30 Location: Custodial Closet 1st - Wire Insulation	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Brown, Homogeneous, Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose 98%, Non-fibrous 2%			
JCS-31 14	224072622-31 Location: Custodial Closet 2nd - Wire Insulation	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Brown, Homogeneous, Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-32 15	224072622-32 Location: 1st Floor Boys - New Bathroom Floor	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Blue, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-33 15	224072622-33 Location: 1st Floor Girls - New Bathroom Floor	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Blue, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-34 16	224072622-34 Location: 3" Black Cove - Adhesive	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Tan, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-35 16	224072622-35 Location: 3" Black Cove - Adhesive	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Tan, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			

PLM Bulk Asbestos Report

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Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
JCS-36 16	224072622-36 Location: 6" Black Cove - Adhesive	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Tan, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-37 16	224072622-37 Location: 6" Black Cove - Adhesive	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Tan, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-38 17	224072622-38 Location: 2nd Copy - Ceiling - Plaster (White)	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-39 18	224072622-39 Location: 2nd Copy - Ceiling - Plaster (Gray)		NA ¹
Analyst Description: Bulk Material Asbestos Types: Other Material:			
JCS-40 17	224072622-40 Location: 2nd Dumbwaiter - Plaster (White)	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-41 18	224072622-41 Location: 2nd Dumbwaiter - Plaster (Gray)	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Cellulose Trace, Non-fibrous 100%			

PLM Bulk Asbestos Report

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Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
JCS-42 17	224072622-42 Location: 1st Dumbwaiter - Plaster (White)	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-43 18	224072622-43 Location: 1st Dumbwaiter - Plaster (Gray)	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Cellulose Trace, Non-fibrous 100%			
JCS-44 17	224072622-44 Location: 1st Custodial Closet Near Storage - Plaster (White)	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-45 18	224072622-45 Location: 1st Custodial Closet Near Storage - Plaster (Gray)	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-46 17	224072622-46 Location: PTO Closet - Plaster (White)	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-47 18	224072622-47 Location: PTO Closet - Plaster (Gray)	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Cellulose Trace, Non-fibrous 100%			

PLM Bulk Asbestos Report

ANTIA24004; Julian Curtis School; Greenwich, CT

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
JCS-48 17	224072622-48 Location: 1st Floor Storage Ceiling - Plaster (White)	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-49 18	224072622-49 Location: 1st Floor Storage Ceiling - Plaster (Gray)	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Cellulose Trace, Non-fibrous 100%			
JCS-50 17	224072622-50 Location: Kitchen Office Plaster Ceiling - Plaster (White)	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-51 18	224072622-51 Location: Kitchen Office Plaster Ceiling - Plaster (Gray)	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Cellulose Trace, Non-fibrous 100%			
JCS-52 19	224072622-52 Location: Principal Bathroom Old Ceramic Floor - Grout	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Cellulose Trace, Non-fibrous 100%			
JCS-53 19	224072622-53 Location: Custodial Closet Old Ceramic Floor - Grout	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Cellulose Trace, Non-fibrous 100%			

PLM Bulk Asbestos Report

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Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
JCS-54 20	224072622-54 Location: Principal Bathroom Old Ceramic Floor - Mortar	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-55 20	224072622-55 Location: Custodial Closet Old Ceramic Floor - Mortar	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-56 21	224072622-56 Location: Custodial Closet 1st - Ceramic Wall Grout	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Beige, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-57 21	224072622-57 Location: Custodial Closet 2nd - Ceramic Wall Grout	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Beige, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-58 22	224072622-58 Location: Custodial Closet 1st - Ceramic Wall Glue	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Tan, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-59 22	224072622-59 Location: Custodial Closet 2nd - Ceramic Wall Glue	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Tan, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			

Client Name: Hygenix Division of Pennoni

PLM Bulk Asbestos Report

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Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
JCS-60 23	224072622-60 Location: 1st Floor Custodial Closet - Vinyl Wall - Glue	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-61 23	224072622-61 Location: 1st Floor Custodial Closet - Vinyl Wall - Glue	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-62 24	224072622-62 Location: Kitchen - 2 x 4 Smooth CT	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: White/Brown, Homogeneous, Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose 30%, Fibrous glass Trace, Non-fibrous 70%			
JCS-63 24	224072622-63 Location: Kitchen - 2 x 4 Smooth CT	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: White/Brown, Homogeneous, Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose 10%, Fibrous glass Trace, Non-fibrous 90%			
JCS-64 25	224072622-64 Location: Kitchen Office - 2 x 4 LR CT	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: White/Gray, Homogeneous, Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose 60%, Fibrous glass 10%, Non-fibrous 30%			
JCS-65 25	224072622-65 Location: Kitchen Office - 2 x 4 LR CT	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: White/Gray, Homogeneous, Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose 60%, Fibrous glass 10%, Non-fibrous 30%			

Client Name: Hygenix Division of Pennoni

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Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
JCS-66 26	224072622-66 Location: 2nd Floor Girls - 2 x 2 Pinhole CT	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Gray/Brown, Homogeneous, Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose 60%, Fibrous glass 20%, Non-fibrous 20%			
JCS-67 26	224072622-67 Location: 2nd Floor Boys - 2 x 2 Pinhole CT	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Gray/Brown, Homogeneous, Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose 60%, Fibrous glass 20%, Non-fibrous 20%			
JCS-68 27	224072622-68 Location: Main Entry - Pattern CT	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: White/Grey, Homogeneous, Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose 70%, Fibrous glass 10%, Non-fibrous 20%			
JCS-69 28	224072622-69 Location: Principal - Glue	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Tan, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Cellulose 5%, Non-fibrous 95%			
JCS-70 29	224072622-70 Location: Principal - 12 x 12 Blue Speck FT	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Green, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-71 28	224072622-71 Location: Office Closet - Glue	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Tan, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Cellulose 5%, Non-fibrous 95%			

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Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
JCS-72 29	224072622-72 Location: Office Closet - 12 x 12 Blue Speck FT	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Green, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-73 30	224072622-73 Location: 1st Floor IT - Gray Flooring	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-74 31	224072622-74 Location: 1st Floor IT - Adhesive	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-75 32	224072622-75 Location: 1st Floor IT - 12 x 12 Dark Blue	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Blue, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-76 30	224072622-76 Location: 2nd Floor Music - Gray Flooring	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-77 31	224072622-77 Location: 2nd Floor Music - Adhesive	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			

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Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
JCS-78 32	224072622-78 Location: 2nd Floor Music - 12 x 12 Dark Blue	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Blue, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-79 33	224072622-79 Location: Kitchen Exhaust Duct - Insulation On Panel	Yes	50% (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Gray, Homogeneous, Fibrous, Bulk Material Asbestos Types: Chrysotile 50.0 % Other Material: Cellulose 20%, Non-fibrous 30%			
JCS-80 34	224072622-80 Location: Bath 1st Floor Women's - Caulk	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-81 34	224072622-81 Location: Bath 1st Floor Men's - Caulk	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-82 35	224072622-82 Location: Wet Wall Access - 1st Floor - Pipe Insulation	Yes	70% (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Gray, Homogeneous, Fibrous, Bulk Material Asbestos Types: Chrysotile 70.0 % Other Material: Non-fibrous 30%			
JCS-83 36	224072622-83 Location: Front Door Window - Putty	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			

Client Name: Hygenix Division of Pennoni

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Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
JCS-84 36	224072622-84 Location: Front Door Window - Putty	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-85 37	224072622-85 Location: Front Door - Caulk	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-86 37	224072622-86 Location: Front Door - Caulk	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JCS-87 38	224072622-87 Location: Sidewalk Right Side - Black Spacer	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Black, Homogeneous, Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose 40%, Non-fibrous 60%			
JCS-88 38	224072622-88 Location: Sidewalk Left Side - Black Spacer	No	NAD (by CVES) by Emeline M. Frix on 07/18/24
Analyst Description: Black, Homogeneous, Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose 40%, Non-fibrous 60%			

Client Name: Hygenix Division of Pennoni

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Reporting Notes:

- (1) Insufficient material submitted for accurate quantitation during PLM analysis (no QC possible).

Analyzed by: Emeline M. Frix
Date: 7/18/2024



Reviewed by: Emeline M. Frix



*NAD/NSD =no asbestos detected; NA =not analyzed; NA/PS=not analyzed/positive stop, (SOF-V) = Sprayed On Fireproofing containing Vermiculite; (SM-V) = Surfacing Material containing Vermiculite; PLM Bulk Asbestos Analysis using Motic, Model BA310 Pol Scope, Microscope, Serial #: 1190000538, by Appd E to Subpt E, 40 CFR 763 quantified by either CVES or 400 pt ct as noted for each analysis (NVLAP 200546-0), ELAP PLM Method 198.1 for NY friable samples, which includes the identification and quantitation of vermiculite, or ELAP 198.6 for NOB samples, or EPA 400 pt ct by EPA 600-M4-82-020 (NY ELAP Lab 11480); Note:PLM is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. NAD or Trace results by PLM are inconclusive, TEM is currently the only method that can be used to determine if this material can be considered or treated as non asbestos-containing in NY State (also see EPA Advisory for floor tile, FR 59,146,38970,8/1/94) National Institute of Standards and Technology Accreditation requirements mandate that this report must not be reproduced except in full without the approval of the lab.This PLM report relates ONLY to the items tested. RI Cert AAL-094, CT Cert PH-0186, Mass Cert AA000054, NJ Lab ID #NY031.

_____END OF REPORT_____

ASBESTOS PLM BULK SAMPLE LOG

Client: ANTIA24004

Site: Julian Curtis School

Greenwich, CT

Type: PLM

Tech: JT

Date: 07/11/24



49 Woodside Street
Stamford, CT 06902
(203) 324-2222 (phone)
www.pennoni.com

LAB ID#	SAMPLE #	SAMPLING LOCATION	DESCRIPTION	QTY.	RESULT
	JCS-01	Custodial Closet 1 st	Ceramic Cove Adhesive		
	JCS-02	Custodial Closet 2 nd	Ceramic Cove Adhesive		
	JCS-03	Custodial Closet 1 st	Ceramic Cove Grout		
	JCS-04	Custodial Closet 2 nd	Ceramic Cove Grout		
	JCS-05	Main Office	Sheet Rock		
	JCS-06	2 nd Floor Copy	Sheet Rock		
	JCS-07	2 nd Floor Room of Copy	Sheet Rock		
	JCS-08	Main Office	Joint Compound		
	JCS-09	2 nd Floor Copy	Joint Compound		
	JCS-10	2 nd Floor Room of Copy	Joint Compound		
	JCS-11	Area 1 - Incinerator	Interior		
	JCS-12	Area 1 - Incinerator	Interior		
	JCS-13	Area 1 - Incinerator	Interior		
	JCS-14	Area 1 - Incinerator	Exterior Mortar		
	JCS-15	Area 1 - Incinerator	Exterior Mortar		
	JCS-16	Area 1 - Incinerator	Exterior Mortar		
	JCS-17	Area 1	Fiberglass Pipe Jacket		
	JCS-18	Area 1	Fiberglass Pipe Jacket		
	JCS-19	Area 1	Fiberglass Pipe Jacket		
	JCS-20	Area 1	1'x2' Cork CT		
	JCS-21	Area 1	1'x2' Cork CT		
	JCS-22	Area 1	Cork CT Adhesive		
	JCS-23	Area 1	Cork CT Adhesive		
	JCS-24	Area 1 - Penetration in Wall @ Incinerator	Insulation Debris		

Notes: Till Positive. 5 Day TAT

Relinquished By: *[Signature]*

Date/Time: *7/16/24 14:20*

Received By: *[Signature]*

Date/Time: *7/16/24 14:20*

jtwitchell@pennoni.com

224072622

ASBESTOS PLM BULK SAMPLE LOG

Client: ANTIA24004

Site: Julian Curtis School

Greenwich, CT

Type: PLM

Tech: JT

Date: 07/11/24



49 Woodside Street
Stamford, CT 06902
(203) 324-2222 (phone)
www.pennoni.com

LAB ID#	SAMPLE #	SAMPLING LOCATION	DESCRIPTION	QTY.	RESULT
	JCS-25	Area 1 - Penetration @ Crawl Space Entrance	Insulation Residue		
	JCS-26	Kitchen Office	Ceramic Glue		
	JCS-27	Kitchen/Cafeteria	Ceramic Glue		
	JCS-28	Kitchen Office	Ceramic Grout		
	JCS-29	Kitchen/Cafeteria	Ceramic Grout		
	JCS-30	Custodial Closet 1 st	Wire Insulation		
	JCS-31	Custodial Closet 2 nd	Wire Insulation		
	JCS-32	1 st Floor Boys	New Bathroom Floor		
	JCS-33	1 st Floor Girls	New Bathroom Floor		
	JCS-34	3" Black Cove	Adhesive		
	JCS-35	3" Black Cove	Adhesive		
	JCS-36	6" Black Cove	Adhesive		
	JCS-37	6" Black Cove	Adhesive		
	JCS-38	2 nd Copy - Ceiling	Plaster (White)		
	JCS-39	2 nd Copy - Ceiling	Plaster (Gray)		
	JCS-40	2 nd Dumbwaiter	Plaster (White)		
	JCS-41	2 nd Dumbwaiter	Plaster (Gray)		
	JCS-42	1 st Dumbwaiter	Plaster (White)		
	JCS-43	1 st Dumbwaiter	Plaster (Gray)		
	JCS-44	1 st Custodial Closet Near Storage	Plaster (White)		
	JCS-45	1 st Custodial Closet Near Storage	Plaster (Gray)		
	JCS-46	PTO Closet	Plaster (White)		
	JCS-47	PTO Closet	Plaster (Gray)		
	JCS-48	1 st Floor Storage Ceiling	Plaster (White)		

CHAIN OF CUSTODY

Notes: Till Positive. 5 Day TAT

Relinquished By:	Date/Time:	Received By:	Date/Time: 7/16/24 14:20
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jtwitchell@pennoni.com

224072622

ASBESTOS PLM BULK SAMPLE LOG

Client: ANTIA24004

Site: Julian Curtis School

Greenwich, CT

Type: PLM

Tech: JT

Date: 07/11/24



49 Woodside Street
Stamford, CT 06902
(203) 324-2222 (phone)
www.pennoni.com

LAB ID#	SAMPLE #	SAMPLING LOCATION	DESCRIPTION	QTY.	RESULT
	JCS-49	1 st Floor Storage Ceiling	Plaster (Gray)		
	JCS-50	Kitchen Office Plaster Ceiling	Plaster (White)		
	JCS-51	Kitchen Office Plaster Ceiling	Plaster (Gray)		
	JCS-52	Principal Bathroom Old Ceramic Floor	Grout		
	JCS-53	Custodial Closet Old Ceramic Floor	Grout		
	JCS-54	Principal Bathroom Old Ceramic Floor	Mortar		
	JCS-55	Custodial Closet Old Ceramic Floor	Mortar		
	JCS-56	Custodial Closet 1 st	Ceramic Wall Grout		
	JCS-57	Custodial Closet 2 nd	Ceramic Wall Grout		
	JCS-58	Custodial Closet 1 st	Ceramic Wall Glue		
	JCS-59	Custodial Closet 2 nd	Ceramic Wall Glue		
	JCS-60	1 st Floor Custodial Closet – Vinyl Wall	Glue		
	JCS-61	1 st Floor Custodial Closet – Vinyl Wall	Glue		
	JCS-62	Kitchen	2x4 Smooth CT		
	JCS-63	Kitchen	2x4 Smooth CT		
	JCS-64	Kitchen Office	2x4 LR CT		
	JCS-65	Kitchen Office	2x4 LR CT		
	JCS-66	2 nd Floor Girls	2x2 Pinhole CT		
	JCS-67	2 nd Floor Boys	2x2 Pinhole CT		
	JCS-68	Main Entry	Pattern CT		
	JCS-69	Principal	Glue		
	JCS-70	Principal	12x12 Blue Speck FT		
	JCS-71	Office Closet	Glue		
	JCS-72	Office Closet	12x12 Blue Speck FT		

Notes: Till Positive. 5 Day TAT

jtwitchell@pennoni.com

CHAIN OF CUSTODY

Relinquished By:	Date/Time:	Received By:	Date/Time: 7/16/24 14:26
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224072622

ASBESTOS PLM BULK SAMPLE LOG

Client: ANTIA24004

Site: Julian Curtis School

Greenwich, CT

Type: PLM

Tech: JT

Date: 07/11/24



49 Woodside Street
Stamford, CT 06902
(203) 324-2222 (phone)
www.pennoni.com

LAB ID#	SAMPLE #	SAMPLING LOCATION	DESCRIPTION	QTY.	RESULT
	JCS-73	1 st Floor IT	Gray Flooring		
	JCS-74	1 st Floor IT	Adhesive		
	JCS-75	1 st Floor IT	12x12 Dark Blue		
	JCS-76	2 nd Floor Music	Gray Flooring		
	JCS-77	2 nd Floor Music	Adhesive		
	JCS-78	2 nd Floor Music	12x12 Dark Blue		
	JCS-79	Kitchen Exhaust Duct	Insulation on Panel		
	JCS-80	Bath 1 st Floor Women's	Caulk		
	JCS-81	Bath 1 st Floor Men's	Caulk		
	JCS-82	Wet Wall Access - 1 st Floor	Pipe Insulation		
	JCS-83	Front Door Window	Putty		
	JCS-84	Front Door Window	Putty		
	JCS-85	Front Door	Caulk		
	JCS-86	Front Door	Caulk		
	JCS-87	Sidewalk Right Side	Black Spacer		
	JCS-88	Sidewalk Left Side	Black Spacer		

CHAIN OF CUSTODY

Notes: Till Positive, 5 Day TAT

Relinquished By:	Date/Time:	Received By:	Date/Time: 7/16/24 14:20
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itwitchell@pennoni.com

224072622

**AmeriSci New York**

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

PLM Bulk Asbestos Report

Hygenix Division of Pennoni
Attn: Robert Brown
49 Woodside Street

Stamford, CT 06902

Date Received 07/29/24 **AmeriSci Job #** 224074098
Date Examined 08/01/24 **P.O. #**
Page 1 of 2
RE: ANTIA24004 P01; Antinozzi; Julian Curtiss School, Greenwich,
CT

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
JC-01 Location: Roof With Hatch - Field 1 Bottom Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Fibrous glass 5%, Non-fibrous 95%	224074098-01	No	NAD (by CVES) by Emeline M. Frix on 08/01/24
JC-02 Location: Roof With Hatch - Field 1 Top Analyst Description: Black/Brown, Homogeneous, Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose 30%, Fibrous glass 5%, Non-fibrous 65%	224074098-02	No	NAD (by CVES) by Emeline M. Frix on 08/01/24
JC-03 Location: Roof With Hatch - Field 2 Bottom Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose 5%, Fibrous glass Trace, Non-fibrous 95%	224074098-03	No	NAD (by CVES) by Emeline M. Frix on 08/01/24
JC-04 Location: Roof With Hatch - Perimeter 1, Bottom Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Fibrous glass 5%, Non-fibrous 95%	224074098-04	No	NAD (by CVES) by Emeline M. Frix on 08/01/24
JC-05 Location: Roof With Hatch - Perimeter 1, Top Analyst Description: Black/Brown, Homogeneous, Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose 10%, Fibrous glass 5%, Non-fibrous 85%	224074098-05	No	NAD (by CVES) by Emeline M. Frix on 08/01/24

Client Name: Hygenix Division of Pennoni

PLM Bulk Asbestos Report

ANTIA24004 P01; Antinozzi; Julian Curtiss School, Greenwich,
CT

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
JC-06	224074098-06	No	NAD
Location: Roof With Hatch - Penetration, Top / On Unit			(by CVES) by Emeline M. Frix on 08/01/24
Analyst Description: Black/Gray, Heterogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 100%			
JC-07	224074098-07	No	NAD
Location: Roof With Hatch - Penetration, Bottom			(by CVES) by Emeline M. Frix on 08/01/24
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Fibrous glass 5%, Non-fibrous 95%			

Reporting Notes:

Analyzed by: Emeline M. Frix
Date: 8/1/2024

Reviewed by: Emeline M. Frix



*NAD/NSD =no asbestos detected; NA =not analyzed; NA/PS=not analyzed/positive stop, (SOF-V) = Sprayed On Fireproofing containing Vermiculite; (SM-V) = Surfacing Material containing Vermiculite; PLM Bulk Asbestos Analysis using Motic, Model BA310 Pol Scope, Microscope, Serial #: 1190000538, by Appd E to Subpt E, 40 CFR 763 quantified by either CVES or 400 pt ct as noted for each analysis (NVLAP 200546-0), ELAP PLM Method 198.1 for NY friable samples, which includes the identification and quantitation of vermiculite, or ELAP 198.6 for NOB samples, or EPA 400 pt ct by EPA 600-M4-82-020 (NY ELAP Lab 11480); Note:PLM is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. NAD or Trace results by PLM are inconclusive, TEM is currently the only method that can be used to determine if this material can be considered or treated as non asbestos-containing in NY State (also see EPA Advisory for floor tile, FR 59,146,38970,8/1/94) National Institute of Standards and Technology Accreditation requirements mandate that this report must not be reproduced except in full without the approval of the lab.This PLM report relates ONLY to the items tested. RI Cert AAL-094, CT Cert PH-0186, Mass Cert AA000054, NJ Lab ID #NY031.

____END OF REPORT____

ASBESTOS P.I.M. BULK SAMPLE LOG

Type: PLM

Julian Curtiss Schaefer

Tech: RF-

Greenwich, CT

Date: 7/26/24



224074098

49 Woodside Street
Stanford, CT 06902
(203) 324-2222 (phone)
www.pennoni.com

[illegible]

Notes: [REDACTED] 5 Day TAT

Results to - rebernhack@permonix.com

Rt	7/26/24	090000	7/29/24 10:22.	Analyse All
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APPENDIX C

XRF Lead Analysis Reports

Test #	Serial #	Calibration Site	Inspector	Surface	Substrate	Pb	Pb +/-	Pb P/F	Unit type
231	X550-02817	PCS Cal	Julian Curtis	JMT	Calibrate		1	0.1 Positive	mg/cm2
232	X550-02817	PCS Cal	Julian Curtis	JMT	Calibrate		1	0.1 Positive	mg/cm2
233	X550-02817	PCS Cal	Julian Curtis	JMT	Calibrate		1	0.1 Positive	mg/cm2
234	X550-02817	PCS Cal	Julian Curtis	JMT	Calibrate		1	0.1 Positive	mg/cm2
235	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Glazed Block	0	0.1 Negative	mg/cm2
236	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Glazed Block	0	0.1 Negative	mg/cm2
237	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Glazed Block	0	0.1 Negative	mg/cm2
238	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Glazed Block	0	0.1 Negative	mg/cm2
239	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Glazed Block	0	0.1 Negative	mg/cm2
240	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Glazed Block	0	0.1 Negative	mg/cm2
241	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Glazed Block	0	0.1 Negative	mg/cm2
242	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Glazed Block	0	0.1 Negative	mg/cm2
243	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Glazed Block	0	0.1 Negative	mg/cm2
244	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Glazed Block	0	0.1 Negative	mg/cm2
245	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Glazed Block	0	0.1 Negative	mg/cm2
246	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Glazed Block	0	0.1 Negative	mg/cm2
247	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Glazed Block	0	0.1 Negative	mg/cm2
248	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Glazed Block	0	0.1 Negative	mg/cm2
249	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Glazed Block	0	0.1 Negative	mg/cm2
250	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Glazed Block	0	0.1 Negative	mg/cm2
251	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Glazed Block	0	0.1 Negative	mg/cm2
252	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Glazed Block	0	0.1 Negative	mg/cm2
253	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Glazed Block	0	0.1 Negative	mg/cm2
254	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Glazed Block	0	0.1 Negative	mg/cm2
255	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Glazed Block	0	0.1 Negative	mg/cm2
256	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Glazed Block	0	0.1 Negative	mg/cm2
257	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Glazed Block	0	0.1 Negative	mg/cm2
258	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Glazed Block	0	0.1 Negative	mg/cm2
259	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Glazed Block	0	0.1 Negative	mg/cm2
260	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Glazed Block	0	0.1 Negative	mg/cm2
261	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Glazed Block	0	0.1 Negative	mg/cm2
262	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Glazed Block	0	0.1 Negative	mg/cm2

263	X550-02817	LeadPaint	Julian Curtis	JMT	White Paint		0.1	0.1 Negative	mg/cm2
264	X550-02817	LeadPaint	Julian Curtis	JMT	White Paint		0.3	0.1 Negative	mg/cm2
265	X550-02817	LeadPaint	Julian Curtis	JMT	White Paint	Closet Door	1	0.1 Positive	mg/cm2
266	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Plaster	0.1	0.1 Negative	mg/cm2
267	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Plaster	0.2	0.1 Negative	mg/cm2
268	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Plaster	0.3	0.1 Negative	mg/cm2
269	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Plaster	0.3	0.1 Negative	mg/cm2
270	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Plaster	0.2	0.1 Negative	mg/cm2
271	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Plaster	0	0.1 Negative	mg/cm2
272	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Plaster	0.3	0.1 Negative	mg/cm2
273	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Plaster	0.1	0.1 Negative	mg/cm2
274	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Plaster	0.2	0.1 Negative	mg/cm2
275	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Plaster	0	0.1 Negative	mg/cm2
276	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Plaster	0.2	0.1 Negative	mg/cm2
277	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Plaster	0	0.1 Negative	mg/cm2
278	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Plaster	0	0.1 Negative	mg/cm2
279	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Plaster	0.6	0.1 Negative	mg/cm2
280	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Plaster	0.3	0.1 Negative	mg/cm2
281	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Plaster	0.2	0.1 Negative	mg/cm2
282	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Plaster	0.1	0.1 Negative	mg/cm2
283	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Plaster	0.2	0.1 Negative	mg/cm2
284	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Plaster	0.1	0.1 Negative	mg/cm2
285	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Plaster	0.2	0.1 Negative	mg/cm2
286	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Plaster	0	0.1 Negative	mg/cm2
287	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Plaster	0	0.1 Negative	mg/cm2
288	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Plaster	0	0.1 Negative	mg/cm2
289	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Plaster	0	0.1 Negative	mg/cm2
290	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Plaster	0.2	0.1 Negative	mg/cm2
291	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Plaster	0.3	0.1 Negative	mg/cm2
292	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Plaster	0	0.1 Negative	mg/cm2
293	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Plaster	0.2	0.1 Negative	mg/cm2
294	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Plaster	0.4	0.1 Negative	mg/cm2
295	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Plaster	0.3	0.1 Negative	mg/cm2

296	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Plaster	0.3	0.1	Negative	mg/cm2
297	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Plaster	0	0.1	Negative	mg/cm2
298	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Plaster	0.4	0.1	Negative	mg/cm2
299	X550-02817	LeadPaint	Julian Curtis	JMT	Wall	Plaster	0	0.1	Negative	mg/cm2
300	X550-02817	LeadPaint	Julian Curtis	JMT	Doors	Wood	0	0.1	Negative	mg/cm2
301	X550-02817	LeadPaint	Julian Curtis	JMT	Doors	Wood	0.6	0.1	Negative	mg/cm2
302	X550-02817	LeadPaint	Julian Curtis	JMT	Doors	Wood	0	0.1	Negative	mg/cm2
303	X550-02817	LeadPaint	Julian Curtis	JMT	Doors	Wood	0	0.1	Negative	mg/cm2
304	X550-02817	LeadPaint	Julian Curtis	JMT	Doors	Wood	0	0.1	Negative	mg/cm2
305	X550-02817	LeadPaint	Julian Curtis	JMT	Doors	Wood	0	0.1	Negative	mg/cm2
306	X550-02817	LeadPaint	Julian Curtis	JMT	Doors	Wood	0	0.1	Negative	mg/cm2
307	X550-02817	LeadPaint	Julian Curtis	JMT	Doors	Wood	0	0.1	Negative	mg/cm2
308	X550-02817	LeadPaint	Julian Curtis	JMT	Doors	Wood	0	0.1	Negative	mg/cm2
309	X550-02817	LeadPaint	Julian Curtis	JMT	Doors	Wood	0	0.1	Negative	mg/cm2
310	X550-02817	LeadPaint	Julian Curtis	JMT	Doors	Wood	0.1	0.1	Negative	mg/cm2
311	X550-02817	LeadPaint	Julian Curtis	JMT	Doors	Wood	0.3	0.1	Negative	mg/cm2
312	X550-02817	LeadPaint	Julian Curtis	JMT	Doors	Wood	0.3	0.1	Negative	mg/cm2
313	X550-02817	LeadPaint	Julian Curtis	JMT	Doors	Wood	0	0.1	Negative	mg/cm2
314	X550-02817	LeadPaint	Julian Curtis	JMT	Doors	Wood	0	0.1	Negative	mg/cm2
315	X550-02817	LeadPaint	Julian Curtis	JMT	Doors	Wood	0.3	0.1	Negative	mg/cm2
316	X550-02817	LeadPaint	Julian Curtis	JMT	Doors	Wood	0.2	0.1	Negative	mg/cm2
317	X550-02817	LeadPaint	Julian Curtis	JMT	Doors	Wood	0.1	0.1	Negative	mg/cm2
318	X550-02817	LeadPaint	Julian Curtis	JMT	Doors	Wood	0.2	0.1	Negative	mg/cm2
319	X550-02817	LeadPaint	Julian Curtis	JMT	Doors	Wood	0	0.1	Negative	mg/cm2
320	X550-02817	LeadPaint	Julian Curtis	JMT	Doors	Wood	0	0.1	Negative	mg/cm2
321	X550-02817	LeadPaint	Julian Curtis	JMT	Doors	Wood	0.4	0.1	Negative	mg/cm2
322	X550-02817	LeadPaint	Julian Curtis	JMT	Doors	Wood	0	0.1	Negative	mg/cm2
323	X550-02817	LeadPaint	Julian Curtis	JMT	Doors	Wood	0.2	0.1	Negative	mg/cm2
324	X550-02817	LeadPaint	Julian Curtis	JMT	Doors	Wood	0	0.1	Negative	mg/cm2
325	X550-02817	LeadPaint	Julian Curtis	JMT	Doors	Wood	0	0.1	Negative	mg/cm2
326	X550-02817	LeadPaint	Julian Curtis	JMT	Doors	Wood	0.2	0.1	Negative	mg/cm2
327	X550-02817	LeadPaint	Julian Curtis	JMT	Doors	Wood	0	0.1	Negative	mg/cm2
328	X550-02817	LeadPaint	Julian Curtis	JMT	Doors	Wood	0.1	0.1	Negative	mg/cm2

329	X550-02817	LeadPaint	Julian Curtis	JMT	Bathroom	Wall Tiles	0	0.1 Negative	mg/cm2
330	X550-02817	LeadPaint	Julian Curtis	JMT	Bathroom	Wall Tiles	0	0.1 Negative	mg/cm2
331	X550-02817	LeadPaint	Julian Curtis	JMT	Bathroom	Wall Tiles	0	0.1 Negative	mg/cm2
332	X550-02817	LeadPaint	Julian Curtis	JMT	Bathroom	Wall Tiles	0	0.1 Negative	mg/cm2
333	X550-02817	LeadPaint	Julian Curtis	JMT	Door Jamb	Wood	1.1	0.1 Positive	mg/cm2
334	X550-02817	LeadPaint	Julian Curtis	JMT	Door Jamb	Wood	1	0.1 Positive	mg/cm2
335	X550-02817	LeadPaint	Julian Curtis	JMT	Door Jamb	Wood	0	0.1 Negative	mg/cm2
336	X550-02817	LeadPaint	Julian Curtis	JMT	Door Jamb	Wood	0	0.1 Negative	mg/cm2
337	X550-02817	LeadPaint	Julian Curtis	JMT	Door Jamb	Wood	0.9	0.1 Negative	mg/cm2
338	X550-02817	LeadPaint	Julian Curtis	JMT	Door Jamb	Wood	0.9	0.1 Negative	mg/cm2
339	X550-02817	LeadPaint	Julian Curtis	JMT	Door Jamb	Wood	1.6	0.3 Positive	mg/cm2
340	X550-02817	LeadPaint	Julian Curtis	JMT	Door Jamb	Wood	1	0.1 Positive	mg/cm2
341	X550-02817	LeadPaint	Julian Curtis	JMT	Door Jamb	Wood	0	0.1 Negative	mg/cm2
342	X550-02817	LeadPaint	Julian Curtis	JMT	Door Jamb	Wood	1.1	0.1 Positive	mg/cm2
343	X550-02817	LeadPaint	Julian Curtis	JMT	Door Jamb	Wood	0.9	0.1 Negative	mg/cm2
344	X550-02817	LeadPaint	Julian Curtis	JMT	Door Jamb	Wood	0.4	0.1 Negative	mg/cm2
345	X550-02817	LeadPaint	Julian Curtis	JMT	Door Jamb	Wood	1	0.1 Positive	mg/cm2
346	X550-02817	LeadPaint	Julian Curtis	JMT	Door Jamb	Wood	0.5	0.1 Negative	mg/cm2
347	X550-02817	LeadPaint	Julian Curtis	JMT	Door Jamb	Wood	0.9	0.1 Negative	mg/cm2
348	X550-02817	LeadPaint	Julian Curtis	JMT	Door Jamb	Wood	0.9	0.1 Negative	mg/cm2
349	X550-02817	LeadPaint	Julian Curtis	JMT	Door Jamb	Wood	1	0.1 Positive	mg/cm2
350	X550-02817	LeadPaint	Julian Curtis	JMT	Door Jamb	Wood	0.9	0.1 Negative	mg/cm2
351	X550-02817	LeadPaint	Julian Curtis	JMT	Door Jamb	Wood	1.4	0.2 Positive	mg/cm2
352	X550-02817	LeadPaint	Julian Curtis	JMT	Door Jamb	Wood	1.3	0.1 Positive	mg/cm2
353	X550-02817	LeadPaint	Julian Curtis	JMT	Door Jamb	Wood	1.1	0.1 Positive	mg/cm2
354	X550-02817	LeadPaint	Julian Curtis	JMT	Door Jamb	Wood	1.1	0.1 Positive	mg/cm2
355	X550-02817	LeadPaint	Julian Curtis	JMT	Door Jamb	Wood	1.1	0.1 Positive	mg/cm2
356	X550-02817	LeadPaint	Julian Curtis	JMT	Door Jamb	Wood	0.9	0.1 Negative	mg/cm2
357	X550-02817	LeadPaint	Julian Curtis	JMT	Door Jamb	Wood	1.1	0.1 Positive	mg/cm2
358	X550-02817	LeadPaint	Julian Curtis	JMT	Window Frame	Wood	0.6	0.1 Negative	mg/cm2
359	X550-02817	LeadPaint	Julian Curtis	JMT	Window Frame	Wood	0.1	0.1 Negative	mg/cm2
360	X550-02817	LeadPaint	Julian Curtis	JMT	Window Frame	Wood	0.1	0.1 Negative	mg/cm2
361	X550-02817	LeadPaint	Julian Curtis	JMT	Window Frame	Wood	0.1	0.1 Negative	mg/cm2

362	X550-02817	LeadPaint	Julian Curtis	JMT	Window Frame	Wood	0.3	0.1 Negative	mg/cm2
363	X550-02817	LeadPaint	Julian Curtis	JMT	Window Frame	Wood	0.1	0.1 Negative	mg/cm2
364	X550-02817	LeadPaint	Julian Curtis	JMT	Window Frame	Wood	0.2	0.1 Negative	mg/cm2
365	X550-02817	LeadPaint	Julian Curtis	JMT	Window Frame	Wood	0.2	0.1 Negative	mg/cm2
366	X550-02817	LeadPaint	Julian Curtis	JMT	Window Frame	Wood	0.8	0.1 Negative	mg/cm2
367	X550-02817	LeadPaint	Julian Curtis	JMT	Window Frame	Wood	0.6	0.1 Negative	mg/cm2
368	X550-02817	LeadPaint	Julian Curtis	JMT	Window Frame	Wood	0.5	0.1 Negative	mg/cm2
369	X550-02817	LeadPaint	Julian Curtis	JMT	Window Frame	Wood	0.2	0.1 Negative	mg/cm2
370	X550-02817	LeadPaint	Julian Curtis	JMT	Window Frame	Wood	0.1	0.1 Negative	mg/cm2
371	X550-02817	LeadPaint	Julian Curtis	JMT	Window Frame	Wood	0.1	0.1 Negative	mg/cm2
372	X550-02817	LeadPaint	Julian Curtis	JMT	Window Frame	Wood	0.1	0.1 Negative	mg/cm2
373	X550-02817	LeadPaint	Julian Curtis	JMT	Window Frame	Wood	0.1	0.1 Negative	mg/cm2
374	X550-02817	LeadPaint	Julian Curtis	JMT	Window Frame	Wood	0.1	0.1 Negative	mg/cm2
375	X550-02817	LeadPaint	Julian Curtis	JMT	Window Frame	Wood	0.2	0.1 Negative	mg/cm2
376	X550-02817	LeadPaint	Julian Curtis	JMT	Window Frame	Wood	0.1	0.1 Negative	mg/cm2
377	X550-02817	LeadPaint	Julian Curtis	JMT	Window Frame	Wood	0.1	0.1 Negative	mg/cm2
378	X550-02817	LeadPaint	Julian Curtis	JMT	Window Frame	Wood	0.1	0.1 Negative	mg/cm2
379	X550-02817	LeadPaint	Julian Curtis	JMT	Window Frame	Wood	0.1	0.1 Negative	mg/cm2
380	X550-02817	LeadPaint	Julian Curtis	JMT	Window Frame	Wood	0.1	0.1 Negative	mg/cm2
381	X550-02817	LeadPaint	Julian Curtis	JMT	Window Frame	Wood	0.2	0.1 Negative	mg/cm2
382	X550-02817	LeadPaint	Julian Curtis	JMT	Window Frame	Wood	0.1	0.1 Negative	mg/cm2
383	X550-02817	LeadPaint	Julian Curtis	JMT	Window Frame	Wood	0.1	0.1 Negative	mg/cm2
384	X550-02817	LeadPaint	Julian Curtis	JMT	Window Frame	Wood	0.1	0.1 Negative	mg/cm2
385	X550-02817	LeadPaint	Julian Curtis	JMT	Window Frame	Wood	0.1	0.1 Negative	mg/cm2
386	X550-02817	LeadPaint	Julian Curtis	JMT	Staircase	Metal	2.3	0.5 Positive	mg/cm2
387	X550-02817	LeadPaint	Julian Curtis	JMT	Staircase	Metal	1.5	0.2 Positive	mg/cm2
388	X550-02817	LeadPaint	Julian Curtis	JMT	Staircase	Metal	1	0.1 Positive	mg/cm2
389	X550-02817	LeadPaint	Julian Curtis	JMT	Staircase	Metal	1.6	0.1 Positive	mg/cm2
390	X550-02817	LeadPaint	Julian Curtis	JMT	Staircase	Metal	1.8	0.1 Positive	mg/cm2
391	X550-02817	LeadPaint	Julian Curtis	JMT	Staircase	Metal	1.2	0.1 Positive	mg/cm2
392	X550-02817	LeadPaint	Julian Curtis	JMT	Staircase	Metal	0	0.1 Negative	mg/cm2
393	X550-02817	LeadPaint	Julian Curtis	JMT	Staircase	Metal	0.9	0.1 Negative	mg/cm2
394	X550-02817	LeadPaint	Julian Curtis	JMT	Staircase	Metal	0.7	0.1 Negative	mg/cm2

395	X550-02817	LeadPaint	Julian Curtis	JMT	Staircase	Metal	1.2	0.1 Positive	mg/cm2
396	X550-02817	LeadPaint	Julian Curtis	JMT	Staircase	Metal	1.6	0.1 Positive	mg/cm2
397	X550-02817	LeadPaint	Julian Curtis	JMT	Staircase	Metal	1.3	0.1 Positive	mg/cm2
398	X550-02817	LeadPaint	Julian Curtis	JMT	Staircase	Metal	0.1	0.1 Negative	mg/cm2
399	X550-02817	LeadPaint	Julian Curtis	JMT	Staircase	Metal	1.3	0.1 Positive	mg/cm2
400	X550-02817	LeadPaint	Julian Curtis	JMT	Staircase	Metal	0.9	0.1 Negative	mg/cm2
401	X550-02817	LeadPaint	Julian Curtis	JMT	Staircase	Metal	0.9	0.1 Negative	mg/cm2
402	X550-02817	LeadPaint	Julian Curtis	JMT	Staircase	Metal	1.3	0.1 Positive	mg/cm2
403	X550-02817	LeadPaint	Julian Curtis	JMT	Staircase	Metal	1.1	0.1 Positive	mg/cm2
404	X550-02817	LeadPaint	Julian Curtis	JMT	Staircase	Metal	4.6	0.3 Positive	mg/cm2
405	X550-02817	LeadPaint	Julian Curtis	JMT	Staircase	Metal	0.7	0.1 Negative	mg/cm2
406	X550-02817	LeadPaint	Julian Curtis	JMT	Staircase	Metal	1	0.1 Positive	mg/cm2
407	X550-02817	LeadPaint	Julian Curtis	JMT	Staircase	Metal	1.2	0.1 Positive	mg/cm2
408	X550-02817	LeadPaint	Julian Curtis	JMT	Staircase	Metal	1.7	0.3 Positive	mg/cm2
409	X550-02817	LeadPaint	Julian Curtis	JMT	Staircase	Metal	0.5	0.1 Negative	mg/cm2
410	X550-02817	LeadPaint	Julian Curtis	JMT	Staircase	Metal	1.5	0.1 Positive	mg/cm2
411	X550-02817	LeadPaint	Julian Curtis	JMT	Staircase	Metal	1.9	0.4 Positive	mg/cm2
412	X550-02817	LeadPaint	Julian Curtis	JMT	Staircase	Metal	1.6	0.1 Positive	mg/cm2
413	X550-02817	LeadPaint	Julian Curtis	JMT	Staircase	Metal	1	0.1 Positive	mg/cm2
414	X550-02817	LeadPaint	Julian Curtis	JMT	Staircase	Metal	0.8	0.1 Negative	mg/cm2
415	X550-02817	LeadPaint	Julian Curtis	JMT	Staircase	Metal	1	0.1 Positive	mg/cm2
416	X550-02817	LeadPaint	Julian Curtis	JMT	Staircase	Metal	1.1	0.1 Positive	mg/cm2
417	X550-02817	LeadPaint	Julian Curtis	JMT	Office/Principal	Plaster	0.1	0.1 Negative	mg/cm2
418	X550-02817	LeadPaint	Julian Curtis	JMT	Office/Principal	Plaster	0.1	0.1 Negative	mg/cm2
419	X550-02817	LeadPaint	Julian Curtis	JMT	Office/Principal	Plaster	0.1	0.1 Negative	mg/cm2
420	X550-02817	LeadPaint	Julian Curtis	JMT	Office/Principal	Plaster	0.1	0.1 Negative	mg/cm2
421	X550-02817	LeadPaint	Julian Curtis	JMT	Office/Principal	Plaster	0.1	0.1 Negative	mg/cm2
422	X550-02817	LeadPaint	Julian Curtis	JMT	Office/Principal	Plaster	0.2	0.1 Negative	mg/cm2
423	X550-02817	LeadPaint	Julian Curtis	JMT	Office/Principal	Plaster	0	0.1 Negative	mg/cm2
424	X550-02817	LeadPaint	Julian Curtis	JMT	Office/Principal	Plaster	0	0.1 Negative	mg/cm2
425	X550-02817	LeadPaint	Julian Curtis	JMT	Office/Principal	Plaster	0.2	0.1 Negative	mg/cm2
426	X550-02817	LeadPaint	Julian Curtis	JMT	Office/Principal	Plaster	0.2	0.1 Negative	mg/cm2
427	X550-02817	LeadPaint	Julian Curtis	JMT	Office/Principal	Plaster	0.3	0.1 Negative	mg/cm2

428	X550-02817	LeadPaint	Julian Curtis	JMT	Office/Principal	Plaster	0.2	0.1	Negative	mg/cm2
429	X550-02817	LeadPaint	Julian Curtis	JMT	Office/Principal	Plaster	0.2	0.1	Negative	mg/cm2
430	X550-02817	LeadPaint	Julian Curtis	JMT	Office/Principal	Plaster	0.2	0.1	Negative	mg/cm2
431	X550-02817	LeadPaint	Julian Curtis	JMT	Office/Principal	Plaster	0.2	0.1	Negative	mg/cm2
432	X550-02817	LeadPaint	Julian Curtis	JMT	Office/Principal	Plaster	0.2	0.1	Negative	mg/cm2
433	X550-02817	LeadPaint	Julian Curtis	JMT	Office/Principal	Plaster	0.3	0.1	Negative	mg/cm2
434	X550-02817	LeadPaint	Julian Curtis	JMT	Office/Principal	Plaster	0.3	0.1	Negative	mg/cm2
435	X550-02817	LeadPaint	Julian Curtis	JMT	Office/Principal	Plaster	0.2	0.1	Negative	mg/cm2
436	X550-02817	LeadPaint	Julian Curtis	JMT	Office/Principal	Plaster	0.1	0.1	Negative	mg/cm2
437	X550-02817	LeadPaint	Julian Curtis	JMT	Office/Principal	Plaster	0.1	0.1	Negative	mg/cm2
438	X550-02817	LeadPaint	Julian Curtis	JMT	Office/Principal	Plaster	0.1	0.1	Negative	mg/cm2
439	X550-02817	LeadPaint	Julian Curtis	JMT	Office/Principal	Plaster	0.1	0.1	Negative	mg/cm2
440	X550-02817	LeadPaint	Julian Curtis	JMT	Office/Principal	Plaster	0.3	0.1	Negative	mg/cm2
441	X550-02817	LeadPaint	Julian Curtis	JMT	Office/Principal	Plaster	0.3	0.1	Negative	mg/cm2
442	X550-02817	LeadPaint	Julian Curtis	JMT	Office/Principal	Plaster	0.2	0.1	Negative	mg/cm2
443	X550-02817	LeadPaint	Julian Curtis	JMT	Office/Principal	Plaster	0.2	0.1	Negative	mg/cm2
444	X550-02817	LeadPaint	Julian Curtis	JMT	Office/Principal	Plaster	0.3	0.1	Negative	mg/cm2
445	X550-02817	LeadPaint	Julian Curtis	JMT	Office/Principal	Plaster	0.1	0.1	Negative	mg/cm2
446	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.6	0.1	Negative	mg/cm2
447	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.7	0.1	Negative	mg/cm2
448	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.7	0.1	Negative	mg/cm2
449	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.5	0.1	Negative	mg/cm2
450	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.6	0.1	Negative	mg/cm2
451	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.6	0.1	Negative	mg/cm2
452	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.5	0.1	Negative	mg/cm2
453	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	1.1	0.1	Positive	mg/cm2
454	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.6	0.1	Negative	mg/cm2
455	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.7	0.1	Negative	mg/cm2
456	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.7	0.1	Negative	mg/cm2
457	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.6	0.1	Negative	mg/cm2
458	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.7	0.1	Negative	mg/cm2
459	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.6	0.1	Negative	mg/cm2
460	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.5	0.1	Negative	mg/cm2

461	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.7	0.1	Negative	mg/cm2
462	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.6	0.1	Negative	mg/cm2
463	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.6	0.1	Negative	mg/cm2
464	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.4	0.1	Negative	mg/cm2
465	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.6	0.1	Negative	mg/cm2
466	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.5	0.1	Negative	mg/cm2
467	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.7	0.1	Negative	mg/cm2
468	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.5	0.1	Negative	mg/cm2
469	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.5	0.1	Negative	mg/cm2
470	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.6	0.1	Negative	mg/cm2
471	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.7	0.1	Negative	mg/cm2
472	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.5	0.1	Negative	mg/cm2
473	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.5	0.1	Negative	mg/cm2
474	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.7	0.1	Negative	mg/cm2
475	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.4	0.1	Negative	mg/cm2
476	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.4	0.1	Negative	mg/cm2
477	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.7	0.1	Negative	mg/cm2
478	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.6	0.1	Negative	mg/cm2
479	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.5	0.1	Negative	mg/cm2
480	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.7	0.1	Negative	mg/cm2
481	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.5	0.1	Negative	mg/cm2
482	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.6	0.1	Negative	mg/cm2
483	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.6	0.1	Negative	mg/cm2
484	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.2	0.1	Negative	mg/cm2
485	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.2	0.1	Negative	mg/cm2
486	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.2	0.1	Negative	mg/cm2
487	X550-02817	LeadPaint	Julian Curtis	JMT	Crown Molding	Wood	0.2	0.1	Negative	mg/cm2
488	X550-02817	LeadPaint	Julian Curtis	JMT	BSMT Floor	Concrete	1.1	0.1	Positive	mg/cm2
489	X550-02817	LeadPaint	Julian Curtis	JMT	BSMT Floor	Concrete	1.1	0.1	Positive	mg/cm2
490	X550-02817	LeadPaint	Julian Curtis	JMT	BSMT Floor	Concrete	1	0.1	Positive	mg/cm2
491	X550-02817	LeadPaint	Julian Curtis	JMT	BSMT Floor	Concrete	1.1	0.1	Positive	mg/cm2
492	X550-02817	LeadPaint	Julian Curtis	JMT	BSMT Floor	Concrete	0.9	0.1	Negative	mg/cm2
493	X550-02817	LeadPaint	Julian Curtis	JMT	BSMT Floor	Concrete	1.4	0.1	Positive	mg/cm2

[illegible]

527	X550-02817	LeadPaint	Julian Curtis	JMT	BSMT	Door Compon	0	0.1	Negative	mg/cm2
528	X550-02817	LeadPaint	Julian Curtis	JMT	BSMT	Door Compon	0	0.1	Negative	mg/cm2
529	X550-02817	LeadPaint	Julian Curtis	JMT	BSMT	Door Compon	0	0.1	Negative	mg/cm2
530	X550-02817	LeadPaint	Julian Curtis	JMT	BSMT	Lift	0	0.1	Negative	mg/cm2
531	X550-02817	LeadPaint	Julian Curtis	JMT	BSMT	Lift	0.1	0.1	Negative	mg/cm2
532	X550-02817	LeadPaint	Julian Curtis	JMT	BSMT	Lift	0.1	0.1	Negative	mg/cm2
533	X550-02817	LeadPaint	Julian Curtis	JMT	BSMT	Lift	0	0.1	Negative	mg/cm2
534	X550-02817	LeadPaint	Julian Curtis	JMT	BSMT	Lift	0.1	0.1	Negative	mg/cm2
535	X550-02817	LeadPaint	Julian Curtis	JMT	BSMT	Lift	0	0.1	Negative	mg/cm2
536	X550-02817	LeadPaint	Julian Curtis	JMT	BSMT	Lift	0	0.1	Negative	mg/cm2
537	X550-02817	LeadPaint	Julian Curtis	JMT	BSMT	Lift	0	0.1	Negative	mg/cm2
538	X550-02817	LeadPaint	Julian Curtis	JMT	BSMT	Incinerator	0	0.1	Negative	mg/cm2
539	X550-02817	LeadPaint	Julian Curtis	JMT	BSMT	Incinerator	0	0.1	Negative	mg/cm2
540	X550-02817	LeadPaint	Julian Curtis	JMT	BSMT	Incinerator	0	0.1	Negative	mg/cm2
541	X550-02817	LeadPaint	Julian Curtis	JMT	BSMT	Incinerator	0	0.1	Negative	mg/cm2
542	X550-02817	LeadPaint	Julian Curtis	JMT	BSMT	Incinerator	0	0.1	Negative	mg/cm2
543	X550-02817	LeadPaint	Julian Curtis	JMT	BSMT	Incinerator	0	0.1	Negative	mg/cm2
544	X550-02817	LeadPaint	Julian Curtis	JMT	BSMT	Incinerator	0	0.1	Negative	mg/cm2
545	X550-02817	LeadPaint	Julian Curtis	JMT			0.5	0.1	Negative	mg/cm2
546	X550-02817	LeadPaint	Julian Curtis	JMT			0.5	0.1	Negative	mg/cm2
547	X550-02817	LeadPaint	Julian Curtis	JMT			0.4	0.1	Negative	mg/cm2
548	X550-02817	LeadPaint	Julian Curtis	JMT			0.1	0.1	Negative	mg/cm2
549	X550-02817	LeadPaint	Julian Curtis	JMT			0	0.1	Negative	mg/cm2
550	X550-02817	PCS Cal	Julian Curtis	JMT	Calibrate		1	0.1	Positive	mg/cm2
551	X550-02817	PCS Cal	Julian Curtis	JMT	Calibrate		1	0.1	Positive	mg/cm2
552	X550-02817	PCS Cal	Julian Curtis	JMT	Calibrate		1	0.1	Positive	mg/cm2
553	X550-02817	PCS Cal	Julian Curtis	JMT	Calibrate		1	0.1	Positive	mg/cm2

APPENDIX D

Site Inspection Photos



Basement Area #1



Basement 1'x2' Ceiling Tiles & Adhesive



Basement Dumbwaiter Closet



Basement Metal Fire Door w/ Door Closer



Basement Incinerator



Interior of Incinerator



Pipes Penetrating Wall & Incinerator



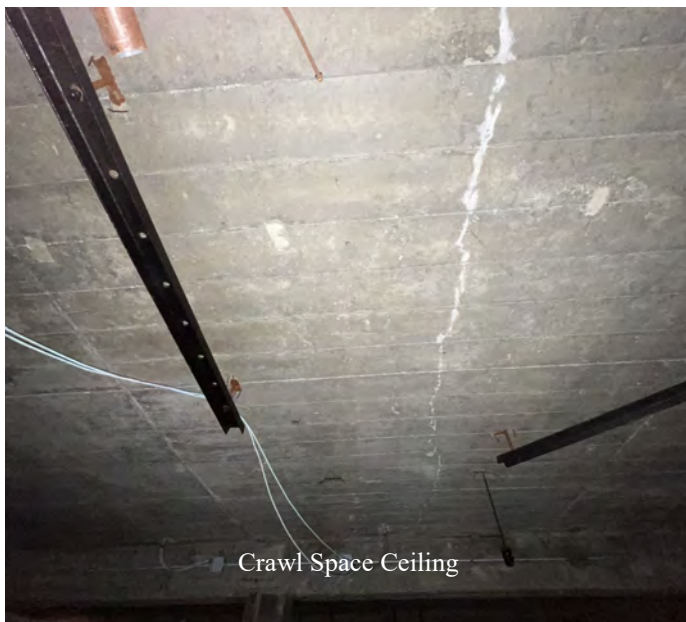
Insulation Debris @ Pipe In Wall



Crawl Space Entrance @ New Door Location



Crawl Space w/ Dirt Floor



Crawl Space Ceiling



Pipes Cut Off in Crawl Space



1st Floor Dumbwaiter Closet



Kitchen Office



Kitchen Office Ceiling



Kitchen Looking @ Office Door & Hall Door



1st Floor Storage Closet



1st Floor Storage Closet Ceiling



Ceiling Deck Above Plaster



1st Floor Custodial Closet



1st Floor Girl's Bathroom



1st Floor Girl's Bathroom



1st Floor IT Room



1st Floor IT Room



1st Floor PTO Closet



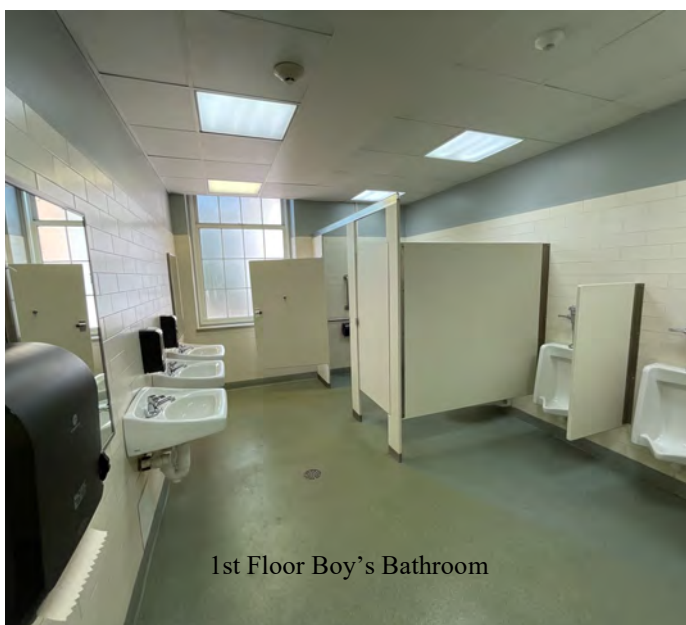
1st Floor Teacher's Bathroom



Pipe Insulation in Bathroom Wet Wall



1st Floor Boy's Bathroom



1st Floor Boy's Bathroom



Above Bathroom Ceilings



Caulk on Bathroom Fixtures



Main Office Closet



Main Office



Principal's Office



Unit Ventilator



Principal's Office Closet



Main Entrance



Main Entrance Lobby



Above Main Entrance Ceiling



Above Lobby Ceiling



Above Crown Molding in Lobby—Old Plaster



Above Crown Molding in Lobby—Old Plaster



1st Floor 2nd Custodian Closet



2nd Floor Dumbwaiter Closet



2nd Floor Staff Room Entry



2nd Floor Staff Room Left



2nd Floor Staff Room Right



2nd Floor Band Room



2nd Floor Bathrooms



2nd Floor Bathroom



2nd Floor Bathroom



2nd Floor Bathroom



2nd Floor Custodial Closet



Main Entry



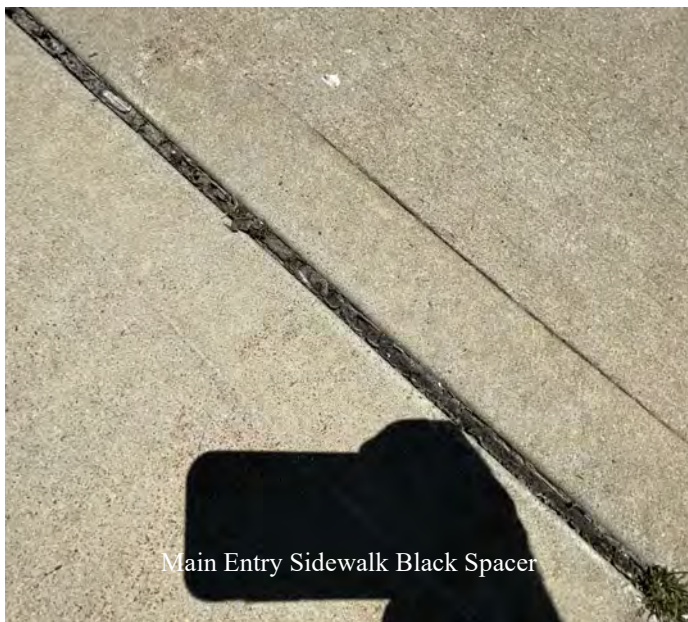
Main Entry Door. Window Has Putty



Main Entry Door Caulk



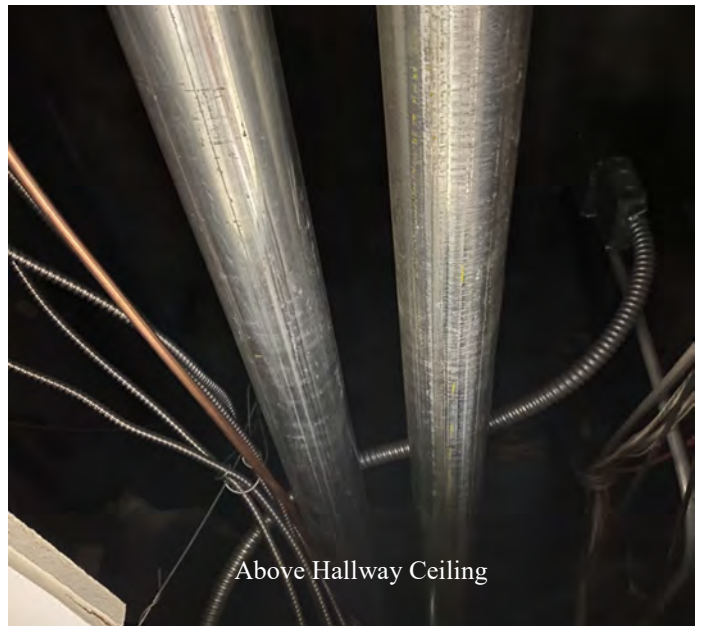
Main Entry Sidewalk



Main Entry Sidewalk Black Spacer



Above Hallway Ceiling



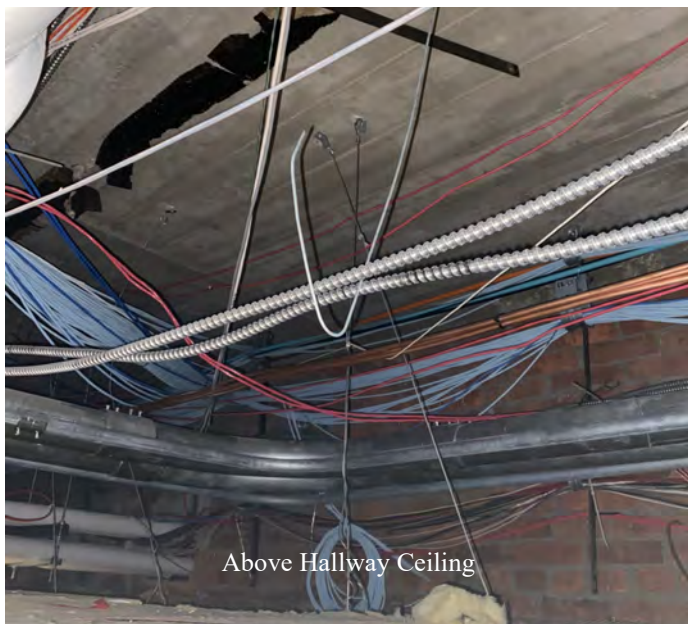
Above Hallway Ceiling



Above Hallway Ceiling



Above Hallway Ceiling



Above Hallway Ceiling



Above Hallway Ceiling



Above Hallway Ceiling



Above Hallway Ceiling



Above Kitchen Ceiling



Above Kitchen Ceiling



Above Kitchen Ceiling

APPENDIX E

Credentials

EMPLOYER'S COPY
STATE OF CONNECTICUT
DEPARTMENT OF PUBLIC HEALTH

NAME

JAMES M. TWITCHELL

VALIDATION NO.

03-062362

CERTIFICATE NO.

000256

CURRENT THROUGH

07/31/24

PROFESSION

ASBESTOS CONSULTANT-PROJECT MONITOR

SIGNATURE

COMMISSIONER

EMPLOYER'S COPY

STATE OF CONNECTICUT
DEPARTMENT OF PUBLIC HEALTH

NAME

JAMES M. TWITCHELL

VALIDATION NO.

03-062151

CERTIFICATE NO.

000241

CURRENT THROUGH

07/31/24

PROFESSION

ASBESTOS CONSULTANT-INSPECTION PLANNER

SIGNATURE

COMMISSIONER

EMPLOYER'S COPY
STATE OF CONNECTICUT
DEPARTMENT OF PUBLIC HEALTH

NAME

JAMES M. TWITCHELL

VALIDATION NO.

03-062363

CERTIFICATE NO.

000221

CURRENT THROUGH

07/31/24

PROFESSION

ASBESTOS CONSULTANT-PROJECT DESIGNER

SIGNATURE

COMMISSIONER

EMPLOYER'S COPY

STATE OF CONNECTICUT
DEPARTMENT OF PUBLIC HEALTH

NAME

JAMES M. TWITCHELL

VALIDATION NO.

03-063022

CERTIFICATE NO.

001822

CURRENT THROUGH

07/31/24

PROFESSION

LEAD INSPECTOR RISK ASSESSOR

SIGNATURE

COMMISSIONER

SECTION 028213 – HAZARDOUS MATERIALS ABATEMENT**PART 1- ASBESTOS REMOVAL SPECIFICATIONS****1.1 SUMMARY**

- 1.1.1 Work Included: Remove and dispose of asbestos containing materials in accordance with the Contract Documents. The Work of this Section shall include, but not be limited to the following:
 - 1.1.1.1 Performance of interior demolition to uncover and gain access to asbestos containing building materials.
 - 1.1.1.2 Removal of asbestos-containing building materials listed in Attachment 028213-2 of this specification and as shown on drawings HZ-100, HZ-101, & HZ-102. Contractor shall also coordinate with Architectural, MEP, and Demo drawings for total scope of work.
 - 1.1.1.3 Removal of any asbestos-containing materials that may be uncovered when walls and ceiling cavities are opened.
 - 1.1.1.4 Transportation of asbestos-containing waste materials to an approved disposal site by a licensed asbestos waste hauler.
 - 1.1.1.5 Disposal of asbestos-containing waste materials at an approved asbestos waste disposal site.
- 1.1.2 Pre-Requisite Work: The Owner will be responsible for vacating the areas where work will take place and removing all movable objects and furnishings prior to the start of prep work for asbestos abatement.
- 1.1.3 Related Work: Work of this Section is part of a project involving exterior remediation, demolition, site work and general construction. The contractor shall coordinate the work of this Section with work specified elsewhere.
- 1.1.4 Limitations: Work shall be performed when children, 18 years old and younger, are not present in the building. If children must be present in the building at any time, a special application will be required and must be approved by the State of Connecticut Department of Public Health.

1.2 REFERENCES**1.2.1 Applicable Regulations**

The contractor shall comply with all applicable federal and state requirements including, but not limited to the following. Where the regulations specify conflicting requirements, the contractor shall follow the stricter requirement.

1.2.1.1 U.S. Environmental Protection Agency

National Emission Standard for Hazardous Air Pollutants (40 CFR 61, Subparts A and M)
Asbestos Hazard and Emergency Response Act (40 CFR 763)

1.2.1.2 U.S. Occupational Safety and Health Administration

Respiratory Protection Standard (29 CFR 1926.103)
Asbestos Construction Standard (29 CFR 1926.1101)
Hazard Communication Standard (29 CFR 1910.1200)

1.2.1.3 Connecticut Department of Public Health

Standards for Asbestos Abatement (Sections 19a-332a (1-16))
Licensure and Training Requirements for Persons Engaged in Asbestos
Abatement and Asbestos Consultation Services and Related Civil Penalties (Sections 20-440(1-9))
Asbestos in Schools Regulations (Section 19a-333(1-13))

1.2.2 Trade Association References

1.2.2.1 ANSI

ANSI Z9.2 - Fundamentals Governing the Design and Operation of Local Exhaust
Systems (1979: R 1991)
ANSI Z88.2 - Respiratory Protection (1992)

1.2.2.2 ASTM

ASTM E1368 - Visual Inspection of Asbestos abatement Projects (1990)
ASTM E1494 - Encapsulants for Spray- or Trowel-Applied Friable Asbestos-Containing
Building Materials (1992)

1.2.2.3 UL

UL 586 - High-Efficiency, Particulate, Air Filter Units (1990)

1.3 DEFINITIONS

1.3.1 Asbestos Containing Material (ACM)

Material containing more than one percent by weight of asbestos.

1.3.2 Amended Water

Water containing a wetting agent or surfactant.

1.3.3 Area Sampling

Sampling of asbestos fiber concentrations at stationary location which approximates the concentration of asbestos in the theoretical breathing zone but is not actually collected in the breathing zone of an employee.

1.3.4 Asbestos

A naturally occurring hydrated mineral silicate separable into commercially usable fibers, including chrysotile (serpentine), amosite (cummingtonite-grunerite), crocidolite (riebeckite), tremolite, anthophyllite, and actinolite.

1.3.5 Asbestos Control Area

Designated rooms, spaces, or areas of the building or structure where asbestos abatement activities take place. For glovebag procedures, the work area shall also include the areas contiguous to where the procedure takes place.

1.3.6 Asbestos Fibers

Those fibers having an aspect ratio of at least 3:1 and longer than 5 micrometers as determined by NIOSH Method 7400.

1.3.7 Asbestos Worker

An individual certified by the State, who disturbs, removes, encapsulates, repairs, or encloses friable asbestos material.

1.3.8 Asbestos Worker Supervisor

An individual certified by the State, who supervises the asbestos workers during the asbestos project and ensures that proper asbestos abatement procedures as well as individual safety procedures are being adhered to.

1.3.9 Asbestos Permissible Exposure Limit

A fiber level of 0.1 fibers per cubic centimeter of air as an 8-hour time weighted average measured in the breathing zone as defined by 29 CFR 1926.1101.

1.3.10 Background

The ambient airborne asbestos concentration in an uncontaminated area as measured prior to any asbestos hazard abatement efforts. Background concentrations for other (contaminated) areas are measured in similar but asbestos free locations.

1.3.11 Contractor

A public authority or any other governmental agency or instrumentality thereof, self-employed person, company, unincorporated associations, firm, partnership or corporation and any owner or operator thereof, which engages in an asbestos project or employs persons engaged in an asbestos project.

1.3.12 Encapsulation

The coating or spraying of asbestos-containing material or the bare surfaces exposed after an abatement with a pigment (non-transparent) sealant.

1.3.13 Encapsulants

Liquid material which can be applied to asbestos-containing material, or the bare surfaces exposed after an abatement which temporarily controls the possible release of asbestos fibers from the material or surface either by creating a membrane over the surface (bridging encapsulant) or by penetrating into the material and binding its components together (penetrating encapsulant).

1.3.14 Friable Asbestos Material

Any asbestos or any ACM that can be crumbled, pulverized, or reduced to a powder when dry, by hand or other mechanical pressure.

1.3.15 Glovebag Technique

A method for removing friable asbestos-containing material from heating, ventilation, and air conditioning (HVAC) ducts, short piping runs, valves, joints, elbows, and other non-planar surfaces. The glovebag assembly is a manufactured device consisting of a large bag (constructed of at least 6-mil transparent plastic), two inward-projecting long sleeve gloves, one inward-projecting water wand sleeve, an internal tool pouch, and an attached, labeled receptacle for asbestos waste. The glovebag is constructed and installed in such a manner that it surrounds the object to be decontaminated and contains all asbestos fibers released during the removal process.

1.3.16 HEPA Filter

A high efficiency particulate air filter capable of trapping and retaining 99.97 percent of particles (asbestos fibers) greater than 0.3 micrometers mass median aerodynamic equivalent diameter.

1.3.17 Negative Pressure Equipment

A portable local exhaust system equipped with HEPA filtration. The system shall be capable of creating a negative pressure differential between the outside and inside of the work area.

1.3.18 Nonfriable Asbestos Material

Material that contains asbestos in which the fibers have been immobilized by a bonding agent, coating, binder, or other material so that the asbestos is well bound and will not normally release asbestos fibers during any appropriate use, handling, storage, or transportation. It is understood that asbestos fibers may be released under other conditions such as demolition, removal, or mishap.

1.3.19 PCM

Phase contrast microscopy (PCM) is a measurement protocol for the assessment of the fiber content of air (NIOSH Method 7400).

1.3.20 Personal Sampling

A method used to determine employees' exposure to airborne fibers. The sample is collected outside the respirator in the worker's breathing zone.

1.3.21 PLM

Polarized light microscopy (PLM) is a measurement protocol for the assessment of the asbestos content of bulk materials (40 CFR Part 763, Subpart F, Appendix A).

1.3.22 Project Monitor

The licensed person who has been retained by the owner to review the contractor's work practices and to perform area air sampling for the project.

1.3.23 TEM

Transmission electron microscopy (TEM) is the measurement protocol for the assessment of the asbestos fiber content of air. (40 CFR Part 763, Subpart E, Appendix A).

1.3.24 Time Weighted Average (TWA)

The TWA is an 8-hour time weighted average airborne concentration of asbestos fibers.

1.3.25 Wetting Agent

A surfactant or chemical agent added to water to improve penetration.

1.4 REQUIREMENTS

1.4.1 Medical Requirements

1.4.1.1 Medical Examinations

Provide medical requirements for all Asbestos Workers and Asbestos Worker Supervisors including, but not limited to medical surveillance and medical record keeping as listed in 29 CFR 1926.1101.

1.4.1.2 Medical Records

Before exposure to airborne asbestos fibers, provide workers with a comprehensive medical examination as required by 29 CFR 1926.1101 and other pertinent State directives. This requirement must have been satisfied within the 12 months prior to the start of work on this contract. The same medical examination shall be given on an annual basis to employees engaged in an occupation involving asbestos and within 30 calendar days before or after the termination of employment in such occupation. Specifically identify x-ray films of asbestos workers to the consulting radiologist and mark medical record jackets with the work "Asbestos".

1.4.2 Training

Train all persons involved in the asbestos control work in accordance with the State training criteria for Asbestos Workers or Asbestos Worker Supervisors. The contractor shall document the training by providing dates of training and the name and address of the training entity. Furnish each Asbestos Worker and Asbestos Worker Supervisor with respirator training and fit testing as required by 29 CFR 1926.1101. Fully cover engineering and other hazard control techniques and procedures.

1.4.3 Permits, Licenses and Notifications

Obtain necessary permits and licenses in conjunction with asbestos removal, hauling and disposal, and furnish notification of such actions required by Federal and State authorities prior to the start of work. The contractor shall pay all fees as required for notification, permit and variance application (as necessary), and for any licenses and certifications.

The Contractor shall send written notification to the following agencies as required by Federal and State regulations, and shall be responsible for payment of all fees attendant to such notifications:

United States Environmental Protection Agency – Region 1
Connecticut Department of Public Health

1.4.4 Environment, Safety and Health Compliance

The contractor shall comply with all applicable Federal and State regulations, regardless of whether the regulation is cited in these specifications.

1.4.5 Respiratory Protection Program

Establish and implement a respirator program as required by ANSI Z88.2, 29 CFR 1926.1101, and 29 CFR 1926.103. Submit a written description of the program, including copies of personal air monitoring data for similar, previously completed projects, to the Project Monitor.

1.4.6 Hazard Communication

Adhere to all parts of 29 CFR Part 1926.59 and provide the Project Monitor with a copy of the Safety Data Sheets (SDS) for all materials brought to the site.

1.4.7 Contractor Qualifications

The contractor shall have held a valid State of Connecticut Asbestos Abatement Contractor license under their current company name for a minimum of three (3) years and shall not have been cited and penalized for violations of asbestos regulations in the past three (3) years. The contractor shall have adequate liability/occurrence insurance for asbestos work, have comprehensive standard operating procedures for asbestos work and have adequate materials, equipment and supplies to perform the work. The contractor shall only use workers from his/her payroll and will not be allowed to sub-contract the abatement work.

1.4.8 Project Supervisor

1.4.8.1 The Contractor shall designate a full-time Project Supervisor who shall meet the following qualifications:

- The Project Supervisor shall hold a current CT asbestos supervisor license and current EPA certificate.
- The Project Supervisor shall meet the requirements of a "Competent Person" as defined by OSHA 1926.1101 and shall have a minimum of two (2) years' experience as a supervisor.
- The Project Supervisor must be able to read and write English fluently, as well as communicate in the primary language of the Workers.

1.4.8.2 If the Project Supervisor is not on-site at any time whatsoever, all work shall be stopped. The Project Supervisor shall remain on-site until the Project is complete. The Project Supervisor cannot be removed from the Project without written consent of the Owner and the Project Monitor. The Project Supervisor shall be removed from the Project if requested by the Owner.

1.4.8.3 The Project Supervisor shall maintain the bound Daily Project Log that also includes the entry/exit logs and the Waste Disposal Log.

1.4.8.4 The Project Supervisor shall be responsible for the performance of the Work and shall represent the Contractor in all respects at the Project site. The Supervisor shall be the primary point of contact for the Owner and Project Monitor.

1.4.9 Independent Project Monitor

The Owner will employ a Connecticut licensed asbestos project monitor, independent from the abatement contractor, to perform various services on behalf of the Owner. The project monitor will perform the necessary monitoring, inspection, testing, and other support services to ensure that building occupants, employees, and visitors will not be adversely affected by the abatement work, that the abatement work proceeds in accordance with these specifications, that the abated areas or abated buildings have been successfully decontaminated. The work of the project

monitor in no way relieves the Contractor from their responsibility to perform the work in accordance with contract/specification requirements, to perform continuous inspection, monitoring and testing for the safety of their employees, and to perform other such services as specified. The cost of the project monitor and their services will be borne by the Owner except for any repeat of final inspection and testing that may be required due to unsatisfactory initial results. Any repeated final inspections and/or testing, if required, will be paid for by the Contractor.

1.5 SUBMITTALS

1.5.1 Manufacturer's Catalog data

The contractor shall submit the following Manufacturer's Catalog Data, prior to starting the asbestos abatement work:

- Local exhaust equipment
- Vacuums
- Respirators
- Pressure differential recording instrument
- Amended water
- Glovebags
- Material Safety Data Sheets
- Encapsulants
- Wastewater Filtration Systems

1.5.2 Statements

The contractor shall submit the following Statements, prior to starting the asbestos abatement work:

1.5.2.1 Health and Safety Plan

Submit a detailed plan of the safety precautions and OSHA compliance program for the project. The plan shall include, but not be limited to lockout/tagout, fall protection and confined space entry procedures. The health and safety plan shall also include both fire and medical emergency response plans.

1.5.2.2 Testing laboratory

Submit the name, address, and telephone number of each testing laboratory selected for the analysis and reporting of personal air samples. Furnish evidence that the selected laboratory is an accredited participant in the AIHA PAT programs for airborne asbestos analysis.

1.5.2.3 Approval of asbestos waste disposal site and transporter

Submit copies of permits for the asbestos waste disposal site, transfer station and the waste transporter. If the Contractor plans to utilize in-state disposal facilities, prior approval will be required from the Department of Energy & Environmental Protection Agency (DEEP).

1.5.2.4 Asbestos Worker and Supervisor certificates

Submit copies of each employee's State asbestos certification cards.

1.5.2.5 Medical certification

Provide a written certification for each Asbestos Worker and Supervisor, signed by a licensed physician indicating that the employee has met or exceeded all the medical prerequisites listed herein and in 29 CFR 1926.1101 and 29 CFR 1926.103.

1.5.2.6 Respiratory protection program

Submit a written program manual or operating procedure including methods of compliance with regulatory statutes.

1.5.3 Field Reports

The contractor shall submit the following Field Reports, daily during the asbestos abatement work:

1.5.3.1 Personal Air Sampling Results

The contractor shall provide copies of laboratory reports for personal air samples to the Project Monitor for review within 24 hours of the "time off" of the sample pump. Notify the Project Monitor immediately of any airborne levels of asbestos fibers more than the Asbestos Permissible Exposure Limits. Post a copy of the personal air sample results at a location accessible to the affected employees. Failure to comply with these requirements may result in all work being stopped until compliance is achieved.

1.5.3.2 Pressure Differential Recordings for Local Exhaust System

For each work area, provide a local exhaust system that creates a negative pressure of at least 0.02 inches of water, relative to the pressure external to the enclosure and operate it continuously, 24 hours a day, until the temporary enclosure of the asbestos control area is removed. Submit records of the pressure differential recordings and the supervisor's inspection of the containment barriers to the Project Monitor at least twice daily.

1.5.3.3 Work Area Entry Log

The contractor shall maintain and provide to the Project Monitor a log of all employees and authorized visitors who enter asbestos work areas. All entries into the log shall be made in non-washable, permanent ink and such pen shall be strung to or otherwise attached to the log to prevent removal from the log-in area. Under no circumstances shall pencil entries be permitted.

1.5.3.4 Daily Performance Log

The project supervisor shall document all work performed on site at a minimum of five (5) times every day. Entries shall include, but not be limited to, job progress, amount of material removed, containment inspections, project issues, etc. and shall be logged into a bound logbook with non-washable, permanent ink.

1.5.4 Project Close-out Submittals

Within forty-five (45) days of project completion, the Contractor shall submit three (3) copies of the documents listed below for review and approval prior to the Contractor's final payment.

- Originals of all waste disposal manifests, seals and disposal logs.

- OSHA compliance air monitoring records conducted during work.
- Daily progress log, including the entry/exit log.
- All list of all workers used in the performance of the project, including name, social security number, current and original EPA training certificate and Connecticut license number.
- For each worker used in the performance of the project, submit the Worker's Acknowledgement Statement.
- Disposal Site/Landfill permit from applicable regulatory agency.
- Project notification and alternate work plans, if applicable, with State acknowledgement.

1.6 PRE-CONSTRUCTION MEETING

- 1.6.1 Prior to commencing the work, the Contractor shall meet with the Owner and the Owner's licensed representative to present and review, as appropriate, the items listed in Section 1.5. The Contractor's Competent Person(s) who will be on-site shall participate in the pre-start meeting. The pre-start meeting is to discuss and determine procedures to be used during the project.

PART 2 - PRODUCTS

2.1 ENCAPSULANTS

- 2.1.1 Only encapsulants rated as acceptable or marginally acceptable based on Battelle Columbus Laboratory test procedures and rating requirements developed under the 1978 US EPA contract shall be used for lockdown encapsulation.
- 2.1.2 Latex paint with solids content greater than 15 percent shall be considered a lockdown sealant for coating all non-metallic surfaces.

2.2 WETTING AGENTS

Wetting agents (surfactants) shall conform to current US EPA requirements and shall contain no toxic or hazardous substances as defined in 29 CFR 1926.59.

2.3 MASTIC REMOVAL SOLVENTS

Mastic removal solvents are not being considered for this project. If allowed, in writing by the Owner, mastic solvents shall conform to current US EPA requirements, and shall contain no toxic or hazardous substances as defined in 29 CFR 1926.59.

PART 3 - EXECUTION

3.1 EQUIPMENT

At all times, provide the Project Monitor and employees with at least two complete sets of personal protective equipment (including disposable coveralls), as required for entry to and inspection of the asbestos control areas. Provide manufacturer's certificate of compliance for all equipment used to contain airborne asbestos fibers.

3.1.1 Respirators

Select respirators from those approved by the National Institute for Occupational Safety and Health (NIOSH).

3.1.1.1 Respirators for Handling Asbestos

Provide personnel engaged in pre-cleaning, cleanup, handling, removal, and demolition of asbestos materials with respiratory protection as indicated in 29 CFR 1926.1101 and 29 CFR 1926.103.

3.1.2 Exterior Whole-Body Protection

3.1.2.1 Outer Protective Clothing

Provide personnel exposed to asbestos with disposable, whole body outer protective clothing, head coverings, gloves, and foot coverings. Provide disposable work gloves. Work gloves shall be disposed of as asbestos waste after the project. Make sleeves secure at the wrists, make foot coverings secure at the ankles, and make clothing secure at the neck by use of tape. Provide disposable undergarments for wear under the outer protective clothing.

3.1.2.2 Eye Protection

Provide goggles to personnel engaged in asbestos abatement operations when the use of a full-face respirator is not required.

3.1.3 Warning Signs and Label

Provide bilingual warning signs printed in English and Spanish (and the prevailing language spoken by employees) at all approaches to asbestos control areas. Locate signs at such a distance that personnel may read the sign and take the necessary protective steps required before entering the area. Provide labels and affix to all asbestos materials, scrap, waste, debris, and other products contaminated with asbestos.

3.1.3.1 Warning Sign

Provide vertical format conforming to 29 CFR 1926.1101, minimum 20-in x 14-in, displaying the following legend in the lower panel.

<u>Legend</u>	<u>Notation</u>
Danger	1-inch Sans Serif Gothic or Block
Asbestos	1-inch Sans Serif Gothic or Block
Cancer and Lung Disease Hazard	1/4-inch Sans Serif Gothic or Block
Authorized Personnel Only	1/4-inch Sans Serif Gothic or Block
Respirators and Protective Clothing are Required in this Area	1/4-inch Sans Serif Gothic or Block

Spacing between lines shall be at least equal to the height of the upper of any two lines.

3.1.3.2 Warning Labels

Provide labels conforming to 29 CFR 1926.1101 of sufficient size to be clearly legible, displaying the following legend:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD
BREATHING ASBESTOS DUST MAY
CAUSE SERIOUS BODILY HARM

3.1.4 Local Exhaust System

For each indoor asbestos abatement area, provide a local exhaust system in accordance with ANSI Z9.2 and 29 CFR 1926.1101 that will provide at least four air changes per hour inside of the negative pressure enclosure. Local exhaust equipment shall be operated 24 hours per day, until the asbestos control area is removed and shall be leak proof the filter and equipped with HEPA filters. Maintain a minimum pressure differential in the asbestos abatement area of minus 0.02 inches of water column relative to adjacent, unsealed areas. In no case shall the building ventilation system be used as the local exhaust system for the asbestos abatement area. Filters on exhaust system equipment shall conform to ANSI Z9.2 and UL 586. The local exhaust system shall terminate out of doors and remote from any public access or ventilation system intakes.

3.1.5 Tools

Vacuums shall be leak proof to the filter and equipped with HEPA filters. Filters on vacuums shall conform to ANSI Z9.2 and UL 586. Do not use power tools to remove asbestos containing materials unless the tool is equipped with effective, integral HEPA filtered exhaust ventilation systems. Remove all residual asbestos from reusable tools prior to storage or reuse.

3.1.6 Decontamination Facilities

Provide each regulated area with separate personnel decontamination facility (PDF) and waste/equipment decontamination facilities (W/EDF). Ensure that the PDF are the only means of ingress and egress to the regulated area and that all equipment, bagged waste, and other material exit the regulated area only through the W/EDF.

3.1.6.1 General Requirements

All personnel entering or exiting a regulated area must go through the PDF and shall follow the requirements at 29 CFR 1926.1101 (j)(1) and these specifications. All waste, equipment and contaminated materials must exit the regulated area through the W/EDF and be decontaminated in accordance with these specifications. Walls and ceilings of the PDF and W/EDF must be constructed of a minimum of 3 layers of 6 mil opaque polyethylene sheeting and be securely attached to existing building components and/or an adequate temporary framework. A minimum of 3 layers of 6 mil re-enforced poly shall also be used to cover the floor under the PDF and W/EDF units. Construct doors so that they overlap and secure to adjacent surfaces. Weight inner doorway sheets with layers of duct tape so that they close quickly after release. Put arrows on sheets so they show direction of travel and overlap. If the building adjacent area is occupied, construct a solid barrier on the occupied side(s) to protect the sheeting and reduce potential for non-authorized personnel entering the regulated area.

3.1.6.2 Temporary Facilities to the PDF and W/EDF

The Asbestos Supervisor shall provide temporary water service connections to the PDF and W/EDF. Backflow prevention must be provided at the point of connection to the VA system. Water supply must be of adequate pressure and meet requirements of 29 CFR 1910.141(d)(3). Provide adequate temporary overhead electric power with ground fault circuit interruption (GFCI) protection. Provide a sub-panel for all temporary power in the clean room. Provide adequate lighting to provide a minimum of 50-foot candles in the

PDF and W/EDF. Provide temporary heat, if needed, to maintain 70°F throughout the PDF and W/EDF.

3.1.6.3 Personal Decontamination Facility (PDF)

The Asbestos Supervisor shall provide a PDF consisting of shower room which is contiguous to a clean room and equipment room which is connected to the regulated area. The PDF must be sized to accommodate the number of personnel scheduled for the project. The shower room, located in the center of the PDF, shall be fitted with as many portable showers as necessary to insure all employees can complete the entire decontamination procedure within 15 minutes. The PDF shall be constructed of opaque poly for privacy. The PDF shall be constructed to eliminate any parallel routes of egress without showering.

3.1.6.3.1 Clean Room

The clean room must be physically and visually separated from the rest of the building to protect the privacy of personnel changing clothes. The clean room shall be constructed of at least 3 layers of 6 mil opaque poly to provide an airtight room. Provide a minimum of 2 - 900 mm (3 foot) wide 6 mil poly doorways. One doorway shall be the entry from outside the PDF and the second doorway shall be to the shower room of the PDF. The floor of the clean room shall be maintained in a clean, dry condition. Shower overflow shall not be allowed into the clean room. Provide 1 storage locker per person. A portable fire extinguisher, Type ABC, shall be provided in accordance with OSHA and NFPA Standard 10. All persons entering the regulated area shall remove all street clothing in the clean room and dress in disposable protective clothing and respiratory protection. Any person entering the clean room does so either from the outside with street clothing on or is coming from the shower room completely naked and thoroughly washed. Females required to enter the regulated area shall be ensured of their privacy throughout the entry/exit process by posting guards at both entry points to the PDF so no male can enter or exit the PDF during her stay in the PDF.

3.1.6.3.2 Shower Room

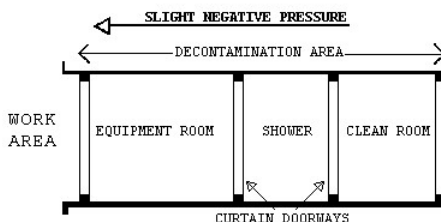
The Asbestos Supervisor shall assure that the shower room is a completely watertight compartment to be used for the movement of all personnel from the clean room to the equipment room and for the showering of all personnel going from the equipment room to the clean room. Each shower shall be constructed so water runs down the walls of the shower and into a drip pan. Install a freely draining smooth floor on top of the shower pan. The shower room shall be separated from the rest of the building and from the clean room and equipment room using airtight walls made from at least 3 layers of 6 mil opaque poly. The shower shall be equipped with a shower head and controls, hot and cold water, drainage, soap dish and continuous supply of soap and shampoo, and shall be maintained in a sanitary condition throughout its use. The controls shall be arranged so an individual can shower without assistance. Provide a flexible hose shower head, hose bibs and all other items shown on Shower Schematic. Wastewater will be pumped to a drain after being filtered through a minimum of a 100-micron sock in the shower drain; a 20-micron filter; and a final 5-micron filter. Filters will be changed a minimum of daily or more often as needed. Filter changes must be done in the shower to prevent loss of contaminated water. Hose down all shower surfaces after each shift and clean any debris from the shower pan. Residue is to be disposed of as asbestos waste.

3.1.6.3.3 Equipment Room

The Asbestos Supervisor shall provide an equipment room which shall be an airtight compartment for the storage of work equipment/tools, reusable personal protective equipment, except for a respirator and for use as a gross decontamination area for personnel exiting the regulated area. The equipment room shall be separated from the regulated area by a minimum 3-foot-wide door made with 2 layers of 6 mil opaque poly. The equipment room shall be separated from the regulated area, the shower room, and the rest of the building by airtight walls and ceiling constructed of a minimum of 3 layers of 6 mil opaque poly. Damp wipe all surfaces of the equipment room after each shift change. Provide an additional loose layer of 6 mil fire retardant poly per shift change and remove this layer after each shift. If needed, provide a temporary electrical sub-panel equipped with GFCI in the equipment room to accommodate any equipment required in the regulated area.

3.1.6.3.4 The PDF shall look like as follows:

Clean room at the entrance followed by a shower room followed by an equipment room leading to the regulated area. Each doorway in the PDF is minimum of 2 layers of 6 mil opaque poly.



3.1.6.4 Waste/Equipment Decontamination Facility (W/EDF)

The Asbestos Supervisor shall provide a W/EDF consisting of a washroom, holding room, and clean room for removal of waste, equipment, and contaminated material from the regulated area. Personnel shall not enter or exit the W/EDF except in the event of an emergency. Clean debris and residue in the W/EDF daily. All surfaces in the W/EDF shall be wiped/hosed down after each shift and all debris shall be cleaned from the shower pan. The W/EDF shall consist of the following:

3.1.6.4.1 Wash Down Station

Provide an enclosed shower unit in the regulated area just outside the Washroom as an equipment bag and container cleaning station.

3.1.6.4.2 Washroom

Provide a washroom for cleaning of bagged or containerized asbestos containing waste materials passed from the regulated area. Construct the washroom using 50 x 100 mm (2" x 4") wood framing and 3 layers of 6 mil poly. Locate the washroom so that packaged materials, after being wiped clean, can be passed to the Holding Room. Doorways in the washroom shall be constructed of 2 layers of 6 mil poly.

3.1.6.4.3 Holding Room

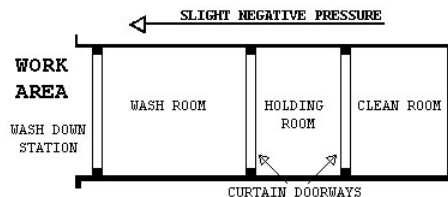
Provide a holding room as a drop location for bagged materials passed from the washroom. Construct the holding room using 50 x 100 mm (2" x 4") wood framing and 3 layers of 6 mil poly. The holding room shall be located so that bagged material cannot be passed from the washroom to the clean room unless it goes through the holding room. Doorways in the holding room shall be constructed of 2 layers of 6 mil poly.

3.1.6.4.4 Clean Room

Provide a clean room to isolate the holding room from the exterior of the regulated area. Construct the clean room using 2 x 4 wood framing and 2 layers of 6 mil poly. The clean room shall be located to provide access to the holding room from the building exterior. Doorways to the clean room shall be constructed of 2 layers of 6 mil poly. When a negative pressure differential system is used, a rigid enclosure separation between the W/EDF clean room and the adjacent areas shall be provided.

3.1.6.4.5 The W/EDF shall be provided as follows:

Washroom leading to a Holding Room followed by a Clean Room leading to outside the regulated area. See diagram.



3.1.6.5 Waste/Equipment Decontamination Procedures

At washdown station in the regulated area, thoroughly wet clean contaminated equipment and/or sealed polyethylene bags and pass into Washroom after visual inspection. When passing anything into the Washroom, close all doorways of the W/EDF, other than the doorway between the washdown station and the Washroom. Keep all outside personnel clear of the W/EDF. Once inside the Washroom, wet clean the equipment and/or bags. After cleaning and inspection, pass items into the Holding Room. Close all doorways except the doorway between the Holding Room and the Clean Room. Workers from the Clean Room/Exterior shall enter the Holding Room and remove the decontaminated/cleaned equipment/bags for removal and disposal. These personnel will not be required to wear PPE. At no time shall personnel from the clean side be allowed to enter the Washroom.

3.2 WORK PROCEDURE

Perform asbestos related work in accordance with 29 CFR 1926.1101, 40 CFR 61-Subpart M, and applicable State regulations. Use wet removal procedures for all asbestos removal work, and negative pressure enclosure techniques for all indoor asbestos removal activities.

Personnel shall wear and utilize protective clothing and equipment as specified herein. Eating, smoking, drinking, chewing gum, tobacco, or applying cosmetics shall not be permitted in the asbestos work or

control areas. Personnel of other trades not engaged in the removal and demolition of asbestos containing materials shall not be exposed at any time to airborne concentrations of asbestos unless all the personnel protection and training provisions of this section are complied with by the trade personnel.

Shut down the building heating, ventilating, and air conditioning system, cap the openings to the system, prior to the commencement of asbestos work. Disconnect electrical service where wet removal is performed and provide temporary electrical service with verifiable ground fault circuit interrupter (GFI) protection prior to the use of any water.

If an asbestos fiber release or spill occurs outside of the asbestos control area, stop work immediately, correct the condition to the satisfaction of the Project Monitor prior to resuming work.

3.2.1 Protection of Adjacent Building Areas

Perform work without damage or contamination of adjacent building areas. Where such areas are damaged or contaminated as verified by the Project Monitor using visual inspection or sample analysis, it shall be restored to its original condition or decontaminated by the contractor at no expense to the owner as deemed appropriate by the Project Monitor. This includes inadvertent spill of dirt, dust, or debris in which it is reasonable to conclude that asbestos may exist. When these spills occur, stop work immediately. Then clean up the spill. When satisfactory visual inspection and air sampling results are obtained from the Project Monitor, asbestos abatement work may be resumed.

3.2.2 Furnishings

Furniture, miscellaneous equipment, and trash are found in the buildings. In areas where asbestos removal work will take place, the contractor shall move all furniture, miscellaneous equipment, and trash from the asbestos control area.

3.2.3 Pre-cleaning

Wet wipe and HEPA vacuum all surfaces within the work area prior to establishment of an enclosure. Fixed objects within the proposed work area shall be pre-cleaned by HEPA filtered vacuum equipment and/or wet cleaning methods as appropriate and enclosed with 6-mil plastic sheeting sealed to protect from contamination.

3.2.4 Asbestos Control Area Procedures

The following requirements apply to all indoor areas:

3.2.4.1 Isolation barriers

Separate any operations in the regulated area from adjacent areas using 6-mil plastic sheeting and duct tape. Individually seal with two layers of 6-mil poly and duct tape all HVAC openings into the regulated area. Individually seal all lighting fixtures, clocks, doors, windows, convectors, speakers, or any other objects/openings in the regulated area.

3.2.4.2 Floor and Wall Plastic

In addition to the isolation barriers, floor shall be covered with two layers of 4-mil plastic sheeting and wall surfaces shall be sealed with a minimum of two layers of 6-mil plastic sheeting, except where asbestos floors and/or walls are being removed, in which case they need not be sealed. The plastic layers on the floor shall extend 12 inches up the walls. Walls shall be covered with plastic sheeting down to the floor level, thus

overlapping the floor material by a minimum of 12 inches. There shall be a distance of at least 12 inches between seams of adjacent layers.

3.2.4.3 Emergency and Fire Exits

Emergency and fire exit locations from the work area shall be maintained, or alternative exits shall be established in accordance with applicable codes and regulations. Exits shall be checked daily against exterior blockage or impediments to exiting. Entrances to the workplace that will not be used for worker entry or emergency exits shall be locked to prevent unauthorized entry.

3.2.4.4 Sanitary Facilities

Adequate portable toilet and hand washing facilities shall be provided by the contractor.

3.2.5 Negative Pressure Enclosure

Provide negative pressure HEPA ventilation for all indoor asbestos control areas as follows:

- 3.2.5.1 The negative pressure ventilation equipment shall be operated continuously, 24 hours a day, from the establishment of isolation barriers through successful clearance air monitoring. If such equipment shuts off; adjacent areas shall be monitored for asbestos fibers.
- 3.2.5.2 A static negative air pressure of 0.02 inches (minimum) water column shall always be maintained in the workplace during abatement to ensure that contaminated air in the work area does not filter back to uncontaminated areas.
- 3.2.5.3 If more than one ventilation unit is installed, units shall be turned on one at a time while checking the integrity of all barriers for secure attachment and the need for additional reinforcement.
- 3.2.5.4 A dedicated power supply for the negative pressure ventilating units shall be utilized.
- 3.2.5.5 On loss of negative pressure or electric power to the negative pressure ventilating units, abatement shall stop immediately and shall not resume until power is restored and negative pressure ventilation equipment is operating again. When power failure or loss of negative pressure equipment lasts or is expected to last longer than one-half hour:
 - the make-up air inlets shall be sealed airtight, and
 - the decontamination systems shall be sealed airtight after the evacuation of workers and/or authorized visitors from the work area, and
 - all adjacent areas shall be monitored for asbestos fiber concentration upon discovery of, and subsequently throughout the power failure.
- 3.2.5.6 Negative pressure ventilation equipment shall be installed and operated to provide at least one air change in the work area every 15 minutes.
- 3.2.5.7 Negative pressure ventilation equipment shall be exhausted to the outside of the building away from occupied areas.
 - At no time shall the negative pressure ventilation unit exhaust within 20 feet of a receptor or adversely affect the air intake ports, louvers, or entrances for the building or adjacent buildings.

- Heavy duty ducting or equivalent, or larger, shape and dimension as that of the negative pressure ventilation exhaust port shall be used to exhaust to the outside of the structure.
- All ducting shall be sealed and braced or supported to maintain airtight joints.

- 3.2.5.8 Careful installation shall be done to ensure that the ducting does not release fibers into uncontaminated building areas.
- 3.2.5.9 The Contractor shall provide a manometer to verify negative air pressure. Manometers shall be read twice daily by the Contractor's Supervisor and recorded within the Daily Project Log.
- 3.2.5.10 The system shall include a series of pre-filters and filters to provide High Efficiency Particulate Air (HEPA) filtration of particles down to 0.3 microns at 100% efficiency and below 0.3 microns at 99.9% efficiency. The Contractor shall supply enough replacement filters to replace pre-filters every 2 hours, secondary filters every 24 hours and primary HEPA filters every 600 hours of operation. A log shall be provided for each unit brought to the site with the current hours of use for each filter. Failure to provide this log will require that all filters be changed at the beginning of the project.
- 3.2.5.11 Once installed and operational, the Contractor's Supervisor shall conduct daily inspections of the Work Area to ensure the airtight integrity of the enclosure and operation of the negative air system. Findings shall be recorded within the Daily Project Log.
- 3.2.6 Alternate Work Practices
- The use of alternate work practices may be allowed only after review by, and with the consent of, the Owner's representative. The contractor shall be responsible for filing any applications for alternative work practices, and payment of all fees associated with such applications.
- 3.2.7 Interior Asbestos Removal Procedures
- Wet asbestos material with a fine spray of amended water during removal, cutting, or other handling to reduce the emission of airborne fibers. Place floor tiles, transite or other sharp-edged asbestos materials in burlap bags prior to placement in 6-mil plastic disposal bags. Other asbestos materials which are unlikely to puncture the plastic shall be removed and placed directly into 6-mil plastic disposal bags. Remove asbestos containing material in a gradual manner, with continuous application of the amended water or wetting agent in such a manner that no asbestos material is disturbed prior to being adequately wetted. Where unusual circumstances prohibit the use of 6-mil plastic bags, submit an alternate proposal for containment of asbestos fibers to the Project Designer for approval. (For example, in the case where non-friable lab counter tops are removed whole, wrapped, and sealed in two layers of 6-mil plastic sheeting and labeled in accordance with NESHAP and OSHA requirements.) Asbestos material shall be containerized while wet. At no time shall asbestos material be allowed to accumulate or become dry. Lower and otherwise handle asbestos containing material as indicated in 40 CFR 61-Subpart M. All asbestos waste generated from removal activities must be completely bagged up, removed from the containment, and placed in the secure waste storage trailer at the end of each work shift.

3.2.7.1 Removal of Friable Asbestos-Containing Materials

Remove friable asbestos-containing thermal system insulation (Tank Insulation, Pipe Insulation, Pipe Elbow and Fitting Insulation, etc.) as follows:

- 3.2.7.1.1 Mist work area continuously with amended water whenever necessary to reduce airborne fiber levels.
- 3.2.7.1.2 If necessary, remove wall and/or ceiling materials under wet conditions to access the asbestos containing materials.
- 3.2.7.1.3 Remove outer layer of wrap on piping while spraying amended water to saturate ACM. Spray all friable insulation with a fine mist of amended water or removal encapsulant. Allow time to saturate material to substrate.
- 3.2.7.1.4 Cut bands holding preformed pipe insulation, slit jackets at seams, remove and hand-place in a disposal bag. Remove job molded fitting insulation in chunks and hand place in a disposal bag.
- 3.2.7.1.5 Remove any residue on ceilings, beams, pipes or fittings with stiff bristle nylon hand brush or scraper/wire brush.
- 3.2.7.1.6 Remove saturated ACM in small sections from all areas. Do not allow material to dry out. As it is removed, simultaneously pack material while still wet into disposal bags.
- 3.2.7.1.7 Twist the neck of bags, bend over and seal with minimum three wrap of duct tape. Clean outside of bag and move to washdown station in the EDF.

Remove friable asbestos-containing soft-coat plaster ceiling as follows:

- 3.2.7.1.8 Mist work area continuously with amended water whenever necessary to reduce airborne fiber levels.
- 3.2.7.1.9 Spray all soft-coat plaster with a fine mist of amended water or removal encapsulant. Allow time to saturate material to substrate.
- 3.2.7.1.10 Remove all gross soft-coat plaster materials and hand-place in disposal bags.
- 3.2.7.1.11 Remove any residue on ceilings, beams, studs or other surfaces with stiff bristle nylon hand brush or scraper/wire brush.
- 3.2.7.1.12 Remove saturated ACM in small sections from all areas. Do not allow material to dry out. As it is removed, simultaneously pack material while still wet into disposal bags.
- 3.2.7.1.13 Twist the neck of bags, bend over and seal with minimum three wrap of duct tape. Clean outside of bag and move to washdown station in the EDF.

3.2.7.2 Mastic/Adhesive Removal Procedures

All mastic/adhesive removal shall be accomplished using bead-blasting machines, mechanical and hand grinding tools. Chemical removal shall not be used without the written consent of the Owner.

3.2.7.3 Cork Ceiling Tiles & Adhesive Removal Procedures

Spray the cork with amended water and allow the material to become saturated. While misting the work area continuously, remove the cork in a gradual manner. Place the cork into waste containers/bags immediately, do not allow the waste to accumulate on the floor. After the cork is removed remove the adhesive from the concrete ceiling using hand scrapers and/or mechanical grinders and chipping guns. Chemical removal shall not be used without the written consent of the Owner.

3.2.7.4 Asbestos Fire Door & Electrical Backer Board Removal Procedures

Remove these components intact and place directly into properly labeled waste containers or wrap the item in three layers of 6-mil plastic sheeting, while wet, and properly label the packaging for disposal.

3.2.7.5 Final Cleaning Procedures

Final cleaning procedures shall be initiated after gross removal and double bagging of ACM waste has been completed. At a minimum, final cleaning shall consist of HEPA vacuuming and wet wiping all exposed surfaces in the work area.

3.2.7.6 Lockdown Encapsulation

Lockdown encapsulation shall be applied to seal nonvisible residue on all surfaces in the work area, including those surfaces from which ACM was removed. Encapsulant shall be applied using airless spray equipment. Spraying shall occur at the lowest pressure range possible to minimize fiber release from encapsulant impact at the surface. It shall be applied with a consistent horizontal or vertical motion.

3.2.8 Air Sampling

The contractor is responsible for performing personal air sampling in accordance with 29 CFR 1926.1101. Area air sampling, including pre-abatement, during abatement and post-abatement will be carried out by the Project Monitor, as required by the client and in compliance with applicable State and Federal regulations.

3.2.9 Inspection of Work

While performing asbestos removal work, the contractor shall be subject to on-site inspection by the Project Monitor and other representatives of the Owner. If the work is found to be in violation of this specification, the Owner's representative will immediately issue a stop work order to be in effect and until the violation is resolved. All related costs including standby time required to resolve the violation shall be at the contractor's expense.

3.2.9.1 Final Visual Inspection

The contractor will notify the Project Monitor when asbestos removal is completed in each work area so that a final visual inspection can be scheduled. The Project Monitor will inspect the area, accompanied by Asbestos Worker Supervisor. During the inspection, the Project Monitor will identify any areas where remedial action is required, including damaged containment barriers, defective or malfunctioning HEPA filter units, asbestos and non-asbestos debris, and any safety violations. If the area is deemed satisfactory by the Project Monitor, the contractor will be permitted to proceed with lockdown encapsulation of the work area. If the visual inspection is not satisfactory, the contractor will bear the added cost of re-cleaning and re-inspecting the area.

3.2.9.2 Clearance Air Testing

The Project Monitor will perform clearance air testing in each work area, after cleaning has been completed and lockdown encapsulation has dried. The contractor shall not dismantle the containment barriers, decontamination facilities or engineering controls until the Project Monitor provides an executed Certification of Final Visual Inspection (Attachment 028213-1) and laboratory analysis report indicating that the clearance air test results are satisfactory. Re-occupancy air samples for all work areas containing more than or equal to 160 square feet or 260 linear feet of asbestos containing materials shall be Transmission Electron Microscopy air samples (TEM) in accordance with AHERA regulations. All other air samples shall be analyzed by Phase Contrast Microscopy (PCM) in accordance with NIOSH Method P&CAM 7400.

For PCM air samples the re-occupancy air monitoring shall be considered satisfactory when every sample is less than or equal to 0.01 f/cc. For TEM air samples the re-occupancy air monitoring shall be considered satisfactory when the average of all the inside samples is less than 70 structures/mm². If the clearance air test results are not satisfactory, the contractor will bear the added cost of re-cleaning, re-inspecting, and retesting the area.

Final clearance air testing will not be required in all abatement areas where demolition of the existing structure is to follow. This only applies if the building is not to be reoccupied and demolition is to follow immediately after the abatement, final visual and encapsulation are completed.

3.3 CLEAN-UP AND DISPOSAL

3.3.1 Disposal of Asbestos

3.3.1.1 Procedure for Disposal

Collect asbestos waste, asbestos contaminated water, scrap, debris, bags, containers, equipment, and asbestos contaminated clothing which may produce airborne concentrations of asbestos fibers and place in sealed fiber-proof, waterproof, non-returnable containers (e.g. double 6-mil plastic bags, cartons, drums or cans). Wastes within the containers must be adequately wet in accordance with 40 CFR 61-Subpart M. Affix a warning and Department of Transportation label to each container and/or bag. The name of the abatement contractor and license number, the name of the waste generator and the location at which the waste was generated shall be clearly indicated on the outside of each container. Prevent contamination of the transport vehicle. These precautions include lining the vehicle cargo area with plastic sheeting and thorough cleaning of the cargo area after transport and unloading of asbestos debris is complete. Dispose of waste asbestos materials at an EPA and State-approved asbestos landfill. Consolidation of loads at an asbestos waste transfer station is permissible provided that the transfer station is properly permitted under regulations of the State of Connecticut. Workers unloading the waste containers shall wear appropriate respirators and personal protective equipment when handling asbestos materials at the disposal site.

3.3.1.2 Transportation and Disposal Site

The following shall apply to the Contractor's waste hauler and disposal site:

- The Contractor's hauler and disposal site shall be approved by the Owner.
- Waste shall be removed from the site only during normal working hours unless otherwise specified or approved by the Owner.
- All waste generated as part of the asbestos project shall be removed from the site with ten (10) calendar days after successful completion of all asbestos abatement work.
- Unless specifically approved by the Owner, the Contractor shall not permit any off-site transfers of the waste or allow the waste to be transported or combined with any other off-site asbestos materials. The Hauler must travel directly to the disposal site as identified on the notifications with no unauthorized stops.

3.3.1.3 Asbestos Waste Shipment Records

For each shipment of asbestos waste generated at the site, the contractor shall supply the owner with a properly executed Waste Shipment Record, in accordance with 40 CFR 61-Subpart M. The contractor shall notify the owner and contact the EPA regional office if

a copy of the waste shipment record, signed by the owner or operator of the disposal site, is not received within 35 days of the date the waste was accepted by the transporter.

PART 4 - BALLAST REMOVAL

4.01 BALLAST REMOVAL & DISPOSAL

The fluorescent light fixtures listed in the attached summary have ballasts that may contain polychlorinated biphenyls (PCBs) or diethyl hexyl phthalate (DEHP). DEHP is a listed hazardous waste as referenced in 40 CFR 261. The hazardous waste number given to DEHP is U028. DEHP-containing ballasts should be handled, stored, and disposed of as hazardous waste. The fluorescent tubes within the lighting fixtures at the site may contain mercury. Prior to the disposal of the potential mercury-containing lamps, testing by Toxicity Characteristic Leaching Procedure (TCLP) should be performed, which identifies whether a waste is toxic and must be managed as hazardous waste. If the mercury concentration exceeds 0.2 milligrams per liter, the lamp fails the TCLP and shall be managed as hazardous waste. Lamps that tested hazardous must be disposed of at a hazardous waste landfill or sent to a lamp recycling facility. Mercury-containing lamps should never be incinerated.

Work of this section shall be carried out in accordance with applicable EPA and State regulations

Disposal requirements & general information:

<http://www.p2pays.org/ref/19/18366.htm>

<http://www.epa.gov/waste/hazard/wastetypes/universal/lamps/faqs.htm>

http://www.epa.gov/reg3wcmd/ts_pcb.htm#ballast

PART 5 – MERCURY CONTAINING UNIVERSAL WASTE MATERIALS

5.01 UNIVERSAL WASTE MERCURY REMOVAL & DISPOSAL

The mercury containing items listed in the attached summary must be removed and disposed of prior to building demolition. For proper removal, storage and disposal requirements please refer to the Connecticut Department of Energy & Environmental Protection Universal Waste Rule. A copy of which has been attached to this specification.

Work of this section shall be carried out in accordance with applicable EPA and State laws and regulations

Disposal requirements & general information:

<http://www.ct.gov/DEP/cwp/view.asp?A=2714&Q=324830>

<http://www.ehd.org/pdf/sources/617.pdf>

<http://www.epa.gov/osw/hazard/wastetypes/universal/batteries.htm>

PART 6 – REFRIGERATOR & AIR CONDITIONER

6.01 REFRIGERATOR & AIR CONDITIONER REMOVAL & DISPOSAL

All required refrigerator and air conditioning units must be removed and disposed of prior to building demolition. The proper handling of these items, prior to disposal, must be performed in accordance with the United States Environmental Protection Agency, Section 608, Refrigerant Recycling Rule. An overview copy from the U.S. EPA website is attached to this specification.

Work of this section shall be carried out in accordance with applicable EPA and State laws and regulations.

Disposal requirements & general information:

<http://www.epa.gov/ozone/title6/608/608fact.html>

PART 7 – SMOKE DETECTORS

7.01 SMOKE DETECTOR REMOVAL & DISPOSAL

Both photoelectric and ionization smoke alarms contain plastic and electronic circuit boards and in some cases batteries (alkaline or lithium). Ionization technology also includes a chamber containing radioactive material (americium-241) incorporated into a gold matrix.

Work of this section shall be carried out in accordance with applicable EPA and State laws and regulations.

Disposal requirements & general information:

http://www.epa.gov/rpdweb00/sources/smoke_dispose.html

PART 8 – BATTERIES

8.01 BATTERY REMOVAL & DISPOSAL

Batteries contain heavy metals such as mercury, lead, cadmium, and nickel, which can contaminate the environment when batteries are improperly disposed of. When incinerated, certain metals might be released into the air or can concentrate in the ash produced by the combustion process.

Work of this section shall be carried out in accordance with applicable EPA and State laws and regulations.

Disposal requirements & general information:

<http://www.epa.gov/osw/conserve/materials/battery.htm>

<http://www.ct.gov/dep/cwp/view.asp?A=2714&Q=324832>

<http://www.ct.gov/dep/cwp/view.asp?A=2714&Q=324830>

PART 9 - LEAD SPECIFICATIONS

9.1 SUMMARY

9.1.1 Work Included: The removal and disposal of lead containing materials in accordance with the Contract Documents. The Work of this Section shall include, but not be limited to the following:

9.1.1.1 Removal of lead-containing building materials listed in Attachment 028213-4.

9.1.1.2 Transportation of any lead hazardous waste to an approved disposal site by a licensed lead waste hauler.

9.1.1.3 Disposal of lead-containing waste materials at an approved lead waste disposal site.

9.1.2 Lead Paint Warning: All contractors shall comply with the requirements of the OSHA Construction Standard for Lead (29 CFR 1926.62) when disturbing painted surfaces at this facility.

The lead paint screening conducted at this facility does not meet OSHA requirements for identifying lead paint subject to OSHA regulations because OSHA does not recognize any method of paint file evaluation as an acceptable means of determining the applicability of these regulations. It is the responsibility of contractors on this project to determine which of their activities are subject to the OSHA construction standard for lead and to implement all controls required by that standard at no additional cost to the Owner.

All paint on existing structural steel at this facility shall be handled as "lead-based-paint" unless proven otherwise. Any testing conducted to prove otherwise shall be at the expense of the party requiring such proof.

9.2 APPLICABLE LEAD STANDARDS

9.2.1 The lead regulations listed below are applicable to this project:

1. 29 CFR 1926.62 - OSHA Lead Standard for the Construction Industry
2. 40 CFR Parts 260-270 (RCRA) - EPA Regulations for Hazardous Wastes
3. Section 406 (B) - Toxic Substances Control Act (TSCA)
4. "Guidance for the Management and Disposal of Lead-Contaminated Materials Generated in the Lead Abatement, Renovation, and Demolition Industries" dated November 4, 1994, revised November 21, 2005 and updated May 18, 2007.
5. EPA's 2008 Lead-Based Paint Renovation, Repair and Painting Program Rule (as amended in 2010 and 2011)

Notes: If there is a conflict between any of the applicable regulations listed above, the contractor shall conduct the work in accordance with the more stringent requirements.

If there is a conflict between these specifications and any of the regulations listed above, the contractor shall inform the Owner and conduct the work in accordance with the regulations.

9.3 CONTRACTOR QUALIFICATIONS

9.3.1 The work described in these specifications shall be carried out by persons who are knowledgeable, qualified, and trained in the removal, treatment and handling of lead paint, and the subsequent cleaning of the affected environment. The lead abatement contractor shall always have a competent supervisor on site during lead abatement work. This person's training shall comply with all applicable State and federal requirements.

9.3.2 The lead abatement contractor shall be licensed by the State of Connecticut Department of Public Health and shall have maintained their current license, in good standing, for a minimum of five (5) years.

9.4 FILINGS AND SUBMITTALS

9.4.1 The lead abatement contractor shall be responsible for securing all required permits for the work of these specifications, including obtaining the temporary EPA ID number, and for paying all applicable fees.

9.4.2 The lead abatement contractor shall submit the following materials to the Owner prior to starting the work, and shall provide copies of the materials at the job site:

1. Names of workers/supervisors assigned to the project
2. Medical examination records for all workers/supervisors
3. Respirator fit test records for all workers/supervisors
4. The contractor's respiratory protection plan
5. The contractor's site safety plan
6. Name and permits for waste hauler and disposal
7. Certificate of insurance
8. Copies of original training and refresher certificates for all workers/supervisors

9.5 PROJECT RESPONSIBILITIES

- 9.5.1 The lead abatement contractor shall furnish all labor, services, materials, equipment, tools, and supplies necessary to complete the work in a professional and timely fashion.
- 9.5.2 An industrial hygienist may be retained at the Owner's expense to monitor the work and will be retained to perform post-abatement testing services. If hired to monitor the work on a full-time basis, the hygienist will be authorized by the Owner to stop or direct changes in work procedures if the safety of workers or building occupants is being compromised.

9.6 OWNER'S RESPONSIBILITIES

- 9.6.1 The owner shall notify the historical society of the lead abatement project if the property is over fifty years old. Notification shall be sent to:

Connecticut Historical Commission/Preservation
59 South Prospect Street, Hartford, CT 06106
Phone: (860) 566-3005 Fax: (860) 566-5078

- 9.6.2 The owner shall vacate all abatement areas and provide unrestricted access to the required building areas.

9.7 MATERIAL AND EQUIPMENT

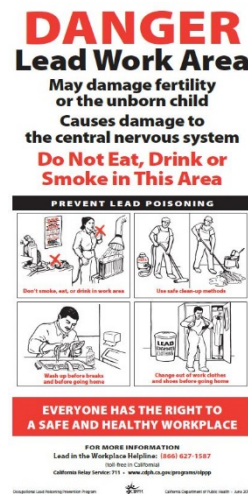
- 9.7.1 Prior to the start of work the contractor shall provide and maintain enough quantity of materials and equipment to assure continuous and efficient work throughout the project. Do not start work unless the following items have been delivered on site and the contractor supervisor has submitted verification to the Owner to this effect:
- 9.7.1.1 Flame-resistant polyethylene sheeting 4 and 6 mil in clear, opaque, and black shades, moisture resistant duct tape capable to continuously sealing polyethylene through project abatement duration, lumber, drywall and plywood for enclosure, posters, signs, and notices.
- 9.7.1.2 Installation and plumbing hardware, shower stalls, hoses, drain pans, sump pumps and water storage drums or wastewater filters.
- 9.7.1.3 Scrapers, brushes, brooms, staple guns, shovels, ladders and scaffolds of suitable height and length, water hose to reach all areas, airless spray equipment, and other hand tools, electric cords, electric power with ground fault interruption.
- 9.7.1.4 Impermeable drums and 6 mil polyethylene bags for lead containing waste; spray adhesive free of methylene chloride to seal seams on polyethylene material.
- 9.7.1.5 Respirators, disposable and recyclable protective clothing, goggles, gloves, and footwear.
- 9.7.2 Deliver materials to the job site in their original packaging or containers. Store all materials away from damage, weather, and contamination. Protect polyethylene from cold exposure. Do not store flammable material inside buildings. Inspect material regularly for damage, deterioration, or contamination. Discard any damaged material. Discard waste per these specifications. Do not block or hinder use of site by employees and visitors of the site by placing or storing material in any unauthorized place.

9.8 ENCAPSULANTS

9.8.1 The use of encapsulants is not anticipated for this project.

9.9 REQUIRED POSTING OF LEAD WORK AREAS

- 9.9.1 The work areas shall be vacated by all unauthorized personnel while lead remediation work is in progress.
- 9.9.2 All entrances to the work area shall be posted in accordance with 29 CFR 1910.1200(f) of OSHA's Hazard Communication Standard:



9.10 LEAD DECONTAMINATION FACILITIES

- 9.10.1 A worker decontamination facility (wash-up station) shall be established prior to the commencement of lead abatement or cleaning. The facility shall be accessible to the work area and located inside the building on the floor where lead abatement work is taking place.
- 9.10.2 The decontamination facility shall provide a changing area with storage for equipment and protective clothing and for street clothes. The worker decontamination facility shall be supplied with hot and cold water, soap, disposable towels, and a container for disposal of towels and other lead-contaminated wastes.

9.11 WORK AREA ENTRY/EXIT

- 9.11.1 Before entering any work area, all workers and authorized visitors shall proceed to the decontamination facility, remove all street clothing, and store these items in the designated changing area. The individual shall then don respiratory protection and disposable coveralls with hoods and foot coverings.
- 9.11.2 On exiting the work area, the worker or visitor shall proceed to the decontamination facility. In the decontamination area, the individual shall remove the protective clothing and respirator, and wash face and hands before leaving the area.

9.12 RESPIRATORY PROTECTION - LEAD

- 9.12.1 Respiratory protection shall be worn by all individuals inside the work area from the initiation of the lead abatement project until the area has successfully passed the re-occupancy criteria. The contractor shall provide all respirators and they shall be NIOSH approved.
- 9.12.2 The contractor shall conduct an exposure assessment in accordance with 29 CFR 1926.62, at the initiation of the operation to ascertain expected exposures during the project. The assessment must be completed in time to comply with the requirements which are triggered by exposure data or the lack of a "negative exposure assessment", and to provide information necessary to assure that all control systems planned are appropriate for that operation and will work properly.
- 9.12.3 The contractor shall provide respirators that meet the minimum requirements, based on the initial exposure assessment and personal air monitoring results for the project.

9.13 LEAD WORK AREA PREPARATION

Most of the lead removal will occur under full containment conditions during asbestos removal. Where lead is the only material to be removed, the contractor shall use the following:

- 9.13.1 Restrict access to the work area by placing barrier tape around the perimeter and posting warning signs. A layer of 6-mil protective sheeting shall be placed on the floor of the room where the lead item will be removed. The protective sheet shall be taped to the wall to prevent dust and water from getting behind/under the floor sheeting. All work area preparation is to conform to State, Local and Federal regulations.
- 9.13.2 Once the area has been set up, employ work procedures that result in an 8-hour Time Weighted Average (TWA) airborne lead level less than the OSHA Permissible Exposure Level (PEL). If the airborne lead exceeds this level, stop work immediately and mist the area with water to lower the airborne lead and revise work procedures to maintain the level within the required limit.

9.14 LEAD WASTE DISPOSAL

- 9.14.1 Based on the amount of material to be removed and disposed of as lead hazardous waste the hazardous waste generator status for this project is determined to be a Small Quantity Generator "SQG"
- 9.14.2 All items listed in the scope of work have not been sampled by TCLP procedures and have instead been assumed to be hazardous lead waste. This material should not be mixed to reduce the lead content to acceptable levels without proper TCLP sampling.

Hazardous Lead Waste includes any class of materials found to have TCLP-Lead content greater than 5.0 Parts per Million (PPM).

Recycled Metals includes scrap metal items that are being recycled and are exempt from hazardous waste disposal requirements according to RCRA and all other applicable State and Federal regulations.

- 9.14.3 Any waste materials that are not being recycled as described above shall be treated and disposed of as hazardous waste.
- 9.14.4 All lead waste on site shall be immediately placed in the appropriate disposal containers. Disposal containers must be properly labeled and dated, maintained in good condition, leak proof and made weather tight at the end of each work shift. All costs associated with wastewater and

- leaks that occur from failure to properly secure containers shall be the sole responsibility of the Contractor.
- 9.14.5 The Contractor must pay special attention to pages 20 – 26 of the “Guidance for the Management and Disposal of Lead-Contaminated Materials Generated in the Lead Abatement, Renovation, and Demolition Industries” dated November 4, 1994, revised November 21, 2005, and updated May 18, 2007. If the Contractor fails to comply with the monitoring requirements, the Owner’s environmental representative shall perform these necessary duties and the Contractor shall bare all associated costs.
- 9.14.6 After the project, the contractor shall furnish copies of properly executed waste manifests to the Owner. Final payment for the work will not be issued until all the waste manifests have been delivered.

END OF SECTION 028213

ATTACHMENT 028213-1 CERTIFICATION OF FINAL VISUAL INSPECTION

Work Area: _____

CONTRACTOR'S CERTIFICATION

As the contractor's authorized representative, I have visually inspected the work area (all surfaces including pipes, beams, ledges, walls, ceiling, and floor), and certify that the area is free of any dust, debris, or asbestos-containing materials or residue. I further certify that the asbestos abatement work was carried out in conformance with the specifications and all applicable State, Federal, and Local regulations.

Abatement Contractor's Representative_____
Date

PROJECT MONITOR'S CERTIFICATION

As the Project Monitor, I have performed a final visual inspection of work area and conducted clearance air testing. The inspection found the area free of visible asbestos residue, and clearance air test results met the release criteria for the work area.

Project Monitor_____
Date

All costs associated with the performance of repeat clearance air testing as the result of failed clearance air sample results shall be borne by the Contractor.

ATTACHMENT 028213-2
INVENTORY OF ASBESTOS CONTAINING BUILDING MATERIALS

JULIAN CURTIS SCHOOL, GREENWICH, CT ASBESTOS CONTAINING BUILDING MATERIAL (ACBM) Listed below are materials analyzed by polarized light microscopy and found to contain >1% asbestos and/or <1% asbestos			
Asbestos Material	Location	Estimated Quantity	Comments
1'x2' Cork Ceiling Adhesive	Basement	500 SF	There is more cork and adhesive in the basement. The quantity provided reflects the area to be renovated.
Pipe Insulation Debris	Basement @ Wall Penetration Near Incinerator	<3 LF	The mastic is not asbestos containing
Exhaust Duct Panel Insulation	Kitchen Exhaust Duct	<3 LF	The insulation is present on a small panel access into the duct. Additional insulation may be present in other locations.
Soft Coat Plaster Ceiling	Entry Lobby, Under Crown Molding	80 SF	The remaining ceiling is sealed with foam along the edge of the crown molding.
Metal & Wood Fire Doors	Most Rooms	12 units	The interior of these doors was not accessible for sampling.
Pipe Insulation	Wet Walls & Other Hidden Locations	288 LF	There are 12 wet walls that may get disturbed during renovations. It is assumed 24 linear feet per wet wall.
Electrical Backer Board	Custodial Closets	4 units	The material is assumed to be asbestos containing.

* Contractor shall coordinate with Architectural, MEP, and Demo drawings for total scope of work.

ATTACHMENT 028213-3
SITE INVENTORY OF UNIVERSAL WASTE/RECYCLABLE MATERIALS

JULIAN CURTIS SCHOOL, GREENWICH, CT UNIVERSAL WASTE		
Listed below are Universal Waste Materials observed during site inspection		
Lower-Level Renovation Areas	Batteries	Emergency lamps/exit signs with batteries (1 location)
	Fluorescent Lamps	Fluorescent fixtures (1)
	Other	Door closers w/ oil (2)
	Other	Smoke detector (1)
Area 2 (Kitchen, Custodial, & Storage)	Batteries	Emergency lamps/exit signs with batteries (4) Storage room batteries (4)
	Fluorescent Lamps	Fluorescent fixtures (13)
	Other	Door closers w/ oil (4)
	Other	Smoke detectors (6)
	Other	Fire strobes (2)
Area 3 (1 st Floor Bathrooms & IT)	Batteries	IT room batteries (2)
	Fluorescent Lamps	Fluorescent fixtures (24)
	Other	Door closers w/ oil (6)
	Other	Smoke detectors (9)
	Other	Fire strobes (4)
Area 4 (Main Office, Principal, & Entry)	Other	AC Units (2)
	Batteries	Emergency lamps/exit signs with batteries (2)
	Fluorescent Lamps	Fluorescent fixtures (12)
	Other	Door closers w/ oil (6)
	Other	Smoke detectors (4)
Area 5 (2 nd Floor Copy Rm, Bath & Custodial))	Other	Fire strobes (3)
	Other	Unit ventilator motor & capacitor (2)
	Batteries	Emergency lamps/exit signs with batteries (2)
	Fluorescent Lamps	Fluorescent fixtures (13)
	Other	Door closers w/ oil (3)
Area 6 (2 nd Floor Bathrooms & Computer Rm)	Other	Smoke detectors (5)
	Other	AC units (2)
	Batteries	Emergency lamps/exit signs with batteries (1)
	Fluorescent Lamps	Fluorescent fixtures (21)
	Other	Door closers w/ oil (4)
	Other	Smoke detectors (5)
	Other	Fire strobes (3)
	Other	AC units (1)

**ATTACHMENT 028213-4
SITE INVENTORY OF LEAD HAZARDOUS MATERIALS**

Material	Comments
Interior Structural Steel & Black Iron	Recycle. If welding occurs on the steel, lead paint must first be removed on all sides of the beam.
2 nd Floor White Painted Closet Door Components	The material is lead containing >1 by XRF. Only materials that will be affected by the renovations will need remediation.
Bathrooms – Painted Door Jambs	The material is lead containing >1 by XRF. Only materials that will be affected by the renovations will need remediation.
Painted Metal Stair Components	The material is lead containing >1 by XRF. Only materials that will be affected by the renovations will need remediation.
Basement Painted Concrete Floor	The material is lead containing >1 by XRF. Only materials that will be affected by the renovations will need remediation.

**ATTACHMENT 028213-5
UNIVERSAL WASTE RULE**

Connecticut Department of Environmental Protection

Universal Waste Rule

Purpose

This fact sheet is designed to answer general questions and provide basic information on management of universal wastes in Connecticut, and is not intended to supersede the applicable regulations. The information provided below addresses the requirements applicable only to large quantity handlers (LQH) and small quantity handlers (SQH) of universal wastes. The universal waste rule requirements are found in Section 22a-449(c)-113 of the Regulations of Connecticut State Agencies (RCSA), effective as of June 27, 2002. It incorporates 40 CFR (Code of Federal Regulations) 273 in its entirety except for following provision that is not incorporated: 40 CFR 273.32(a)(3) (regarding an exemption from notification requirements for large quantity handlers of recalled universal waste pesticides). It is your responsibility to comply with all applicable laws and regulations. The state has modified certain federal requirements making the program more stringent in certain sections. For the specific modifications, refer to the above noted web site.

What is the Universal Waste Rule?

The Universal Waste Rule provides a set of streamlined regulations to reduce the regulatory burden by allowing longer time for the storage of the wastes, reduced record-keeping requirements and consolidation off-site without a permit. Universal wastes are:

1. Generated in a wide variety of settings other than the industrial settings usually associated with hazardous wastes;
2. Generated by a vast community (typically greater than 1,000 sources);
3. May be present in significant volumes in non-hazardous waste management systems.

Why did EPA develop the Universal Waste Rule and DEP adopt the rule?

There are three general goals that EPA had when it developed the streamlined universal waste regulations:

1. To encourage resource conservation while ensuring adequate protection of human health and the environment;
2. To improve implementation of the current Subtitle C hazardous waste regulatory program;
3. To provide incentives for individuals and organizations to collect the unregulated portions of these universal waste streams and manage them using the same systems developed for the regulated portion, thus removing them from the municipal waste stream.

Although EPA's primary goal for the universal waste program is to encourage recycling, batteries, thermostats, pesticides, lamps and used electronics being sent for disposal may also be managed under the universal waste regulations.

What wastes are subject to the Universal Waste Rule? 40 CFR 273.1 and Sections 22a-449(c)-113(a)(2)(B) of the RCSA

There are five waste streams that can be managed as a universal waste in Connecticut. These universal wastes are:

1. Batteries,
2. Mercury-containing thermostats,
3. Certain pesticides,
4. Lamps (including but not limited to fluorescent, neon and mercury vapor lamps), and
5. Used electronics.

How long can I store Universal Wastes on-site? 40 CFR 273.15 and 40 CFR 273.35

In general, a handler can store a universal waste on-site for no longer than one year from the date the universal waste is generated, or received from another handler.

How much can I store on-site? 40 CFR 273.6

- A small quantity handler can accumulate not more than 5000 kilograms total of universal waste (batteries, pesticides, thermostats, lamps and used electronics collectively) at any time.
- A large quantity handler can accumulate 5000 kilograms or more of universal waste (batteries, pesticides, thermostats, lamps and used electronics collectively) at any time.

When does the time limit begin? 40 CFR 262.34(a)(2)

In general, the time limit begins when the generator first determines that the universal waste is a waste. It must be marked, labeled and dated at that time.

What are the universal waste labeling and marking requirements? 40 CFR 273.14 and 273.34 with modifications under Section 22a-449(c)-113(a)(2)(I) &(T) of the RCSA and Sections 22a-449(c)-113(c) and (d) of the RCSA. A generator must follow the labeling and marking requirements as outlined below:

1. Universal waste batteries (each battery) or a container in which the batteries are contained must be labeled or marked clearly with any of the following: "Universal Waste - Battery(ies)" or "Waste Battery(ies), or "Used Battery(ies)".
2. Each container in which the thermostats are contained, must be labeled or marked clearly with any one of the following: "Universal Waste Thermostat(s)" or "Waste Thermostat(s)", or "Used Thermostat(s)".
3. Universal waste lamps (each lamp) or a container or package in which such lamps are contained must be labeled or marked clearly with any of the following: "Universal Waste - Lamp(s)" or "Waste Lamp(s), or "Used Lamp(s)".
4. A container containing recalled universal waste pesticides as covered under these regulations must be labeled or marked clearly with:
 - a. the label that was on or accompanied the product as sold or distributed; and

- b. the words "Universal Waste - Pesticide(s)" or "Waste - Pesticide(s)".

A container of unused pesticide products as covered under these regulations must be labeled or marked clearly with:

- a. the label that was on the product when purchased, if still legible; or, if not feasible, an appropriate label as required under DOT regulations 49 CFR part 172; or, if not feasible, another label prescribed or designated by the pesticide collection program; and
 - b. the words "Universal Waste - Pesticide(s)" or "Waste Pesticide(s)".
1. Universal waste used electronics (each piece of equipment) or a container, package or pallet in which the used electronics are contained must be labeled or marked clearly with any of the following: "Universal Waste - used electronics" or "Waste Used Electronics, or "Used Electronics".

What are the requirements for areas where universal wastes are stored? 40 CFR 273.13 and 273.33 with modifications in Section 22a-449(c)-113(F), (G), (H), (Q), (R) and (S) of the RCSA and Section 22a-449(c)-113(c) and (d) of the RCSA.

A handler must manage universal wastes in a way that prevents releases of any universal waste or component, or constituent of a universal waste to the environment. Universal waste pesticides, lamps and thermostats must be stored in a container. A handler must contain any universal waste battery that shows evidence of leakage, spillage or damage that could cause leakage in a container. A handler must place and keep any universal waste thermostats in a container. All containers for universal waste must be closed, structurally sound, compatible with the contents of the universal waste, and must be capable of preventing leakage, spillage or damage that could cause leakage.

Used electronics must be stored in a building with a roof and four walls or in a cargo carrying portion of a truck, in a manner to prevent used electronics from being exposed to the environment. The used electronics must be handled, stored and transported in a manner that maintains the reuse or recyclability of the used electronic. A handler must immediately clean up and contain any broken cathode ray tube and place in a container that is closed, structurally sound and compatible with the CRT. It should prevent leakage, spillage or releases of broken CRTs, glass particles or other hazardous constituents from such broken tubes to the environment. A handler must not shred, crush, heat or otherwise treat used electronics. A small quantity handler may disassemble used electronics for the sole purpose of marketing, reselling, reusing or recycling components. A large quantity handler must first obtain a permit issued by the commissioner before disassembling used electronics.

Adequate aisle space must be maintained around the containers to allow unobstructed movement of personnel and emergency response equipment. A minimum of 30-inch aisle space is recommended.

Handlers of universal waste must immediately contain all releases of universal wastes and other residues from universal wastes. A handler must determine whether any material resulting from the release (e.g., spilled material, residue, absorbent) is hazardous wastes, and if so, must manage that material as a hazardous waste. The handler is considered the generator of the material resulting from the release and is treated as a hazardous waste generator.

What are the requirements when shipping universal waste off-site? RCSA Section

22a-449(c)-113(a)(1) incorporating 40 CFR 273.18 and 40 CFR 273.38 with modifications under 22a-449(c)-113(a)(2)(L),(M),(W) and (X).

You are prohibited from sending or taking universal waste to a place other than another universal waste handler, a destination facility (including a RCRA treatment, storage, disposal facility), or a foreign destination.

If you self-transport universal waste off-site, you become a universal waste transporter and must comply with all universal waste transporter regulations under Subpart D and F of 40 CFR 273.

If your universal waste meets the definition of hazardous materials under 49 CFR 171 through 180, you must package, label, mark and placard the shipment, and prepare the proper shipping papers in accordance with DOT regulations under 49 CFR parts 172 through 180.

Before sending universal waste to another universal waste handler, you must ensure that the receiving handler will receive the shipment.

If you send a shipment of universal waste to another handler or to a destination facility and the shipment is rejected, you must either receive the waste back or agree on a destination facility to which the shipment will be sent.

You may reject a shipment of universal waste to your site. If you do so, you must inform the original handler. You must send the shipment back to the original handler or send the shipment to a destination facility agreed to by both the originating and receiving handler.

If you receive a shipment of hazardous waste that cannot be managed as a universal waste, you must notify EPA of the illegal shipment and provide the necessary information to EPA.

If you receive a shipment of non-hazardous, non-universal waste, the handler may manage the waste in compliance with federal, state or local solid waste regulations.

How do I track my universal waste shipments? RCSCA Section 22a-449(c)-113(a)(2)(Y) and (Z) incorporating 40 CFR 273.19; 273.39.

Universal waste does not count toward generator status. Universal wastes do not need to be shipped on a manifest.

A small quantity handler of universal waste is not required to keep records of shipments of universal wastes unless the waste is being exported to a foreign destination.

A large quantity handler of universal waste must keep a record of each universal waste shipment received at the facility. In addition, a large quantity handler of universal waste must keep a record of each universal waste shipment sent from the handler to other facilities. Each record may be in the form of a log, invoice, manifest, bill of lading or other shipping document. The records must include the following information: name and address of the original handler, quantity of each type of universal waste shipped or received, date of shipment or receipt. You must retain all of these records for at least three years from the date of receipt of shipment or the date a shipment of universal waste left the facility.

What are the employee training requirements?

A small quantity handler of universal waste must inform all employees who handle or have responsibility for managing universal waste. The information must describe proper handling

and emergency procedures appropriate to the type(s) of universal waste handled at the facility.

A large quantity handler of universal waste must ensure that all employees are thoroughly familiar with the proper waste handling and emergency procedures, relative to their responsibilities during normal facility operations and emergencies.

Where can I obtain additional information?

For further information on this program, contact DEP's Waste Engineering and Enforcement Division through COMPASS (Compliance Assistance) at (888) 424-4193 or mail to:

Department of Environmental Protection
Bureau of Materials Management and Compliance Assurance
Engineering and Enforcement Division
79 Elm Street
Hartford, CT 06106-5127

Content Last Updated September 2002

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**ATTACHMENT 020810-6
REFRIGERANT RECYCLING RULE
U.S. EPA, SECTION 608 OVERVIEW**

[Revised Section 608 Refrigerant Management Regulations | US EPA](#)

Section 608 of the Clean Air Act: Stationary Refrigeration and Air Conditioning

Importance of Protecting the Ozone Layer

The stratospheric ozone layer shields the Earth from the sun's harmful ultraviolet radiation. Emissions of certain synthetic chemicals – including chlorofluorocarbons (CFCs), halons, and hydrochlorofluorocarbons (HCFCs) – that are commonly used as refrigerants, solvents, and insulating foams destroy the ozone layer and have created an “ozone hole” over the South Pole.

In addition, many of these ozone-depleting substances (ODS), as well as their substitutes such as hydrofluorocarbons (HFCs), are greenhouse gases that contribute to climate change. The purpose of this fact sheet is to help you understand requirements under the National Recycling and Emission Reduction Program.

National Recycling and Emission Reduction Program

The Clean Air Act (CAA) defines EPA's responsibilities for protecting and improving the nation's air quality and the stratospheric ozone layer. Section 608 establishes the National Recycling and Emission Reduction Program.

Prohibition on Venting

Section 608 prohibits individuals from intentionally venting ODS refrigerants (including CFCs and HCFCs) and their substitutes (such as HFCs), while maintaining, servicing, repairing, or disposing of air-conditioning or refrigeration equipment.

The purpose of this program is to:

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The schedule to
follows:

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January 1, 20

Ban on producti
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reduction goal.

January 1, 20

Ban on producti
and HCFC-142b,
reduction goal.

Section 608 Regulatory Requirements: Stationary Refrigeration Conditioning



Unless otherwise specified, section 608 requirements apply to all refrigerants, excluding a limited number

Enforcement

EPA performs random inspections, responds to tips, and pursues potential case violators of the Section 608 regulations. EPA is authorized to assess fines for a of these regulations.

Additional Resources

**ATTACHMENT 020810-7
PROJECT DESIGNER LICENSE**



State of Connecticut

Lookup Detail View

Name

Name
JAMES M TWITCHELL

License Information

lookup

License Type	License Number	Expiration Date	Granted Date	License Name	License Status		Licensure Actions or Pending Charges
Asbestos Consultant-Project Designer	221	07/31/2025	03/02/2004	James M. Twitchell	ACTIVE	CURRENT	None

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SECTION 02 84 33 - ABATEMENT OF PCB CONTAINING MATERIALS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1 Work Included: Remove and dispose of assumed polychlorinated biphenyls (PCB) containing building materials (>50 PPM) in accordance with the Contract Document, TSCA regulations at 40 CFR 761 and the Connecticut General Statutes 22a-467. The Work of this Section shall include, but not be limited to the following:

1.1.1.1 Furnish all labor, materials, facilities, equipment, installation services, employee training, notifications, permits, licenses, certifications, agreements, and incidentals necessary to perform the specified work.

1.1.1.2 Removal of building products identified in Attachment 028433-1, as PCB Bulk Product Waste (>50 PPM). Work shall also be coordinated with Architectural and MEP drawings for total scope of work.

1.1.1.3 Supply containers for temporary storage of PCB-containing waste materials at the site

1.1.1.4 Transportation of PCB-containing waste materials to an approved disposal facility by a properly licensed waste hauler.

1.1.1.5 Disposal of PCB-containing waste materials at approved waste disposal facilities.

1.1.2 Related Work: Work of this Section is part of a project involving other hazardous materials abatement, renovation, site work and general construction. The contractor shall coordinate the work of this Section with work specified elsewhere.

1.1.3 Limitation: The abatement contractor is prohibited from collecting any PCB samples at the site without the direct and written permission of the Owner or Owner's representative. The abatement contractor bears complete liability for any sampling performed without written consent, including any cost incurred by the Owner.

1.2 REFERENCES

1.2.1 Applicable Regulations

The contractor shall comply with all applicable federal and state requirements including, but not limited to the following. Where the regulations specify conflicting requirements, the contractor shall follow the stricter requirement.

1.2.1.1 American National Standards Institute (ANSI)

ANSI.Z89.1 Personal Protective Equipment-Protective Headwear for Industrial Workers Requirements (latest revision)
ANSI.Z87

1.2.1.2 Code of Federal Regulations (CFR)

- Hazardous Waste Operations and Emergency Response (29 CFR 1910.120)

- Respiratory Protection Standard (29 CFR 1910.134)
- Hazard Communication (29 CFR 1910.1200)
- General Health and Safety Provisions (29 CFR 1926.20)
- Ventilation (29 CFR 1926.57)
- Hazard Communication Program (29 CFR 1926.59)
- Hazardous Waste Operations and Emergency Response (29 CFR 1926.65)
- Criteria for Personal Protective Equipment (29 CFR 1926.95)
- Materials Handling, Storage and Use (29 CFR 1926, Subpart H)
- Scaffolding (29 CFR 1926, Subpart L)
- Fall Protection (29 CFR 1926, Subpart M)
- Ladders (29 CFR 1926, Subpart X)
- Toxic and Hazardous Substances (29 CFR 1926, Subpart Z)
- National Primary and Secondary Ambient Air Quality Standards for Particulate Matter (40 CFR 50.6)
- Hazardous Waste Management System: General (40 CFR 260)
- Identification and Listing of Hazardous Waste (40 CFR 261)
- Standards Applicable to Generators of Hazardous Waste (40 CFR 262)
- Standards Applicable to Transporters of Hazardous Waste (40 CFR 263)
- Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities (40 CFR 264)
- Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities (40 CFR 265)
- Land Disposal Restrictions (40 CFR 268)
- Toxic Substance Control Act (40 CFR 700)
- PCBs Manufacturing, Processing, Distribution in Commerce and Use Prohibitions (40 CFR 761)
- Hazardous Materials Program Definitions and General Procedures (49 CFR 105)
- General Information, Regulations and Definitions (49 CFR 171)
- Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information and Training Requirements (49 CFR 172)
- Shippers-General Requirements for Shipments and Packaging (49 CFR 173)
- Carriage by Public Highway (49 CFR 177)

1.2.1.3 National Institute for Occupational Safety and Health (NIOSH)

- Respiratory Decision Logic (Publication #87-108)
- Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (NIOSH Publication 85-115)

1.2.1.4 United States Environmental Protection Agency (EPA)

- Polychlorinated Biphenyl (PCB) Site Revitalization Guidance Under the Toxic Substances Control Act
- PCB Bulk Product Waste Reinterpretation (Oct 24, 2012)

1.2.1.5 Connecticut Department of Energy & Environmental Protection (CT DEEP)

- Regulations of Connecticut State Agencies (22a-133k-1 through 22a-133k-3)

1.3 DEFINITIONS

1.3.1 Authorized Personnel

Owner or the Owner's Representative, and all other personnel who are authorized officials of any regulating agency, be it State, Local, Federal, or Private entity who possess legal authority for enforcement or inspection of the work.

1.3.2 Containment

The enclosure on the interior and/or exterior of the building which establishes a contaminated area and surrounds the location where hazardous material remediation is taking place and establishes a Controlled Work Area.

1.3.3 Clearance Criteria

A Visual Inspection of all removal surfaces and post remediation sampling, performed by the independent testing lab employed by the Owner's, conforming to all standards set forth by all authorities having jurisdiction, mentioned in the references.

1.3.4 Fixed Object

Mechanical equipment, electrical equipment, fire detection systems, alarms, and all other fixed equipment, fixtures or other items which cannot be removed from the work area.

1.3.5 HEPA

High Efficiency Particulate Absolute filtration efficiency of 99.97 percent down to 0.3 microns. Filtration provided on specialized vacuums and air filtration devices to trap particles.

1.3.6 PCB Bulk Product Waste

PCB bulk product waste means waste derived from manufactured products containing PCBs in a non-liquid state, at any concentration where the concentration at the time of designation for disposal was 50 ppm PCBs. PCB bulk product waste includes but is not limited to:

- (1) Non-liquid bulk wastes or debris from the demolition of buildings and other man-made structures manufactured, coated, or serviced with PCBs. PCB bulk product waste does not include debris from the demolition of buildings or other man-made structures that is contaminated by spills from regulated PCBs which have not been disposed of, decontaminated, or otherwise cleaned up in accordance with subpart D of this part.
- (2) PCB-containing wastes from the shredding of automobiles, household appliances, or industrial appliances.
- (3) Plastics (such as plastic insulation from wire or cable; radio, television, and computer casings; vehicle parts; or furniture laminates); preformed or molded rubber parts and components; applied dried paints, varnishes, waxes or other similar coatings or sealants; caulking; adhesives; paper; Galbestos; sound deadening or other types of insulation; and felt or fabric products such as gaskets.
- (4) Fluorescent light ballasts containing PCBs in the potting material. Bulk product waste includes waste derived from manufactured products containing PCBs in a non-liquid state where the concentration at the time of designation for disposal is $\geq$ 50 mg/kg PCBs (see 40 C.F.R. §§ 761.3 and 761.62).

1.3.7 PCB Remediation Waste

PCB remediation waste is waste containing PCBs because of a spill or release and are subject to the cleanup and disposal requirements (see 40 C.F.R. §761.61).

1.3.8 PPE

Personal Protective Equipment.

1.3.9 TSCA

The Toxic Substance Control Act

1.4 REQUIREMENTS

1.4.1 General

The Contractor shall furnish all labor, materials, facilities, equipment, installation services, employee training, notifications, permits, licenses, certifications, agreements, and incidentals necessary to perform the specified work. Work shall be performed in accordance with the contract documents, the latest regulations from the Occupational Safety and Health Administration (OSHA), the United States Environmental Protection Agency (USEPA), the State of Connecticut and all other applicable federal, state, and local agencies.

1.4.2 Notification

The Contractor shall be responsible for submitting project notification and any applicable fees as required by the US EPA & Connecticut Department of Energy & Environmental Protection (DEEP). The contractor shall be responsible for securing all required permits and variances for the project, including the US EPA Temporary ID #.

1.4.3 Training

All project personnel engaged in the work covered under this section shall be trained in accordance with OSHA Regulations 29 CFR 1910.1000 and 29 CFR 1910.1200. It should also be noted that work associated with PCB removal shall also involve exposure to asbestos. An exposure assessment for asbestos in accordance with 29 CFR 1926.1101 shall be required and the Contractor shall meet all training requirements as covered in the Asbestos Removal Specifications.

1.4.4 Project Health and Safety

1.4.4.1 The contractor is responsible and liable for the health and safety of all on-site personnel and the off-site community affected by the project. All on-site workers and other persons entering the abatement work areas, decontamination areas or waste handling and staging areas shall be knowledgeable of and always comply with the requirements of the site-specific Health and Safety Plan (HASP). The contractor's HASP shall comply with all applicable federal, state, and local regulations protecting human health and the environment from the hazards posed by the work performed under this project.

- 1.4.4.2 Consistent disregard for the provisions of the HASP shall be deemed enough cause for the immediate stoppage of work and termination of the Contract or any Subcontracts without compromise or prejudice to the rights of the Owner
- 1.4.4.3 In addition to exposure concerns relating to the presence of PCBs, other health and safety considerations will apply to this project. The contractor shall be always responsible for the health and safety of contractor employees. It is the contractor's responsibility to comply with all applicable health and safety regulations.
- 1.4.5 Project Health and Safety Officer
- 1.4.5.1 The Contractor shall designate a full-time Project Health & Safety Officer who shall meet the following qualifications:
- The Project Health & Safety Officer shall hold a current CT asbestos supervisor license and EPA certificate and have a minimum of eight (8) hours of supervisor training in hazardous waste site operations in accordance with the requirements of 29 CFR 1910.
 - The Project Health & Safety Officer shall meet the requirements of a "Competent Person" as defined by OSHA 1926.1101 and shall have a minimum of two (2) years experience as a supervisor over PCB related work.
 - The Project Health & Safety Officer must be able to read and write English fluently, as well as communicate in the primary language of the Workers.
- 1.4.5.2 If the Project Health & Safety Officer is not on-site at any time whatsoever, all work shall be stopped. The Project Health & Safety Officer shall remain on-site until the Project is complete. The Project Health & Safety Officer cannot be removed from the Project without written consent of the Owner and the Project Monitor. The Project Health & Safety Officer shall be removed from the Project if requested by the Owner.
- 1.4.5.3 The Project Health & Safety Officer shall maintain the bound Daily Project Log that also includes the entry/exit logs and the Waste Disposal Log.
- 1.4.5.4 The Project Health & Safety Officer shall be responsible for ensuring that project personnel and site visitors are informed of and always comply with the provisions of the HASP during the project. Review of the HASP shall be acknowledged and documented by obtaining the name, signature and affiliation of all persons reviewing the HASP.
- 1.4.5.5 The Project Health & Safety Officer shall be responsible for the performance of the Work and shall represent the Contractor in all respects at the Project site. The Health & Safety Officer shall be the primary point of contact for the Owner and Project Monitor.
- 1.4.6 Respiratory Protection Program
- Establish and implement a respirator program as required by ANSI Z88.2, 29 CFR 1926.1101, and 29 CFR 1926.103. Submit a written description of the program, including copies of personal air monitoring data for similar, previously completed projects, to the Project Monitor.

1.4.7 Hazard Communication

Adhere to all parts of 29 CFR Part 1926.59 and provide the Project Monitor with a copy of the Material Safety Data Sheets (MSDS) for all materials brought to the site.

1.5 SUBMITTALS

The following documents shall be submitted to the Owner, or Owner's representative, a minimum of fifteen (15) business days prior to commencement of abatement work:

1.5.1 Manufacturer's Catalog Data

Catalog sheets, specifications, and application instructions for any removal products, if used.

1.5.2 Abatement Plan

Submit an abatement plan that clearly describes the procedures to be used for the removal of all PCB containing building materials and associated debris. The plan shall include details to protect workers and prevent PCB contamination from migrating outside of the regulated areas. The abatement plan shall include, but not be limited to, a drawing indicating the location, size, and details of PCB Collection Areas (drop cloths etc.,) staging areas for PCB removal from identified area, location and details of containment, decontamination facilities, sequencing of removal, work procedures, types of equipment, crew size, and emergency procedures for fire and medical emergencies.

1.5.3 Health and Safety Plan (HASP)

Submit a detailed, site-specific plan of the safety precautions and OSHA compliance program for the project. The HASP shall govern all work conducted at the site during the abatement of the building and related debris, waste handling, sampling, management, and waste transportation. Any discrepancies between the contractor's HASP and these specifications or federal and state regulations shall be resolved in favor of the more stringent requirements that provide the highest degree of protection to the project personnel and the surrounding community and environment. The plan shall include, but not be limited to the following:

- Health and Safety Organization
- Site Description and Hazard Assessment
- Training
- Medical Surveillance
- Work Areas
- Personal Protective Equipment
- Personal Hygiene and Documentation
- Standard Operating Procedures and Engineering Controls
- Emergency Equipment and First Aid Provisions
- Equipment Decontamination
- Air Monitoring
- Telephone List
- Emergency Response and Evacuation Procedures and Routes
- Site Control
- Spill Prevention & Containment Plan
- Heat and Cold Stress
- Record Keeping

- Community Protection Plan

1.5.4 Worker's Qualifications Data

Documentation of OSHA 40-Hour HAZWOPER Training for all employees and sub-contractors to be used for the abatement work and 8-Hour HAZWOPER Supervisor Training for the designated on-site Health and Safety Officer for the abatement work shall be submitted. Persons performing PCB abatement and their supervisor shall be personally experienced in PCB abatement work and shall have been regularly employed by a company performing PCB abatement for a minimum of 3 years.

1.5.5 PCB Disposal Plan

Submit a detailed plan for the transportation and disposal of PCB-containing wastes generated during the project which identifies the following:

- Waste packaging, labeling, placarding, and manifest procedures
- The name, address and 24-hour contact number for the proposed treatment or disposal facility or facilities to which waste generated during the project will be transported.
- The name, address, contact person(s), and state-specific permit numbers for proposed waste transporters, and EPA identification numbers for firms that will transport hazardous waste.
- The license plate numbers of vehicles to be used in transporting of the waste from the site to the disposal facility.
- The route(s) by which the waste will be transported to the designated disposal facility, and states or territories through which the waste will pass if the waste is to be disposed of outside of the State of Connecticut.

1.5.6 PCB Work Closeout Submittals

Submit the following documents to the Owner or Owner's representative within thirty (30) days of the waste being removed from the site:

- Waste profile sheets
- Pre-disposal analysis test results (If required by disposal facility)
- Signed manifests from the disposal facility
- Tipping receipts provided by the disposal facility
- Certification of the final treatment/disposal signed by the responsible disposal facility official.

1.6 PRE-CONSTRUCTION MEETING

- 1.6.1 Prior to the commencement of the Work, the contractor shall meet with the Owner and the Owner's representatives for reviewing the Contract Documents, discussing requirements for the Work, and reviewing the Work procedures.

PART 2 - PRODUCTS

All products delivered to the site shall be in the original packages, containers, etc. with the name of the manufacturer and the brand name on them.

2.1 ABATEMENT PRODUCTS

2.1.1 Disposal Drums

Metal or fiberboard with locking ring tops, with warning labels as required by OSHA, CTDEEP and/or EPA.

2.1.2 Respirators

Approved by the National Institute for Occupational Safety and Health (NIOSH).

2.1.3 Vacuum Cleaners

Vacuums equipped with HEPA filters.

2.1.4 Plastic Sheets

- Minimum 6 mil., opaque, fire-retardant polyethylene sheets.
- Floor Protective Layer: Minimum 10-mil., reinforced polyethylene sheets.

2.2 GENERAL PRODUCTS

2.2.1 Decontamination Equipment

Enough supply of disposable mops, rags, and sponges for work area decontamination shall be available.

2.2.2 General Tools

Enough supply of scaffolding, ladders, lifts, and hand tools, (e.g., scrapers, wire cutters, brushes, utility knives, wire saws, etc.) shall be provided as needed.

2.3 PERSONNEL PROTECTIVE EQUIPMENT

The contractor shall provide to all workers and authorized visitors, in enough quantity the appropriate safety equipment for this project (e.g., hard hats meeting the requirements of ANSI Standard Z89.1-1981, eye protection meeting the requirements of ANSI Standard Z87.1-1979, safety shoes meeting the requirements of ANSI Standard Z41.1- 1967, disposable PVC gloves or other work gloves).

2.4 EMERGENCY PRODUCTS

2.4.1 Fire Extinguishers

The contractor shall provide a minimum of one fire extinguisher for each abatement/work area with a minimum 20-pound Class ABC dry fire extinguisher with Underwriter Laboratory approval per 29 CFR 1910.157

2.4.2 First Aid Kit

The contractor shall supply a minimum of one first aid kit meeting the requirements of 29 CFR 1910.151 for the site.

PART 3 - EXECUTION**3.1 EQUIPMENT**

At all times, provide the Owner, Owner's Representative, Authorized Visitors, and employees with at least two complete sets of personal protective equipment (including disposable coveralls), as required for entry to and inspection of the abatement areas. Provide manufacturer's certificate of compliance for all equipment used to contain airborne asbestos fibers.

3.1.1 Respirators

Select respirators from those approved by the National Institute for Occupational Safety and Health (NIOSH).

3.1.1.1 Respirators for Handling PCBs

Provide personnel engaged in pre-cleaning, cleanup, handling, removal, and demolition of PCB materials with a minimum of half-face respirator with HEPA filter cartridge for all projects. Respiratory protection shall be in accordance with OSHA regulation 1910.134 and ANSI Z88.2.

3.1.2 Exterior Whole-Body Protection**3.1.2.1 Outer Protective Clothing**

Provide personnel exposed to PCBs with whole body outer protective clothing, head coverings, gloves, and foot coverings that are made of Tyvek or equivalent material. Provide disposable work gloves. Make sleeves secure at the wrists, make foot coverings secure at the ankles, and make clothing secure at the neck by use of tape. Provide disposable undergarments for wear under the outer protective clothing. All protective clothing shall be disposed of as PCB waste each time a worker exits the regulated work area.

3.1.2.2 Hard Hats, Eye Protection, Footwear

Hard hats, eye protection, rubber boots shall be provided by the contractor as required for workers and authorized visitors. Safety shoes and hard hats shall comply with ANSI Z89.1 (1969) and ANSI Z41.1 (1967)

3.1.3 Protective Clothing Disposal

All contaminated protective clothing, respirator cartridges and disposable protective items will be segregated for disposal and transported under a Bill of Lading and disposed of as PCB remediation waste with PCB <50PPM.

3.1.4 Warning Signs and Labels

Provide bilingual warning signs printed in English and Spanish (and the prevailing language spoken by employees) at all approaches to the control areas. Locate signs at such a distance that personnel may read the sign and take the necessary protective steps required before entering the area. Provide labels and affix to all materials, scrap, waste, debris, and other products contaminated with PCBs.

3.1.4.1 Warning Signs

Provide a vertical format with a minimum 20-in x 14-in displaying the following legend:

WARNING:
HAZARDOUS WASTE WORK AREA
PCBS-POISON
NO SMOKING, EATING OR DRINKING
AUTHORIZED PERSONNEL ONLY
PROTECTIVE CLOTHING IS REQUIRED IN THIS AREA

3.1.4.2 Warning Labels

All waste containers, with PCB materials >50 PPM, must be labeled with the name of the waste contained, the date in which the material was placed in vessel and the last date at which addition of waste occurred. Each container shall also have the following labeling:

HAZARDOUS WASTE-Federal law prohibits improper disposal.
If found, contact the nearest police or public safety authority or
the U.S. Environmental Protection Agency.
Generator's Name: _____
Manifest Document No.: _____

3.1.5 Local Exhaust System

For each interior containment area, provide a local exhaust system in accordance with ANSI Z9.2 and 29 CFR 1926.1101 that will provide localized filtration within the interior enclosure. Local exhaust equipment shall be operated 24 hours per day, until the control area is removed and shall be leak proof and equipped with HEPA filters. In no case shall the building ventilation system be used as the local exhaust system for the abatement area. Filters on exhaust system equipment shall conform to ANSI Z9.2 and UL 586. The local exhaust system shall terminate out of doors and remote from any public access or ventilation system intakes.

3.1.6 Tools

Vacuums shall be leak proof to the filter and equipped with HEPA filters. Filters on vacuums shall conform to ANSI Z9.2 and UL 586. Do not use power tools to remove PCB containing materials unless the tool is equipped with effective, integral HEPA filtered exhaust ventilation systems. Proper decontamination of all tools is required prior to removal from the site.

3.2 WORK PROCEDURE

Perform PCB related work in accordance with all applicable federal, state, and local regulations. Employ localized HEPA filtration for all interior building material removal activities.

Personnel shall wear and utilize protective clothing and equipment as specified herein. Eating, smoking, drinking, chewing gum, tobacco, or applying cosmetics shall not be permitted in the work or control areas. Personnel of other trades not engaged in the removal and demolition of PCB containing materials shall not be exposed at any time to airborne concentrations of PCBs unless all the personnel protection and training provisions of this section are complied with by the trade personnel.

Prior to any abatement work, seal all penetrations, shut down the building heating, ventilating, and air conditioning system, cap the openings to the system. Disconnect electrical service where wet removal is performed and provide temporary electrical service with verifiable ground fault circuit interrupter (GFI) protection prior to the use of any water.

If any PCB release or spill occurs outside of the regulated area, stop work immediately, correct the condition to the satisfaction of the Owner's representative prior to resuming work.

3.2.1 Protection of Adjacent Building Areas

Perform work without damage or contamination of adjacent building areas. Where such areas are damaged or contaminated as verified by the Owner's representative using visual inspection or sample analysis, it shall be restored to its original condition or decontaminated by the contractor at no expense to the owner as deemed appropriate by the Owner's representative. This includes inadvertent spill of dirt, dust, liquid, or debris in which it is reasonable to conclude that PCBs may exist. When these spills occur, stop work immediately. Then clean up the spill. When satisfactory visual inspection and sampling results are obtained from the Owner's representative, PCB abatement work may be resumed.

3.2.2 PCB Work Areas

The following requirements apply to all PCB work areas:

3.2.2.1 Abatement Zone

The abatement zone shall consist of all areas where abatement or waste handling and staging activities are ongoing and the immediate surrounding area that may be contaminated. Each zone shall be delineated with a minimum of orange construction fencing for exterior areas and plastic sheeting with signage for interior areas and restricted from access by all persons except those directly necessary to the completion of each abatement task. The abatement zones shall be relocated and delineated as necessary as work progresses from one portion of the project site to another. Access shall be controlled at the periphery of the abatement zones to regulate the flow of personnel and equipment into and out of each zone and to ensure that proper procedures for entering and exiting are followed.

3.2.2.2 Decontamination Zone

The decontamination zone is the transition zone between the abatement area and the clean support zone of the site and is intended to reduce the potential for contaminants from being dispersed from the abatement zone to the clean areas. The decontamination zone shall consist of a buffer area surrounding each abatement zone through which the transfer of equipment, materials, personnel, and containerized waste products will occur and in which decontamination of equipment, personnel and clothing will occur. The decontamination zone shall be clearly delineated with a minimum of orange construction fencing and labeled with signage as provided in Section 3.1.4 of this specification. All emergency response and first aid equipment shall be maintained in this zone and all protective equipment and clothing shall be removed or decontaminated in this zone prior to removal into the clean areas.

3.2.2.3 Support Zone

The support zone will consist of all areas outside of the decontamination zones.

3.2.3 PCB Building Material Removal

3.2.3.1 Isolation barriers

Isolation barriers (i.e., sealing off all openings, including but not limited to windows, corridors, doorways, barriers, skylights, ducts, grills, diffusers, and any other penetrations of the workplace) shall be installed with one layer of 6-mil plastic sheeting sealed with tape.

3.2.3.2 Floor and Wall Plastic (Interior Abatement Areas)

In addition to the isolation barriers, a tent-containment shall be constructed around areas where interior PCB removal will take place. The walls and ceiling of the containment shall be comprised of two layers of 6-mil plastic sheeting (minimum thickness), except for surfaces to be removed. The plastic floor layers shall be comprised of two layers of 10-mil reinforced plastic sheeting, overlapping with the walls of the tent, and extending a minimum of 12-inches up the foundation wall. Seams and wall attachments in the plastic sheeting shall be securely sealed with duct tape and spray adhesive.

3.2.3.3 Emergency and Fire Exits

Emergency and fire exit from the work area shall be maintained, or alternative exits shall be established in accordance with applicable codes and regulations. Exits shall be checked daily against exterior blockage or impediments to exiting. Entrances to the workplace that will not be used for worker entry or emergency exits shall be locked to prevent unauthorized entry.

3.2.4 HEPA Air Filtering Machines

Provide localized HEPA ventilation for all indoor control areas as follows:

- 3.2.4.1 The HEPA ventilation equipment shall operate continuously, 24 hours a day, from the establishment of isolation barriers through successful final clearance.
- 3.2.4.2 If more than one ventilation unit is installed, units shall be turned on one at a time while checking the integrity of all barriers for secure attachment and the need for additional reinforcement.
- 3.2.4.3 A dedicated power supply for the negative pressure ventilating units shall be utilized.
- 3.2.4.4 On loss of negative pressure or electric power to the negative pressure ventilating units, abatement shall stop immediately and shall not resume until power is restored and negative pressure ventilation equipment is operating again.
- 3.2.4.5 Negative pressure ventilation equipment shall be exhausted to the outside of the building away from occupied areas and at no time shall the negative

pressure ventilation unit exhaust within 20 feet of a receptor or adversely affect the air intake ports, louvers, or entrances for the building or adjacent buildings.

3.2.4.6 The system shall include a series of pre-filters and filters to provide High Efficiency Particulate Air (HEPA) filtration of particles down to 0.3 microns at 100% efficiency and below 0.3 microns at 99.9% efficiency. The Contractor shall supply enough replacement filters to replace pre-filters every 2 hours, secondary filters every 24 hours and primary HEPA filters every 600 hours of operation. A log shall be provided for each unit brought to the site with the current hours of use for each filter. Failure to provide this log will require that all filters be changed at the beginning of the project.

3.3 PCB-CONTAINING BUILDING MATERIAL REMOVAL – BULK PRODUCT WASTE >50 ppm

- 3.3.1 Building materials shall be handled and removed in a manner which does not break-down the materials into a fine dust or powder where possible. Grinders or other mechanical equipment must be fitted with HEPA-filtered dust collectors.
- 3.3.2 Equipment and other machinery used for demolition must remain outside of the "Abatement Zone" wherever possible to prevent cross contamination into surrounding areas. Where items must enter the "Abatement Zone", they must be completely decontaminated prior to leaving the zone.
- 3.3.3 All materials removed will be placed in temporary lined containers at the point of generation and transferred from the "Abatement Zone" to the waste containers along a designated route. The waste will then be properly containerized, transported off-site and disposed of in accordance with 40 CFR 761.62 as bulk product waste. Care shall be taken to prevent dropping of demolition debris on surrounding surfaces from the "Abatement Zone" when moving the waste to proper storage/disposal containers. If waste is "live" loaded into waste trailers, plastic sheeting will be placed over the ground surface between the "Abatement Zone" and the waste container to catch debris that might fall from the excavator during loading. The plastic sheeting will be disposed of as PCB remediation waste < 50 ppm. Containers will be secured within a lockable fenced in location with proper signage for storage. Containers will be marked with the ML marking per §761.45.
- 3.3.4 Work shall be coordinated to ensure proper shoring and bracing of materials to remain prior to the performance of work.
- 3.3.5 The use of minimal quantities of water to moisten any dust prior to collection shall be utilized. PCB waste shall never show evidence of free liquid water, pooling, or ponding within the waste stream.

3.4 CLEANING AND DECONTAMINATION

The Contractor shall be responsible for the complete cleaning and decontamination of the Abatement Zone upon completion of the work. HEPA vacuum and wet cleaning methods shall be used to remove all visible dust and debris from all surfaces within the work area.

- 3.4.1 Liquids used to wet dust and debris shall be collected and decontaminated in accordance with 40 C.F.R. §761.79 (b)(1) or disposed of in accordance with §761.60 (a).

- 3.4.2 Rags and other disposable cleaning materials shall be properly disposed of as PCB remediation waste <50 PPM.
 - 3.4.3 Plastic sheeting and containment barrier materials shall be properly disposed of as PCB remediation waste <50 PPM.
 - 3.4.4 Equipment used in the remediation of PCBs shall be decontaminated prior to leaving the site. Decontamination shall be in accordance with 40 C.F.R. §761.79 and Sub-part S procedures.
 - 3.4.5 Wash water and decontamination liquids shall be captured and containerized in DOT approved 55-gallon barrels for off-site disposal.
- 3.5 CERTIFICATION OF ABATEMENT
- 3.5.1 Schedule visual clearance inspection with the Owner's Representative at the site, when work area is ready for clearance testing.
 - 3.5.2 The Owner's Representative will employ the services of an independent testing/monitoring lab to perform visual clearance inspection. Visual Clearance Criteria requirements are as follows:
 - 3.5.2.1 Containment barriers are intact and warning signs are in place.
 - 3.5.2.2 Decontamination facilities are in place and tools used for abatement have been properly cleaned and decontaminated.
 - 3.5.2.3 HEPA ventilation system is functioning.
 - 3.5.2.4 PCB containing building materials have been removed from the work area and placed in container. Waste container is sealed, posted, and secured.
 - 3.5.2.5 Work contains no waste or visible debris from abatement work. Trash, extraneous plastic sheeting, used disposable PPE, and one layer of plastic have been removed from containment area and placed in appropriate PCB waste containers.
 - 3.5.2.6 PCB containing materials have been removed to the extent specified herein.
 - 3.5.3 The remediation contractor shall be responsible for achieving all aspects of the Visual Inspection Criteria to the satisfaction of the Owner. Any costs associated with satisfaction of the Visual Inspection Criteria shall be borne by the Contractor.
 - 3.5.4 On completion of the building remediation, and at the Owner's discretion, re-occupancy testing in the remaining building area can be performed. Re-occupancy sampling, if selected by the Owner, will use the following requirements:
 - 3.5.5.1 Post verification sampling shall not be performed until an area has passed the visual inspection.
 - 3.5.5.2 In building locations adjacent to areas where remediation occurred, wipe samples shall be collected. Samples shall be collected from the floor in these areas to verify the effectiveness of the containment procedures. One blank sample and one duplicate sample will be collected for QA/QC for each sampling episode.

- 3.5.5.3 The laboratory shall be an accredited laboratory for PCB analysis. All samples will be extracted using USEPA Method 3540C and analyzed for PCBs using USEPA Method 8082.
- 3.5.5.4 Analytical results of $\leq 1 \mu\text{g}/100\text{cm}^2$ will be considered in compliance with the State of Connecticut Department of Public Health and EPA recommended limit.
- 3.5.5.5 In addition to wipe samples, air samples can be collected. Air samples, if selected, will be collected in accordance with EPA Method TO-10A. Enough sample volume will be collected to ensure a minimum laboratory reporting limit of approximately 50 nanograms/ m^3 .
- 3.5.5.6 Field blank samples shall be collected during each sampling episode.
- 3.5.5.7 Air samples shall be collected in the center of the room/area, approximately four (4') feet from the floor, using polyurethane foam (PUF) cartridges connected to a pump with tubing.
- 3.5.5.8 The laboratory shall be accredited for PCB analysis. All samples will be analyzed by USEPA Method TO-10A and at a minimum shall include PCB homologues and/or PCB congeners. Sample results shall be evaluated using EPA SW846 Chapter 9 for statistical accuracy.
- 3.5.5.9 Analytical results of <300 nanograms PCBs per cubic meter of air will be considered satisfactory.
- 3.5.6 Should any of the verification samples exceed the specified limits additional cleaning and/or ventilation of the areas will be required. Additional sampling will then be performed until the clearance criteria is achieved.

3.6 MARKING OF WASTE CONTAINERS

- 3.6.1 All waste containers containing PCB Bulk Product Waste, PCB Remediation Waste and PCB contaminated debris, containment system components, used PPE, personal and equipment wash water and decontamination fluids, or other wastes generated during the abatement work shall be labeled as follows:

DOT Class 9 UN3432 (solid)
Or UN2315 (liquid) PCB Waste
RQ
Waste for Disposal

Federal law prohibits improper disposal.
If found, contact the nearest police or public safety authority or
the U.S. Environmental Protection Agency

- a. Generator's Information: _____
b. Manifest Tracking No.: _____
c. Accumulation Start Date: _____
d. EPA ID No.: _____
e. EPA Waste No.: _____
f. Total Weight: _____
g. Container No.: _____

HANDLE WITH CARE!

In addition, all containers must be marked with a PCB ML marker.

- 3.6.2 All markings must be durable, in English and printed on or affixed to the surface of the package or on a label, tag or sign; displayed on a background of sharply contrasting color; un-obscured by labels or attachments and located away from any other markings that could substantially reduce its effectiveness.
- 3.7 WASTE MANAGEMENT AND DISPOSAL
- 3.7.1 All contaminated waste shall be carefully loaded on trucks or other appropriate vehicles for transport. Before and during transport, care shall be exercised to ensure that no unauthorized persons have access to the material.
- 3.7.2 Transporters of the waste are prohibited from "back hauling" any freight after the disposition of the Owner's waste stream until decontamination of the vehicle and/or trailer is assured.
- 3.7.3 The Contractor shall be responsible for all packaging, labeling, transport, disposal, and record-keeping associated with PCB waste in accordance with all federal, state, and local regulations.
- 3.7.4 The Contractor shall ensure that the person transporting the waste holds a valid permit issued in accordance with appropriate federal, state, and local regulations.
- 3.7.5 The Contractor shall provide to the transporter at the time of transfer appropriate shipping records as required by the federal, state, and local regulations with a copy to the project engineer.
- 3.7.6 Contractor shall maintain proper follow up procedures to assure that waste materials have been received by the designated waste site in a timely manner and in accordance with all federal, state, and local regulations.
- 3.7.7 The Contractor shall assure that disposal of polychlorinated biphenyls (PCB) bulk product waste be disposed of in accordance with 40 C.F.R. 761.62 and shall provide a tracking/manifest form signed by the facilities authorized representative. The Contractor shall assure that disposal of polychlorinated biphenyls (PCB) remediation waste be disposed of in accordance with 40 C.F.R. 761.61 and shall provide a tracking/manifest form signed by the facilities authorized representative. The Contractor shall assure that any PCB liquid water waste be properly decontaminated in accordance with 40 C.F.R. §761.79 (b)(1) or disposed of in accordance with §761.60 (a). The Contractor shall assure that any chemicals, solvents, or other products used be properly decontaminated in accordance with 40 C.F.R. §761.79 (g) or disposed of in accordance with §761.60 (a)

END OF SECTION

ATTACHMENT 02 84 33-1
PCB CONTAINING BUILDING MATERIAL LOCATION

Material	PCB CONTAINING	Comment
Any Penetration & Patching Locations through painted surfaces for Mechanical & Electrical Work.	Assumed Bulk Product Waste >50 PPM	Contractor shall coordinate with Architectural, MEP, and Demo drawings for total scope of work.
Any Interior Wall Demolition/Opening.	Assumed Bulk Product Waste >50 PPM	Contractor shall coordinate with Architectural, MEP, and Demo drawings for total scope of work.
Caulk and Putty Removal From Entrance Painted Entrance Door Removal, Including Caulk & Putty.	Assumed Bulk Product Waste >50 PPM	Contractor shall coordinate with Architectural, MEP, and Demo drawings for total scope of work.
Any Ceramic Floor Moisture Barrier Removal.	Assumed Bulk Product Waste > 50 PPM	Contractor shall coordinate with Architectural, MEP, and Demo drawings for total scope of work.

SECTION 035416 - HYDRAULIC CEMENT UNDERLAYMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Polymer-modified, self-leveling, hydraulic cement underlayment for application below interior floor coverings.
- B. Related Sections: Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Division 1 Section "Execution".
 - 2. Division 1 Section "Construction and Demolition Waste Management."
 - 3. Division 3 Section "Cast-in-Place Concrete" (refer to notes in Structural Drawings for specifications) for new floor substrates and patching of existing slabs-on-grade.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Qualification Data: For qualified Installer.
- C. Product Certificates: Signed by manufacturers of underlayment and floor-covering systems certifying that products are compatible.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Installer who is approved by manufacturer for application of underlayment products required for this Project.
- B. Product Compatibility: Manufacturers of underlayment and floor-covering systems certify in writing that products are compatible.
- C. Fire-Resistance Ratings: Where indicated, provide hydraulic-cement underlayment systems identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ventilation, ambient temperature and humidity, and other conditions affecting underlayment performance.
 1. Place hydraulic cement underlayments only when ambient temperature and temperature of substrates are between 50 and 80 deg F.

PART 2 - PRODUCTS

2.1 HYDRAULIC-CEMENT-BASED UNDERLAYMENTS

- A. Underlayment: Hydraulic-cement-based, polymer-modified, self-leveling product that can be applied in minimum uniform thickness of 1/4 inch and that can be feathered at edges to match adjacent floor elevations.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Ardex Americas.
 - b. BASF Construction Chemicals, Inc.
 - c. CMP Specialty Products, Inc.
 - d. Laticrete.
 - e. Mapei.
 2. Cement Binder: ASTM C 150, portland cement, or hydraulic or blended hydraulic cement as defined by ASTM C 219.
 3. Compressive Strength: Not less than 4000 psi at 28 days when tested according to ASTM C 109/C 109M.
 4. Underlayment Additive: Resilient-emulsion product of underlayment manufacturer, formulated for use with underlayment when applied to substrate and conditions indicated.
- B. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch; or coarse sand as recommended by underlayment manufacturer.
 1. Provide aggregate when recommended in writing by underlayment manufacturer for underlayment thickness required.
- C. Water: Potable and at a temperature of not more than 70 deg F (21 deg C).
- D. Primer: Product of underlayment manufacturer recommended in writing for substrate, conditions, and application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for conditions affecting performance of the Work.
- B. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare and clean substrate according to manufacturer's written instructions.
 - 1. Treat nonmoving substrate cracks according to manufacturer's written instructions to prevent cracks from telegraphing (reflecting) through underlayment.
 - 2. Fill substrate voids to prevent underlayment from leaking.
- B. Concrete Substrates: Mechanically remove, according to manufacturer's written instructions, laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants that might impair underlayment bond.
 - 1. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq.ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test, ASTM F1869: Proceed with installation only after substrates do not exceed a maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
 - b. Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 85 percent relative humidity level measurement, or as recommended by hydraulic cement underlayment manufacturer.
- C. Nonporous Substrates: For ceramic tile, quarry tile, and terrazzo substrates, remove waxes, sealants, and other contaminants that might impair underlayment bond, and prepare surfaces according to manufacturer's written instructions.
- D. Adhesion Tests: After substrate preparation, test substrate for adhesion with underlayment according to manufacturer's written instructions.

3.3 INSTALLATION

- A. Mix and install underlayment components according to manufacturer's written instructions.
 - 1. Close areas to traffic during underlayment installation and for time period after installation recommended in writing by manufacturer.
 - 2. Coordinate installation of components to provide optimum adhesion to substrate and between coats.

3. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.
- B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.
- C. Install underlayment to produce uniform, level surface.
 1. Install a final layer without aggregate to product surface.
 2. Feather edges to match adjacent floor elevations.
- D. Cure underlayment according to manufacturer's written instructions. Prevent contamination during installation and curing processes.
- E. Do not install floor coverings over underlayment until after time period recommended in writing by underlayment manufacturer.
- F. Apply surface sealer at rate recommended by manufacturer.
- G. Remove and replace underlayment areas that evidence lack of bond with substrate, including areas that emit a "hollow" sound when tapped.

3.4 INSTALLATION TOLERANCES

- A. Finish and measure surface, so gap at any point between gypsum cement underlayment surface and an unleveled, freestanding, 10-foot-long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch.
 1. Coordinate with tolerances of scheduled finished flooring; most restrictive tolerance shall govern.

3.5 PROTECTION

- A. Protect underlayment from concentrated and rolling loads for remainder of construction period.

END OF SECTION 035416

SECTION 042000 - UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Clay face brick (at face of exterior ramps).
3. Mortar and grout.
4. Steel reinforcing bars.
5. Masonry-joint reinforcement.
6. Ties and anchors.
7. Miscellaneous masonry accessories.

B. Products Installed but not Furnished under This Section:

1. Steel lintels in unit masonry.
2. Steel shelf angles for supporting unit masonry.
3. Hollow-metal frames in unit masonry openings, furnished under Division 8 Section "Hollow Metal Doors and Frames."

C. Related Requirements:

1. Division 1 Section "Construction and Demolition Waste Management."
2. Refer to Structural Drawings for notes and specifications governing structural requirements of masonry, grout, masonry reinforcement, and attachment to structure.
3. Division 7 Section "Penetration Firestopping" for firestopping at openings in masonry walls.
4. Division 7 Section "Joint Firestopping" for firestopping at tops of masonry walls.

1.3 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For the following:
 - 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
 - 2. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315. Show elevations of reinforced walls.
- C. Samples for Initial Selection:
 - 1. Clay face brick, in the form of straps of five or more bricks.
 - 2. Colored mortar.
- D. Samples for Verification: For each type and color of the following:
 - 1. Pigmented mortar. Make Samples using same sand and mortar ingredients to be used on Project.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Material Certificates: For each type and size of the following:
 - 1. Masonry units.
 - a. Include material test reports substantiating compliance with requirements.
 - b. For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.
 - c. For exposed brick, include test report for efflorescence according to ASTM C67.
 - d. For masonry units, include data and calculations establishing average net-area compressive strength of units.
 - 2. Cementitious materials. Include name of manufacturer, brand name, and type.
 - 3. Mortar admixtures.
 - 4. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
 - 5. Grout mixes. Include description of type and proportions of ingredients.
 - 6. Reinforcing bars.
 - 7. Joint reinforcement.
 - 8. Anchors, ties, and metal accessories.

- C. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
 - 1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
 - 2. Include test reports, according to ASTM C1019, for grout mixes required to comply with compressive strength requirement.
- D. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.
- E. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C1093 for testing indicated.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.9 FIELD CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides of walls, and hold cover securely in place.
 2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe, and hold cover in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 2. Protect sills, ledges, and projections from mortar droppings.
 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
1. Do not lay masonry when atmospheric temperature is below 32 degrees F on a rising temperature, or below 40 degrees F. on a falling temperature, unless approved provisions are made for heating materials and protecting work.
 2. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.
- E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
1. Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required.
 2. When ambient temperature exceeds 100 deg F, or 90 deg F with a wind velocity greater than 8 mph, do not spread mortar beds more than 48 inches ahead of masonry. Set masonry units within one minute of spreading mortar.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.2 PERFORMANCE REQUIREMENTS

- A. Provide unit masonry that develops indicated net-area compressive strengths at 28 days.
 - 1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.
 - 2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C1314.

2.3 UNIT MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work and will be within 20 feet vertically and horizontally of a walking surface].
- C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
 - 1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.4 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
 - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
 - 2. Provide bullnose units for outside corners unless otherwise indicated.

B. CMUs: ASTM C90.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength as follows:
 - a. 2800 psi unless otherwise indicated on Structural plans or sections. Refer to notes in Structural Drawings.
1. Density Classification: Normal weight.
2. Size (Width): Manufactured to dimensions 3/8 inch (10 mm) less than nominal dimensions.
3. Exposed Faces: Provide color and texture matching the range represented by Architect's sample.
4. Provide units bearing U.L. label for use in fire-resistance rated walls and partitions.

2.5 MASONRY LINTELS

A. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs matching adjacent CMUs in color, texture, and density classification, with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

B. Clay Face Brick: ASTM C 216, Grade SW, Type FBS, and as follows:

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 3350 psi.
2. Initial Rate of Absorption: Less than 20 g/30 sq. in. per minute when tested per ASTM C 67.
3. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
4. Surface Coloring: Brick with surface coloring, other than flashed or sand-finished brick, shall withstand 50 cycles of freezing and thawing per ASTM C 67 with no observable difference in the applied finish when viewed from 10 feet (3 m).
5. Size: As noted per Type.
6. Application: Use where brick is exposed, unless otherwise indicated.
7. Color and Texture: Match existing building face brick as directed by Architect.
8. Basis-of-Design Product: Subject to compliance with requirements, provide the following products:
 - a. TYPE A, typical face brick. Match existing color and texture.
 - 1) Size: Modular 2 1/4 in. x 3 5/8 in. x 7 5/8 in.
 - 2) Set in running bond unless noted otherwise.

2.6 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C114.

- B. Hydrated Lime: ASTM C207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Masonry Cement: ASTM C91/C91M.
- E. Mortar Cement: ASTM C1329/C1329M.
- F. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C979/C979M. Use only pigments with a record of satisfactory performance in masonry mortar.
- G. Aggregate for Mortar: ASTM C144.
 - 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
 - 2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 (1.18-mm) sieve.
 - 3. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- H. Aggregate for Grout: ASTM C404.
- I. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C494/C494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
- J. Water: Potable.

2.7 REINFORCEMENT

- A. Uncoated-Steel Reinforcing Bars: ASTM A615/A615M or ASTM A996/A996M, Grade 60 (Grade 420).
- B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch (3.77-mm) steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.
- C. Masonry-Joint Reinforcement, General: ASTM A951/A951M.
 - 1. Interior Walls: Hot-dip galvanized carbon steel.
 - 2. Exterior Walls: Hot-dip galvanized carbon steel.
 - 3. Wire Size for Side Rods: 0.187-inch (4.76-mm) diameter.
 - 4. Wire Size for Cross Rods: 0.187-inch (4.76-mm) diameter.
 - 5. Wire Size for Veneer Ties: 0.187-inch (4.76-mm) diameter.
 - 6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches (407 mm) o.c.
 - 7. Provide in lengths of not less than 10 feet (3 m), with prefabricated corner and tee units.

- D. Masonry-Joint Reinforcement for Single-Wythe Masonry: Ladder **or** truss type with single pair of side rods and cross rods spaced not more than 16 inches on center.

2.8 TIES AND ANCHORS

- A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A82/A82M, with ASTM A153/A153M, Class B-2 coating.
 2. Stainless Steel Wire: ASTM A580/A580M, Type 304.
 3. Galvanized-Steel Sheet: ASTM A653/A653M, Commercial Steel, G60 (Z180) zinc coating.
 4. Steel Sheet, Galvanized after Fabrication: ASTM A1008/A1008M, Commercial Steel, with ASTM A153/A153M, Class B coating.
 5. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304.
 6. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
 7. Stainless Steel Bars: ASTM A276 or ASTM A666, Type 304.
- B. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch-diameter, hot-dip galvanized steel wire.
 2. Tie Section: Triangular-shaped wire tie, sized to extend within 1-inch of masonry face, made from 0.25-inch-diameter, hot-dip galvanized steel wire.

2.9 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane or PVC.
- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D2000, Designation M2AA-805 or PVC, complying with ASTM D2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D226/D226M, Type I (No. 15 asphalt felt).

2.10 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without

discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. PROSOCO, Inc.
2. Diedrich Technologies, Inc.
3. EaCo Chem. Inc.

2.11 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
1. Do not use calcium chloride in mortar or grout.
 2. Use portland cement-lime, masonry cement or mortar cement mortar unless otherwise indicated.
 3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.
1. For masonry below grade or in contact with earth, use Type M.
 2. For reinforced masonry, use Type S.
 3. For mortar parge coats, use Type S or Type N.
 4. For exterior, above-grade, load-bearing and nonload-bearing walls and parapet walls; for interior load-bearing walls; for interior nonload-bearing partitions; and for other applications where another type is not indicated, use Type N.
 5. For interior nonload-bearing partitions, Type O may be used instead of Type N.
 6. Refer to Structural Drawings for compressive strength requirements.
- D. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.
1. Pigments shall not exceed 10 percent of portland cement by weight.
 2. Pigments shall not exceed 5 percent of masonry cement or mortar cement by weight.
 3. Mix to match Architect's sample.
 4. Application: Use pigmented mortar for exposed mortar joints with the following units:
 - a. Clay face brick.
- E. Grout for Unit Masonry: Comply with ASTM C476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
2. Proportion grout in accordance with ASTM C476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi. Refer to Structural Drawings for more detailed requirements.
3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C143/C143M.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
 2. Verify that foundations are within tolerances specified.
 3. Verify that reinforcing dowels are properly placed.
 4. Verify that substrates are free of substances that impair mortar bond.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.
- B. Build chases and recesses to accommodate items specified in this and other Sections.
- C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.
- D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.
- F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

- G. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested according to ASTM C67. Allow units to absorb water so they are damp but not wet at time of laying.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond unless otherwise indicated on the Drawings; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.
- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4 inches. Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.
- D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.
- H. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.
- I. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
 - 1. Install compressible filler in joint between top of partition and underside of structure above.
 - 2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c. unless otherwise indicated.
 - 3. Wedge nonload-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
 - 4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Division 7 Section "Joint Firestopping."

3.5 MORTAR BEDDING AND JOINTING

- A. Lay CMUs as follows:

1. Bed face shells in mortar and make head joints of depth equal to bed joints.
 2. Bed webs in mortar in all courses of piers, columns, and pilasters.
 3. Bed webs in mortar in grouted masonry, including starting course on footings.
 4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
 5. Fully bed units and fill cells with mortar at anchors and ties as needed to fully embed anchors and ties in mortar.
- B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Set cast-stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.
1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
 2. Allow cleaned surfaces to dry before setting.
 3. Wet joint surfaces thoroughly before applying mortar.
 4. Rake out mortar joints for pointing with sealant.
- D. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- E. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.6 MASONRY-JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
1. Space reinforcement not more than 16 inches o.c.
 2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
 3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.
- E. Cut and bend reinforcing units as directed by manufacturer for continuity at[**corners,**] returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.7 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

- A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:
 - 1. Provide an open space not less than 1 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
 - 2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
 - 3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.8 CONTROL AND EXPANSION JOINTS

- A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- B. Form control joints in concrete masonry using one of the following methods:
 - 1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout, and rake out joints in exposed faces for application of sealant.
 - 2. Install preformed control-joint gaskets designed to fit standard sash block.
 - 3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar, or rake out joint for application of sealant.
 - 4. Install temporary foam-plastic filler in head joints, and remove filler when unit masonry is complete for application of sealant.
- C. Form expansion joints in brick as follows:
 - 1. Build flanges of metal expansion strips into masonry. Lap each joint 4 inches in direction of water flow. Seal joints below grade and at junctures with horizontal expansion joints if any.
 - 2. Build flanges of factory-fabricated, expansion-joint units into masonry.
 - 3. Build in compressible joint fillers where indicated.
 - 4. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Division 7 Section "Joint Sealants."
- D. Provide horizontal, pressure-relieving joints by either leaving an airspace or inserting a compressible filler of width required for installing sealant and backer rod specified in Division 7 Section "Joint Sealants," but not less than 3/8 inch.
 - 1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.9 LINTELS

- A. Install steel lintels where indicated.
- B. Provide masonry lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels.
- C. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.10 REINFORCED UNIT MASONRY

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
 - 1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 - 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
 - 1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
 - 2. Limit height of vertical grout pours to not more than 60 inches.

3.11 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
- B. Inspections: Special inspections according to Level B in TMS 402/ACI 530/ASCE 5.
 - 1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
 - 2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
 - 3. Place grout only after inspectors have verified proportions of site-prepared grout.
- C. Testing Prior to Construction: One set of tests.

- D. Clay Masonry Unit Test: For each type of unit provided, according to ASTM C67 for compressive strength.
- E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C140 for compressive strength.
- F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C780.
- G. Prism Test: For each type of construction provided, according to ASTM C1314 at 7 days and at 28 days.

3.12 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 - 3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
 - 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
 - 5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
 - 6. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.
 - 7. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.

3.13 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

- B. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.
- C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042000

SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Steel framing and supports for countertops.
 - 2. Steel framing and supports for applications where framing and supports are not specified in other Sections.
 - 3. Elevator machine beams, hoist beams.
 - 4. Steel shapes for supporting elevator door sills.
 - 5. Shelf angles.
 - 6. Metal ladders.
 - 7. Elevator pit sump covers.
 - 8. Miscellaneous steel trim.
 - 9. Loose bearing and leveling plates for applications where they are not specified in other Sections.

- B. Products furnished, but not installed, under this Section include the following:

- 1. Loose steel lintels.
 - 2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
 - 3. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.

- C. Related Sections: Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:

- 1. Division 1 Section "Construction and Demolition Waste Management."
 - 2. Division 4 Section "Unit Masonry" for installing loose lintels, anchor bolts, and other items built into unit masonry.
 - 3. Refer to Structural Drawings for specifications related to steel framing, supports, and other steel items attached to the structural-steel framing.

1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Nonslip aggregates and nonslip-aggregate surface finishes.
 - 2. Fasteners.
 - 3. Shop primers.
 - 4. Shrinkage-resisting grout.
 - 5. Manufactured metal ladders.
- B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:
 - 1. Steel framing and supports for countertops.
 - 2. Steel framing and supports for applications where framing and supports are not specified in other Sections.
 - 3. Elevator machine beams, hoist beams.
 - 4. Steel shapes for supporting elevator door sills.
 - 5. Shelf angles.
 - 6. Metal ladders.
 - 7. Elevator pit sump covers.
 - 8. Miscellaneous steel trim.
 - 9. Loose steel lintels.
- C. Delegated-Design Submittal: For ladders, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer's experience with providing delegated-design engineering services of the kind indicated, including documentation that engineer is licensed in the jurisdiction in which Project is located.
- B. Mill Certificates: Signed by stainless steel manufacturers, certifying that products furnished comply with requirements.

- C. Welding certificates.
- D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- E. Research Reports: For post-installed anchors.

1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel in accordance with the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - 3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls, floor slabs, decks, and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design ladders.
- B. Structural Performance of Aluminum Ladders: Ladders, including landings, shall withstand the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- C. Rolled-Steel Floor Plate: ASTM A786/A786M, rolled from plate complying with ASTM A36/A36M or ASTM A283/A283M, Grade C or D.

- D. Steel Tubing: ASTM A500/A500M, cold-formed steel tubing.
- E. Steel Pipe: ASTM A53/A53M, Standard Weight (Schedule 40) unless otherwise indicated.
- F. Cast Iron: Either gray iron, ASTM A48/A48M, or malleable iron, ASTM A47/A47M, unless otherwise indicated.
- G. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.
- H. Extruded Bars and Tubing: ASTM B221 (ASTM B221M), Alloy 6063-T5/T52.
- I. Extruded Structural Pipe and Round Tubing: ASTM B429/B429M, Alloy 6063-T6.
 - 1. Provide Standard Weight (Schedule 40) pipe unless otherwise indicated.
- J. Aluminum Plate and Sheet: ASTM B209, Alloy 6061-T6.
- K. Aluminum-Alloy Rolled Tread Plate: ASTM B632/B632M, Alloy 6061-T6.
- L. Aluminum Castings: ASTM B26/B26M, Alloy A356.0-T6.

2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
 - 1. Provide stainless steel fasteners for fastening aluminum or stainless steel.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A (ASTM F568M, Property Class 4.6); with hex nuts, ASTM A563 (ASTM A563M); and, where indicated, flat washers.
- C. High-Strength Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325 (Grade A325M), Type 3, heavy-hex steel structural bolts; ASTM A563, Grade DH3, (ASTM A563M, Class 10S3) heavy-hex carbon-steel nuts; and where indicated, flat washers.
- D. Stainless Steel Bolts and Nuts: Regular hexagon-head annealed stainless steel bolts, ASTM F593 (ASTM F738M); with hex nuts, ASTM F594 (ASTM F836M); and, where indicated, flat washers; Alloy Group 1 (A1).
- E. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563 (ASTM A563M); and, where indicated, flat washers.
 - 1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

- F. Anchors, General: Capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing in accordance with ASTM E488/E488M, conducted by a qualified independent testing agency.
- G. Cast-in-Place Anchors in Concrete: Either threaded or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A47/A47M malleable iron or ASTM A27/A27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F2329/F2329M.
- H. Post-Installed Anchors:
 - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.
 - 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless steel bolts, ASTM F593 (ASTM F738M), and nuts, ASTM F594 (ASTM F836M).

2.4 MISCELLANEOUS MATERIALS

- A. Shop Primers: Provide primers that comply with Division 9 Section "Painting."
- B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- C. Water-Based Primer: Emulsion type, anticorrosive primer for mildly corrosive environments that is resistant to flash rusting when applied to cleaned steel, complying with MPI#107 and compatible with topcoat.
- D. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
- E. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.
- F. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- G. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- H. Shrinkage-Resistant Grout: Factory-packaged, nonmetallic, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.5 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
- J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
 - 1. Fabricate units from slotted channel framing where indicated.
 - 2. Furnish inserts for units installed after concrete is placed.
- C. Fabricate supports for operable partitions from continuous steel beams of sizes recommended by partition manufacturer with attached bearing plates, anchors, and braces as recommended by partition manufacturer. Drill or punch bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.
- D. Galvanize miscellaneous framing and supports where indicated.
- E. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

2.7 SHELF ANGLES

- A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch bolts, spaced not more than 6 inches from ends and 24 inches o.c., unless otherwise indicated.
 - 1. Provide mitered and welded units at corners.
 - 2. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately 2 inches larger than expansion or control joint.
- B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.
- C. Galvanize and prime shelf angles located in exterior walls.
- D. Prime shelf angles located in exterior walls with zinc-rich primer.
- E. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.8 METAL LADDERS (ELEVATOR LADDER)

- A. General:
 - 1. Comply with ANSI A14.3, except for elevator pit ladders.
 - 2. For elevator pit ladders, comply with ASME A17.1/CSA B44.
- B. Steel Ladders:
 - 1. Space siderails 18 inches apart unless otherwise indicated.
 - 2. Siderails: Continuous, 1/2-by-2-1/2-inch steel flat bars, with eased edges.
 - 3. Rungs: 3/4-inch-diameter steel bars.

4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
5. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.
6. Provide nonslip surfaces on top of each rung by coating with abrasive material metallically bonded to rung.
7. Source Limitations: Obtain nonslip surfaces from single source from single manufacturer.
8. Provide platforms as indicated fabricated from welded or pressure-locked steel bar grating, supported by steel angles. Limit openings in gratings to no more than 1/2 inch in least dimension.
9. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted steel brackets.
10. Galvanize ladders, including brackets.

2.9 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
 1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Galvanize exterior miscellaneous steel trim.
- D. Prime miscellaneous steel trim with zinc-rich primer.

2.10 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.
- B. Galvanize bearing and leveling plates.
- C. Prime plates with zinc-rich primer.

2.11 LOOSE STEEL LINTELS

- A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.

- B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span, but not less than 8 inches (200 mm) unless otherwise indicated.
- C. Galvanize and prime loose steel lintels located in exterior walls.
- D. Prime loose steel lintels located in exterior walls with zinc-rich primer.

2.12 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.13 GENERAL FINISH REQUIREMENTS

- A. Finish metal fabrications after assembly.
- B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.14 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.
 - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean galvanized surfaces of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.
- C. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
 - 1. Shop prime with zinc rich primer unless otherwise indicated.
- D. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning." SSPC-SP 3, "Power Tool Cleaning." requirements indicated below:
 - 1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 3. Items Indicated to Receive Primers Specified in Section 099600 "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 4. Other Steel Items: SSPC-SP 3, "Power Tool Cleaning."

5. Galvanized-Steel Items: SSPC-SP 16, "Brush-off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals."
- E. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2.15 ALUMINUM FINISHES

- A. As-Fabricated Finish: AA-M12.
- B. Clear Anodic Finish: AAMA 611, Class I, AA-M12C22A41.
- C. Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
 - 1. Cast Aluminum: Heavy coat of bituminous paint.
 - 2. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Anchor supports for operable partitions, overhead doors and overhead grilles securely to, and rigidly brace from, building structure.
- C. Anchor shelf angles securely to existing construction with expansion anchors.
- D. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.
 - 1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.
- E. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installation of Bearing and Leveling Plates" Article.
 - 1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

3.3 INSTALLATION OF BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with shrinkage-resistant grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.4 REPAIRS

- A. Touchup Painting:

1. Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - a. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
 2. Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 9 Section "Painting."
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 055000

SECTION 055214 - EXTERIOR METAL RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Custom steel and iron exterior decorative railings. Refer to drawing for custom and manufactured shapes.

B. Related Requirements:

1. Division 32 Section "Portland Cement Concrete Pavement" for mounting substrate at ramps.
2. Division 32 Section "Stone Unit Paving" for mounting substrate at landing.

1.2 COORDINATION AND SCHEDULING

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible.
- B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver items to Project site in time for installation.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Manufacturer's product lines of decorative metal railings components to be integrated into the work.
2. Fasteners.
3. Post-installed anchors.
4. Shop primer.
5. Intermediate coats and topcoats.
6. Bituminous paint.
7. Nonshrink, nonmetallic grout.
8. Anchoring cement.
9. Metal finishes.

B. Shop Drawings: Include plans, elevations, sections, and attachment details.

C. Samples for Verification: For each type of exposed finish required.

- 1.
2. Fittings, end caps, and brackets.
3. Welded connections; provide a 6-inch square sample showing connection from post to rail at lamb's tongue termination, made of full-size components.

- D. Delegated Design Submittal: For railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For delegated design professional engineer.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel in accordance with the following:
1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect mechanical finishes on exposed surfaces of railings from damage by applying a strippable, temporary protective covering before shipping.

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of ramps, landings and other construction contiguous with railings by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design railings, including attachment to building construction.
- B. Structural Performance: Railings, including attachment to building construction, are to withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
1. Handrails and Top Rails of Guards:

- a. Uniform load of 50 lbf/ft. (0.73 kN/m) applied in any direction.
 - b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior railings by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
- 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Same metal and finish as supported rails unless otherwise indicated.

2.3 STEEL AND IRON DECORATIVE RAILINGS

- A. Source Limitations: Obtain steel decorative railing components from single source from single manufacturer.
- B. Tubing: ASTM A500/A500M (cold formed) or ASTM A513/A513M, Type 5.
- C. Bars: Hot-rolled, carbon steel complying with ASTM A29/A29M, Grade 1010.
- D. Plates, Shapes, and Bars: ASTM A36/A36M.
- E. Cast Iron: Either gray iron, ASTM A48/A48M, or malleable iron, ASTM A47/A47M, unless otherwise indicated.

2.4 FASTENERS

- A. Fastener Materials:
 - 1. Ungalvanized-Steel Railing Components: Plated-steel fasteners complying with ASTM F1941/F1941M, Class Fe/Zn 5 for electrodeposited zinc coating where concealed; Type 304 stainless steel fasteners where exposed.
 - 2. Finish exposed fasteners to match appearance, including color and texture, of railings.
- B. Provide concealed fasteners for interconnecting railing components and for attaching railings to other work unless exposed fasteners are unavoidable and have been approved by the architect.
- C. Post-Installed Anchors: Fastener systems with working capacity greater than or equal to the design load, in accordance with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193 or ICC-ES AC308.

1. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless steel bolts, ASTM F593 and nuts, ASTM F594.

2.5 MISCELLANEOUS MATERIALS

- A. Handrail terminations: Cast-iron.
 1. Provide cast-metal fittings designed for use with railing profile as indicated on drawings.
- B. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- C. Epoxy Zinc-Rich Primer: Compatible with topcoat.
- D. Epoxy Intermediate Coat: Compatible with primer and topcoat.
- E. Polyurethane Topcoat: Compatible with undercoat.
- F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- G. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- H. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
 1. Water-Resistant Product: At exterior locations, provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.6 FABRICATION

- A. Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations.
 1. Clearly mark units for reassembly and coordinated installation.
 2. Use connections that maintain structural value of joined pieces.
- C. Cut, drill, and punch metals cleanly and accurately.
 1. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated.
 2. Remove sharp or rough areas on exposed surfaces.

- D. Form work true to line and level with accurate angles and surfaces.
- E. Fabricate connections that will be exposed to weather in a manner to exclude water.
 - 1. Provide weep holes where water may accumulate.
 - 2. Locate weep holes in inconspicuous locations.
- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. Connections: Fabricate railings with welded connections unless otherwise indicated.
- H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove flux immediately.
 - 4. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #1 welds; ornamental quality with no evidence of a welded joint.
- I. Mechanical Connections: Connect members with concealed mechanical fasteners and fittings.
 - 1. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
 - 2. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.
- J. Form changes in direction as follows:
 - 1. By radius bends of radius indicated, or by inserting prefabricated elbow and termination fittings of radius indicated.
- K. Bend members in jigs to produce uniform curvature for each configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- L. Close exposed ends of hollow railing members with prefabricated cap and end fittings of same metal and finish as railings; refer to drawings for terminations.
- M. Railing is free-standing. Terminate railings at posts set 1-1/2-inches from building per drawings. Close ends of terminations at walls.
- N. Brackets, Flanges, Fittings, and Anchors: Provide flanges, miscellaneous fittings, and anchors to interconnect railing members to other Work unless otherwise indicated.
- O. Provide inserts and other anchorage devices for connecting railings to concrete or masonry Work.
 - 1. Fabricate anchorage devices capable of withstanding loads imposed by railings.
 - 2. Coordinate anchorage devices with supporting structure.

- P. For railing posts set in concrete, provide stainless steel sleeves not less than 6 inches (150 mm) long with inside dimensions not less than 1/2 inch (13 mm) greater than outside dimensions of post, with metal plate forming bottom closure.
- Q. Toe Boards: Maintain bottom rail at 4 inches or less from concrete and stone substrates so toe boards are not required.

2.7 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.
- C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.8 STEEL AND IRON FINISHES

- A. For nongalvanized-steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves; however, hot-dip galvanize anchors to be embedded in exterior concrete or masonry.

Retain "Preparation for Shop Priming" Paragraph below for nongalvanized railings.

- B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3.
- C. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1 for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.
- D. High-Performance Coating: Apply epoxy intermediate and polyurethane topcoats to prime-coated surfaces. Comply with coating manufacturer's written instructions and with requirements in SSPC-PA 1 for shop painting. Apply at spreading rates recommended by coating manufacturer.
 - 1. Color: Black.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Perform cutting, drilling, and fitting required for installing railings.

1. Fit exposed connections together to form tight, hairline joints.
 2. Install railings level, plumb, square, true to line; without distortion, warp, or rack.
 3. Set railings accurately in location, alignment, and elevation; measured from established lines and levels.
 4. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 5. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).
 6. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (6 mm in 3 m).
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
- C. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.2 RAILING CONNECTIONS

- A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article, whether welding is performed in the shop or in the field.

3.3 ANCHORING POSTS

- A. Use stainless steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.
- B. Leave anchorage joint exposed with 1/8-inch (3-mm) buildup, sloped away from post.

3.4 REPAIR

- A. Touchup Painting:
1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - a. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.

3.5 PROTECTION

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.
- B. Restore finishes damaged during installation and construction period, so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 055214

SECTION 061053 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Rooftop equipment bases and support curbs.
 - 2. Wood blocking, cants, and nailers.
 - 3. Wood furring.
 - 4. Plywood backing panels.
 - 5. Miscellaneous lumber and plywood.
- B. Related Sections: Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Division 1 Section "Construction and Demolition Waste Management."
 - 2. Division 6 Section "Interior Architectural Woodwork" for interior woodwork not specified in this Section.

1.3 DEFINITIONS

- A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.
- B. Dimension Lumber: Lumber of 2 inches nominal or greater size but less than 5 inches nominal size in least dimension.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include

physical properties of treated materials based on testing by a qualified independent testing agency.

3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.5 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:
1. Preservative-treated wood, fire-retardant-treated wood, and wood required to have both characteristics.
 2. Power-driven fasteners.
 3. Post-installed anchors.
 4. Metal framing anchors.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
 3. Dress lumber, S4S, unless otherwise indicated.

- B. Maximum Moisture Content of Lumber: 19 percent for 2-inch nominal (38-mm actual) thickness or less; no limit for more than 2-inch nominal thickness unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWP A U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
 - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
 - 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 - 4. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
 - 5. Wood floor plates that are installed over concrete slabs-on-grade.
 - 6. Items scheduled to be preservative-treated and fire-retardant-treated shall be treated in accordance with requirements for both.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
 - 1. Treatment shall not promote corrosion of metal fasteners.

2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D3201 at 92 percent relative humidity. Use where exterior type is not indicated.
 4. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D5664, and design value adjustment factors shall be calculated according to ASTM D6841.
- C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
- E. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not bleed through, contain colorants, or otherwise adversely affect finishes.
- F. Application: All miscellaneous rough carpentry shall be fire-retardant treated, except blocking for handrails, millwork, cabinets and window and door frames as permitted in accordance with CT State Building Code 2022/ IBC 603.1 exception 14.
1. Items scheduled to be preservative-treated and fire-retardant-treated shall be treated in accordance with requirements for both.

2.4 DIMENSION LUMBER FRAMING

- A. Framing: Construction or No. 2 grade of any species.

2.5 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
1. Blocking.
 2. Nailers.
 3. Rooftop equipment bases and support curbs.
 4. Cants.
 5. Furring.
 6. Grounds.
- B. Dimension Lumber Items: Construction or No. 2 grade lumber of any species.
- C. Concealed Boards: 19 percent maximum moisture content of any of the following species and grades:

1. Mixed southern pine or southern pine, No. 3 grade; SPIB.
2. Eastern softwoods, No. 3 Common grade; NELMA.
3. Northern species, No. 3 Common grade; NLGA.

- D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.6 PLYWOOD SUBFLOORING AND BACKING PANELS

- A. Miscellaneous Concealed Plywood: DOC PS 1, A-D Interior, thickness as indicated but not less than 5/8 inch (16 mm).
- B. Equipment Backing Panels: Plywood, DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch (19-mm) nominal thickness.

2.7 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.
- B. Nails, Brads, and Staples: ASTM F1667.
- C. Screws for Fastening to Metal Framing: ASTM C1002 and ASTM C954, length as recommended by screw manufacturer for material being fastened.
- D. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- E. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, ICC-ES AC58, ICC-ES AC193, or ICC-ES AC308 as appropriate for the substrate.
1. Material: Carbon-steel components, zinc plated to comply with ASTM B633, Class Fe/Zn 5.
 2. Material: Stainless steel with bolts and nuts complying with ASTM F593 and ASTM F594, Alloy Group 1 or 2 (ASTM F738M and ASTM F836M, Grade A1 or A4).

2.8 METAL FRAMING ANCHORS

- A. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, G60 (Z180) coating designation.
 - 1. Use for interior locations unless otherwise indicated.
- B. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A653/A653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 (Z550) coating designation; and not less than 0.036 inch thick.
 - 1. Use for wood-preservative-treated lumber and where indicated.

2.9 MISCELLANEOUS MATERIALS

- A. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D3498 that is approved for use indicated by adhesive manufacturer.
- B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.
- D. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- E. Do not splice structural members between supports unless otherwise indicated.
- F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

- G. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
 - 1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
- H. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- I. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- J. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- K. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
 - 2. ICC-ES evaluation report for fastener.
- L. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 INSTALLATION OF WOOD BLOCKING AND NAILER

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

3.3 INSTALLATION OF WOOD FURRING

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
- A. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal-size furring horizontally and vertically at 24 inches o.c.

- B. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal-size furring vertically at 16 inches o.c.

3.4 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061053

SECTION 062023 - INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Interior running trim and panelized assemblies for opaque finish to match existing and as indicated.
- 2. Salvage, relocation, and repair of existing painted wood panels, trim and wood window components within the work area and as indicated.
- 3. Interior plastic laminate veneer custom millwork as indicated.

- B. Related Sections: Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:

- 1. Division 1 Section "Construction and Demolition Waste Management."
- 2. Division 6 Section "Miscellaneous Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view.
- 3. Division 9 Section "Painting" for priming and backpriming of interior finish carpentry.
- 4. Division 12 Section "Manufactured Plastic-Laminate-Clad Casework" for standardized plastic laminate casework.
- 5. Division 12 Section "Solid Surfacing Materials" for countertops, wall caps and trim.

1.3 DEFINITIONS

- A. MDF: Medium-density fiberboard.
- B. MDO: Plywood with a medium-density overlay on the face.
- C. PVC: Polyvinyl chloride.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.

1. Include data for wood-preservative treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained. Include chemical-treatment manufacturer's written instructions for finishing treated material.
 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced before shipment to Project site to levels specified.
- B. Samples: For each exposed product and for each color and texture specified.
- C. Samples for Initial Selection: For each type of product involving selection of colors, profiles, or textures.
- D. Samples for Verification:
1. For each species and cut of lumber and panel products with nonfactory-applied finish, with half of exposed surface finished, 50 sq. in. (300 sq. cm) for lumber and 8 by 10 inches (200 by 250 mm) for panels.
 2. For each finish system and color of lumber and panel products with factory-applied finish, 50 sq. in. (300 sq. cm) for lumber and 8 by 10 inches (200 by 250 mm) for panels.
 3. Plastic and metal laminates, 8 by 10 inches (200 by 250 mm), for each type, color, pattern, and surface finish.

1.5 QUALITY ASSURANCE

- A. High Performance Building Requirements:
1. Adhesives, sealants, paints or coatings used for work in this section for interior applications shall meet the requirements of Division 1, Section "Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings", where applicable.
 2. Materials manufactured within a radius of 500 miles from the project site where all or a portion of the raw resources also originate within a radius of 500 miles shall be documented in accordance with the High Performance Building Requirements of this Section.
 3. Materials that contain recycled content shall be documented in accordance with the High Performance Building Requirements of this Section.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with the Architectural Woodwork Standards, Section 2.
- B. Do not deliver interior architectural woodwork until painting and similar finish operations that might damage woodwork have been completed in installation areas.
- C. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation.
1. Protect materials from weather by covering with waterproof sheeting, securely anchored.
 2. Provide for air circulation around stacks and under coverings.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install interior finish carpentry materials until wet-work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.
 - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.
- C. Field Measurements: Where interior architectural woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings.
 - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being concealed by construction, and indicate measurements on Shop Drawings.

1.8 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.
- B. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with applicable rules of any rules-writing agency certified by the American Lumber Standard Committee's (ALSC) Board of Review. Grade lumber by an agency certified by the ALSC's Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. For exposed lumber, mark grade stamp on end or back of each piece, or omit grade stamp and provide certificates of grade compliance issued by grading agency.
- C. Softwood Plywood: DOC PS 1.

- D. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1, made with adhesive containing no urea formaldehyde.
- E. Hardboard: ANSI A135.4.
- F. MDF: ANSI A208.2, Grade 130.
- G. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.
- A. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.
 - 1. Manufacturer: Subject to compliance with requirements, provide high-pressure decorative laminates by one of the following:
 - a. Basis-of-Design as indicated on Finish Legend.
 - b. Formica Corporation
 - c. Nevamar Company, LLC; Decorative Products Division.
 - d. Wilsonart International; Division of Premark International, Inc.
 - e. Interior Arts, a subsidiary of The October Company, Inc.
- B. Melamine-Faced Particleboard: Particleboard complying with ANSI A208.1, Grade M-2, finished on both faces with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.
 - 1. Color: As selected by Architect from manufacturer's full range.

2.2 INTERIOR TRIM AND PANELIZED ASSEMBLIES

- A. Architectural Woodwork Standards Grade: Premium.
- B. Hardwood Lumber Trim for Opaque Finish (Painted):
 - 1. Species: Any closed-grain hardwood. Match existing to the greatest extent feasible.
 - 2. Maximum Moisture Content: 5 to 10 percent.
 - 3. Finger Jointing: Not allowed.
 - 4. Gluing for Width: Not allowed.
 - 5. Veneered Material: Use plain-sliced veneer for lumber trim wider than 6 inches (150 mm). Provide solid hardwood at all exposed edges.
 - 6. Face Surface: Surfaced (smooth).
 - 7. Matching: Selected for compatible grain and color.
 - 8.
- C. Semiexposed Surfaces: Provide surface materials indicated below:
 - 1. Compatible species to that indicated for exposed surfaces, stained to match.

2.3 PLASTIC LAMINATE

- A. "High Pressure Laminates" shall meet the definition and performance requirements of ANSI/NEMA 3 LD – 2000. Vertical grade laminate shall be VGS, GP-28 balanced with a minimum grade of CLS. Countertops shall be HGS, GP-50 as specified. Minimum 150 color options.
 - 1. Provide at all exposed surfaces as indicated.
- B. Adhesives:
 - 1. PVA: Adhesive shall be mechanically applied; no contact adhesive will be permitted.
 - 2. EVA: Adhesive shall be mechanically applied; no contact adhesive will be permitted.

2.4 SOLID SURFACING COUNTERTOPS, WALL CAPS AND TRIM

- A. Grade: Premium.
- B. Provide as indicated in the Drawings. See Division 12 Section "Solid Surfacing Materials" for additional requirements.

2.5 MISCELLANEOUS MATERIALS

- A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.
- B. Low-Emitting Materials: Adhesives shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- C. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.
- D. Paneling Adhesive: Comply with paneling manufacturer's written recommendations for adhesives.
- E. Multipurpose Construction Adhesive: Formulation complying with ASTM D 3498 that is recommended for indicated use by adhesive manufacturer.

2.6 ACCESSORIES

- A. Countertop support brackets: Aluminum, Rakks brackets or equal as indicated and as required for support of countertops.
- B. Standards for Adjustable Shelf Supports: BHMA A156.9, B04071; zinc-plated steel.
- C. Adjustable Shelf Supports: BHMA A156.9, B04081 or B04091; zinc-plated steel.

- D. Balance of hardware as indicated in Division 12 Section "Manufactured Plastic Laminate Casework." Provide locks at all drawers throughout reception area.

2.7 FABRICATION

- A. Back out or kerf backs of the following members, except those with ends exposed in finished work:
 - 1. Interior standing and running trim, except shoe and crown molds.
 - 2. Wood-board paneling.
- B. Ease edges of lumber less than 1 inch (25 mm) in nominal thickness to 1/16-inch (1.5-mm) radius and edges of lumber 1 inch (25 mm) or more in nominal thickness to 1/8-inch (3-mm) radius.

2.8 SHOP FINISHING

- A. Grade: Provide finishes of same grades as items to be finished.
- B. General: Finish architectural woodwork at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.
- A. Interior Architectural Woodwork for Opaque Finish: Shop prime with one coat of wood primer as specified in Division 9 Section "Painting."
- B. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.
 - 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling and to end-grain surfaces. Concealed surfaces of plastic-laminate-clad woodwork do not require backpriming when surfaced with plastic laminate, backing paper, or thermoset decorative panels.
- C. Opaque Finish:
 - 1. Grade: Premium
 - 2. Interior water-based acrylic-alkyd.
 - 3. Sheen: Satin, 31-45 gloss units measured on 60-degree gloss meter per ASTM D 523.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

- B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.
- B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

3.3 INSTALLATION, GENERAL

- A. Do not use materials that are unsound; warped; improperly treated or finished; inadequately seasoned; too small to fabricate with proper jointing arrangements; or with defective surfaces, sizes, or patterns.
- B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials.
 - 1. Use concealed shims where necessary for alignment.
 - 2. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
 - 3. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.
 - 4. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
 - 5. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

3.4 INSTALLATION OF STANDING AND RUNNING TRIM

- A. Install trim with minimum number of joints as is practical, using full-length pieces from maximum lengths of lumber available.
 - 1. Do not use pieces less than 24 inches long, except where necessary.
 - 2. Stagger joints in adjacent and related standing and running trim.
 - 3. Cope at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint.
 - 4. Use scarf joints for end-to-end joints.
 - 5. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.
 - 6. Match color and grain pattern of trim for transparent finish (stain or clear finish) across joints.

7. Install trim after gypsum-board joint finishing operations are completed.
8. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting.
9. Fasten to prevent movement or warping.
10. Countersink fastener heads on exposed carpentry work and fill holes.

3.5 INSTALLATION OF PANELING

- A. Plywood Paneling: Match existing trim profiles and panel details in appearance.
1. Leave 1/4-inch gap to be covered with trim at top, bottom, and openings.
 2. Install with uniform tight joints between panels.
 3. Attach panels to supports with manufacturer's recommended panel adhesive and fasteners.
 4. Space fasteners and adhesive as recommended by panel manufacturer.
 5. Conceal fasteners to greatest practical extent.
 6. Arrange panels with grooves and joints over supports.
 - a. Fasten to supports with nails of type and at spacing recommended by panel manufacturer.
 - b. Use fasteners with prefinished heads matching groove color.

3.6 INSTALLATION OF MILLWORK

- A. Install without distortion so millwork fits properly and is accurately aligned. Adjust hardware to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
1. Install with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
 2. Maintain veneer sequence matching.
 3. Fasten through back, near top and bottom, at ends and not more than 16 inches o.c. with No. 10 wafer-head screws sized for 1-inch penetration into wood framing, blocking, or hanging strips.
- B. Install standards for adjustable shelf supports according to manufacturer's written instructions. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors. Space fasteners not more than 12 inches o.c.
- C. Cut shelves to neatly fit openings with only enough gap to allow shelves to be removed and reinstalled.

3.7 COUNTERTOPS

- A. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.

1. Align adjacent solid-surfacing-material countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
2. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
3. Secure backsplashes to tops with concealed metal brackets at 16 inches o.c. and to walls with adhesive.
4. Caulk space between backsplash and wall with sealant specified in Division 7 Section "Joint Sealants."

3.8 ADJUSTING

- A. Replace interior finish carpentry that is damaged or does not comply with requirements.
 1. Interior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.
- B. Adjust joinery for uniform appearance.

3.9 CLEANING

- A. Clean interior finish carpentry on exposed and semiexposed surfaces.
- B. Restore damaged or soiled areas and touch up factory-applied finishes if any.

3.10 PROTECTION

- A. Protect installed products from damage from weather and other causes during construction.
- B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.
 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 062023

SECTION 071326 - SELF-ADHERING SHEET WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes waterproofing system to be applied to below-grade areas at outside of elevator pit and associated slab replacement areas:
 - 1. Modified bituminous sheet waterproofing.
 - 2. Blindside sheet waterproofing.
 - 3. Protection course.
 - 4. Molded-sheet drainage panels.
- B. Related Sections: Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Division 1 Section "Construction and Demolition Waste Management."

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, and tested physical and performance properties of waterproofing.
 - 2. Include manufacturer's written instructions for evaluating, preparing, and treating substrate.

- B. Shop Drawings: Show locations and extent of waterproofing and details of substrate joints and cracks, expansion joints, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.
 - 1. Include setting drawings showing layout, sizes, sections, profiles, and joint details of pedestal-supported concrete pavers.
- C. Samples: For each exposed product and for each color and texture specified, including the following products:
 - 1. 8-by-8-inch (200-by-200-mm) square of waterproofing and flashing sheet.
 - 2. 4-by-4-inch (100-by-100-mm) square of drainage panel.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Research Reports: For modified bituminous sheet waterproofing/termite barrier, showing compliance with ICC AC380.
- C. Field quality-control reports.
- D. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended in writing by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.
 - 1. Do not apply waterproofing in snow, rain, fog, or mist.
- B. Maintain adequate ventilation during preparation and application of waterproofing materials.

1.8 WARRANTY

- A. Manufacturer's Warranty:
 - 1. Waterproofing Warranty: Manufacturer agrees to furnish replacement waterproofing material for waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.

- a. Warranty Period: Five years from date of Substantial Completion.
- B. Installer's Special Warranty: Specified form, signed by Installer, covering Work of this Section, for warranty period of two years.
 - 1. Warranty includes removing and reinstalling protection board, drainage panels, insulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Waterproofing System: Obtain waterproofing materials, protection course, and molded-sheet drainage panels from single source from single manufacturer.

2.2 MODIFIED BITUMINOUS SHEET WATERPROOFING

- A. Modified Bituminous Sheet Waterproofing: Minimum 60-mil (1.5-mm) nominal thickness, self-adhering sheet consisting of 56 mils (1.4 mm) of rubberized asphalt laminated on one side to a 4-mil- (0.10-mm-) thick, polyethylene-film reinforcement, and with release liner on adhesive side.
 - 1. Basis of Design: GCP Applied Technologies; Bituthene Low Temperature Membrane.
 - 2. Subject to compliance with requirements, provide products from one of the following modified bituminous sheet waterproofing manufacturers:
 - a. Carlisle Coatings and Waterproofing.
 - b. GPC Applied Technologies company.
 - c. Henry Company.
 - d. W.R. Meadows, Inc.
 - 3. Physical Properties:
 - a. Tensile Strength, Membrane: 325 psi (2.24 MPa) minimum; ASTM D412, Die C, modified.
 - b. Ultimate Elongation: 300 percent minimum; ASTM D412, Die C, modified.
 - c. Low-Temperature Flexibility: Pass at minus 25 deg F (minus 32 deg C); ASTM D1970/D1970M.
 - d. Crack Cycling: Unaffected after 100 cycles of 1/8-inch (3-mm) movement; ASTM C836/C836M.
 - e. Puncture Resistance: 50 lbf (222 N) minimum; ASTM E154/E154M.
 - f. Water Absorption: 0.1 percent weight-gain maximum after 48-hour immersion at 70 deg F (21 deg C); ASTM D570.
 - g. Water Vapor Permeance: less than 0.1 perm (5.7 ng/Pa x s x sq. m) maximum; ASTM E96/E96M, Water Method.
 - h. Hydrostatic-Head Resistance: 230 feet (70 m) minimum; ASTM D5385.

4. Sheet Strips: Self-adhering, rubberized-asphalt strips of same material and thickness as sheet waterproofing.

2.3 BLINDSIDE SHEET WATERPROOFING

- A. Blindside Sheet Waterproofing for Horizontal Applications: Uniform, flexible, multilayered-composite sheet membrane that forms a permanent bond with fresh concrete placed against it; complete with accessories and preformed shapes for an unbroken waterproofing assembly; with the following physical properties:
 1. Basis of Design: GCP Applied Technologies; Preprufe 300R.
 2. Subject to compliance with requirements, provide blindside sheet waterproofing products from one of the following manufacturers:
 - a. Carlisle Coatings and Waterproofing.
 - b. GPC Applied Technologies company.
 - c. Henry Company.
 - d. W.R. Meadows, Inc.
 3. Physical Properties:
 - a. Low-Temperature Flexibility: Pass at minus 20 deg F (minus 29 deg C); ASTM D1970/D1970M.
 - b. Peel Adhesion to Concrete: 5 lbf/in. (875 N/m) minimum; ASTM D903, modified.
 - c. Lap Adhesion: 8 lbf/in. (1408 N/m) minimum; ASTM D1876, modified.
 - d. Hydrostatic-Head Resistance: 230 feet (70 m); ASTM D5385, modified.
 - e. Puncture Resistance: 200 lbf (890 N) minimum; ASTM E154/E154M.
 - f. Water Vapor Permeance: 0.01 perm (0.6 ng/Pa x s x sq. m) maximum; ASTM E96/E96M, Water Method.
 - g. Ultimate Elongation: 335 percent minimum; ASTM D412, modified.
- B. Mastic, Adhesives, and Detail Tape: Liquid mastic and adhesives, and adhesive tapes recommended by waterproofing manufacturer.

2.4 AUXILIARY MATERIALS

- A. Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
 1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.
- B. Primer: Liquid solvent-borne primer recommended for substrate by sheet waterproofing material manufacturer.
- C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by sheet waterproofing material manufacturer.

- D. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, of trowel grade or low viscosity.
- E. Substrate Patching Membrane: Low-viscosity, two-component, modified asphalt coating.
- F. Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm), predrilled at 9-inch (229-mm) centers.
- G. Protection Course, Asphaltic: ASTM D6506, semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners and as follows:
 - 1. Thickness: Nominal 1/4 inch (6 mm).
 - 2. Adhesive: Rubber-based solvent type recommended by waterproofing manufacturer for protection course type.

2.5 MOLDED-SHEET DRAINAGE PANELS

- A. Molded-Sheet Collector-Panel System with Polymeric Film: Composite subsurface collector-panel system by same manufacturer as primary molded-sheet drainage panels; consisting of a high-profile, studded, nonbiodegradable, molded-plastic-sheet drainage core; with a nonwoven-geotextile facing with an apparent opening size not exceeding No. 40 (0.425-mm) sieve laminated to one side of the core and a polymeric film bonded to the other side; and with a vertical flow rate through the core of 9 to 17 gpm per ft. (112 to 211 L/min. per m) and a minimum horizontal, in-plane flow rate as indicated on Drawings. Provide system with manufacturer's outlets, connectors, tapes, and other accessories to connect primary molded-sheet drainage panels with piped subdrainage system.
 - 1. Basis of Design: GCP Applied Technologies; Hydroduct 220 with Hydroduct Coil 600.
 - 2. Subject to compliance with requirements, provide products from one of the following manufacturers:
 - a. Carlisle Coatings and Waterproofing.
 - b. GPC Applied Technologies company.
 - c. Henry Company.
 - d. W.R. Meadows, Inc.

2.6 INSULATION DRAINAGE PANELS

- A. Insulation: Comply with Section 072100 "Thermal Insulation" for general building insulation, including insulation drainage panels.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of waterproofing.
 - 1. Verify that concrete has cured and aged for minimum time period recommended in writing by waterproofing manufacturer.
 - 2. Verify that substrate is visibly dry and within the moisture limits recommended in writing by manufacturer. Test for capillary moisture by plastic sheet method according to ASTM D4263.
 - 3. Verify that compacted subgrade is dry, smooth, sound, and ready to receive waterproofing sheet.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, mortar, and other projections.
- E. Fill form tie holes, honeycomb, aggregate pockets, holes, and other voids.
- F. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D4258.
- G. Bridge and cover isolation joints, expansion joints, and discontinuous deck-to-wall and deck-to-deck joints with overlapping sheet strips of widths according to manufacturer's written instructions.
 - 1. Invert and loosely lay first sheet strip over center of joint. Firmly adhere second sheet strip to first and overlap to substrate.
- H. Corners: Prepare, prime, and treat inside and outside corners in accordance with manufacturer's instructions.
 - 1. Install membrane strips centered over vertical inside corners. Install 3/4-inch (19-mm) fillets of liquid membrane on horizontal inside corners and as follows:

- a. At footing-to-wall intersections, extend liquid membrane in each direction from corner or install membrane strip centered over corner.
 - b. At plaza-deck-to-wall intersections, extend liquid membrane or sheet strips onto deck waterproofing and to finished height of sheet flashing.
- I. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions.

3.3 INSTALLATION OF MODIFIED BITUMINOUS SHEET WATERPROOFING

- A. Install modified bituminous sheets according to waterproofing manufacturer's written instructions.
- B. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.
- C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- (64-mm-) minimum lap widths and end laps. Overlap and seal seams, and stagger end laps to ensure watertight installation.
 1. When ambient and substrate temperatures range between 25 and 40 deg F (minus 4 and plus 5 deg C), install self-adhering, modified bituminous sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F (16 deg C).
- D. Apply continuous sheets over already-installed sheet strips, bridging substrate cracks, construction, and contraction joints.
- E. Seal edges of sheet waterproofing terminations with mastic.
- F. Install sheet waterproofing and auxiliary materials to tie into adjacent waterproofing.
- G. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches (150 mm) beyond repaired areas in all directions.
- H. Immediately install protection course with butted joints over waterproofing membrane.
 1. Molded-sheet drainage panels may be used in place of a separate protection course to vertical applications when approved by waterproofing manufacturer and installed immediately.

3.4 INSTALLATION OF BLINDSIDE SHEET WATERPROOFING

- A. Install blindside sheet waterproofing according to manufacturer's written instructions.
- B. Place and secure molded-sheet drainage panels over substrate. Lap edges and ends of geotextile to maintain continuity.

- C. Horizontal Applications: Install sheet with face against substrate. Accurately align sheets and maintain uniform side and end laps of minimum dimensions required by membrane manufacturer. Overlap and seal seams, and stagger and tape end laps to ensure watertight installation.
- D. Corners: Seal lapped terminations and cut edges of sheet waterproofing at inside and outside corners with detail tape.
- E. Seal penetrations through sheet waterproofing to provide watertight seal with detail tape patches or wraps and a liquid-membrane troweling.
- F. Install sheet waterproofing and auxiliary materials to produce a continuous watertight tie into adjacent waterproofing.
- G. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Tape perimeter of damaged or nonconforming area extending 6 inches (150 mm) beyond repaired areas in all directions. Apply a patch of sheet waterproofing and firmly secure with detail tape.

3.5 INSTALLATION OF MOLDED-SHEET DRAINAGE PANELS

- A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck substrate, according to manufacturer's written instructions. Use adhesive or another method that does not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.
 - 1. For vertical applications, install protection course before installing drainage panels.

3.6 INSTALLATION OF INSULATION DRAINAGE PANELS

- A. Install insulation drainage panels over waterproofed surfaces. Cut and fit to within 3/4 inch (19 mm) of projections and penetrations.
- B. Ensure that drainage channels are aligned and free of obstructions.
- C. On vertical surfaces, set insulation drainage panels in adhesive or tape applied according to manufacturer's written instructions.

3.7 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a site representative qualified by waterproofing membrane manufacturer to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components; and to furnish daily reports to Architect.
- B. Waterproofing will be considered defective if it does not pass tests and inspections.

3.8 PROTECTION, REPAIR, AND CLEANING

- A. Do not permit foot or vehicular traffic on unprotected membrane.
- B. Protect waterproofing from damage and wear during remainder of construction period.
- C. Protect installed insulation drainage panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.
- D. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.
- E. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

END OF SECTION 071326

SECTION 075216 - STYRENE-BUTADIENE-STYRENE (SBS) MODIFIED BITUMINOUS
MEMBRANE ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Styrene-butadiene-styrene (SBS)-modified bituminous membrane roof system for infill replacement within an existing roof system.
2. Accessory roofing materials.
3. Substrate board.
4. Vapor retarder.
5. Roof insulation.
6. Insulation accessories and cover board.
7. Walkways.

B. Related Requirements:

1. Division 1 Section "Construction Waste Management and Disposal."
2. Division 6 Section "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.
3. Division 7 Section "Sheet Metal Flashing and Trim" for metal roof flashings and counterflashings.
4. Division 7 Section "Roof Specialties" for premanufactured roof hatch and curbs.
5. Division 7 Section "Joint Sealants" for joint sealants, joint fillers, and joint preparation.

1.2 DEFINITIONS

- A. Roofing Terminology: Definitions in ASTM D1079 and glossary of NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to Work of this Section.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Roofing Conference: Conduct conference at Project site.

1. Meet with Owner, Construction Manager, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, air barrier Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.

3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For insulation and roof system component fasteners, include copy of SPRI's Directory of Roof Assemblies listing.

B. Shop Drawings: Include plans, sections, details, and attachments to other work, including the following:

1. Layout and thickness of insulation.
2. Base flashings and membrane terminations.
3. Flashing details at penetrations.
4. Tapered insulation, including slopes.
5. Crickets, saddles, and tapered edge strips, including slopes.
6. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
7. Tie-in with adjoining air barrier.

C. Samples for Verification: For the following products:

1. Cap Sheet: Samples of manufacturer's standard color, matching existing roof cap sheet, for selection by Architect.
2. Flashing Sheet: Samples of manufacturer's standard color, matching existing flashing sheet, for selection by Architect.
3. Walkway Pads or Rolls: Samples of manufacturer's standard colors for selection by Architect.

D. Wind Uplift Resistance Submittal: For roofing system indicating compliance with wind uplift performance requirements.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Manufacturer Certificates:

1. Performance Requirement Certificate: Signed by roof membrane manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - a. Submit evidence of complying with performance requirements.
2. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.
- C. Product Test Reports: For roof membrane and insulation, tests performed by a qualified testing agency, indicating compliance with specified requirements.
- D. Evaluation Reports: For components of membrane roofing system, from ICC-ES.
- E. Field Test Reports:
 1. Concrete internal relative humidity test reports.
 2. Fastener-pullout test results and manufacturer's revised requirements for fastener patterns.
- F. Field quality-control reports.
- G. Sample Warranties: For manufacturer's special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roofing system to include in maintenance manuals.
- B. Certified statement from existing roof membrane manufacturer stating that existing roof warranty has not been affected by Work performed under this Section.

1.7 QUALITY ASSURANCE

- A. Qualifications:
 1. Manufacturers: A qualified manufacturer that is UL listed for roofing system identical to that used for this Project.
 2. Installers: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to maintain manufacturer's warranty for existing roof system.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer.
 - 1. Protect stored liquid material from direct sunlight.
 - 2. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources.
 - 1. Store in a dry location.
 - 2. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.9 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.10 WARRANTY

- A. Existing Roofing System Warranty: Perform work on or adjacent to the existing membrane roof system in accordance with the requirements of the existing roof system's manufacturer to protect and maintain the Owner's existing roof system warranty.
 - 1. Roofing work that impacts the existing membrane roof system must be performed by an authorized installer; coordinate with Owner.
 - 2. Warranty Period: Submit Manufacturer's documentation confirming continuation of Owner's existing roof system warranty without interruption to the period of its original duration.
- A. Special Warranty for new roof area: Manufacturer must provide an all-inclusive, no dollar limit, non-prorated roof warranty. Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.
 - 1. Special warranty includes roof membrane, base flashings, roof insulation, fasteners, cover boards, substrate board, and other components of roofing system.
 - 2. Special warranty includes the roof assembly's resistance of design wind speeds as indicated in the Structural Drawings.
 - 3. Warranty Period: 20 years from Date of Substantial Completion.
- B. Special Project Warranty for new roof area: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section, including all

components of roofing system such as roof membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards, and vapor retarders, for the following warranty period:

1. Warranty Period: Two years from Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed roofing system and flashings to withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roof system and flashings to remain watertight.
 1. Accelerated Weathering: Roof membrane to withstand 2000 hours of exposure when tested according to ASTM G152, ASTM G154, or ASTM G155.
 2. Impact Resistance: Roof membrane to resist impact damage when tested according to ASTM D3746/D3746M, ASTM D4272/D4272M, or the "Resistance to Foot Traffic Test" in FM Approvals 4470.
- B. Material Compatibility: Roofing materials to be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roof membrane manufacturer based on testing and field experience.
- C. Wind Uplift Resistance: Design roofing system to resist the wind uplift pressures indicated in the Structural Drawings.
- D. Energy Performance: Roofing system to have an initial solar reflectance of not less than 0.70 and an emissivity of not less than 0.75 when tested in accordance with ANSI/CRRC S100.
- E. Exterior Fire-Test Exposure: ASTM E108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency.
 1. Identify products with appropriate markings of applicable testing agency.
- F. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated.
 1. Identify products with appropriate markings of applicable testing agency.

2.2 MANUFACTURERS

- A. Styrene-Butadiene-Styrene (SBS)-Modified Bituminous Membrane Roof System:
 1. Manufacturers: Subject to compliance with requirements and compatibility with existing adjacent modified bitumen roofing, provide roof system components by one of the following:
 - a. GAF (Basis-of-Design).

- b. Siplast.
- c. Johns Manville.

2.3 SOURCE LIMITATIONS

- A. Obtain components for roof system from roof membrane manufacturer.

2.4 BASE SHEET MATERIALS

- A. SBS-Modified Bitumen Type I, Glass-Fiber-Mat Base Sheet: ASTM D6163/D6163M, Type I, Grade S, SBS-modified asphalt sheet, reinforced with glass fibers, smooth surfaced, suitable for cold adhesive or hot asphalt application method.
 - 1. Basis-of-Design Product: GAF; Ruberoid 20.

2.5 INTERPLY SHEETS

- A. Glass-Fiber Interply Sheet: ASTM D2178/D2178M, Type IV, asphalt-impregnated, glass-fiber felt.
 - 1. Basis-of-Design Product: GAF; GAFGLAS Ply 4 Ply Sheet roofing felt.

2.6 STYRENE-BUTADIENE-STYRENE (SBS) MODIFIED BITUMINOUS CAP SHEET

- A. SBS-Modified Bitumen Type I, Polyester Mat, Granule-Surfaced Cap Sheet: ASTM D6164/D6164M, Type I, Grade G, SBS-modified asphalt sheet, reinforced with polyester fabric, suitable for cold adhesive or hot asphalt application method.
 - 1. Basis-of-Design Product: GAF; Ruberoid Mop Granule.
 - 2. Granule Color: Match existing roof cap sheet.

2.7 BASE FLASHING SHEET MATERIALS

- A. SBS-Modified Bitumen Backer Sheet: ASTM D6163/D6163M, Type I or II, Grade S, reinforced with glass fibers, smooth surfaced, suitable for application method specified.
- B. Glass-Fiber Fabric: Woven glass-fiber cloth, treated with asphalt, complying with ASTM D1668/D1668M, Type I.
- C. Liquid Flashing System: Roof membrane manufacturer's standard one- or two-part moisture curing resin with low solvent content, consisting of a primer, flashing cement, and scrim.

2.8 ASPHALT MATERIALS

- A. Asphalt Primer: ASTM D41/D41M.

- B. Roofing Asphalt: ASTM D312/D312M, Type III or IV as recommended by roofing system manufacturer for application.

2.9 ACCESSORY ROOFING MATERIALS

- A. General: Accessory materials recommended by roofing system manufacturer for intended use and compatible with other roofing components.
 - 1. Adhesives and Sealants: Comply with VOC limits of authorities having jurisdiction.
- B. Prefabricated Pipe Flashings: As recommended by roof membrane manufacturer.
- C. Roof Vents: As recommended by roof membrane manufacturer.
 - 1. Size: Not less than 4-inch (100-mm) diameter.
- D. Metal Termination Bars: Manufacturer's standard, predrilled stainless steel or aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick; with anchors.
- E. Asphalt Roofing Cement: ASTM D4586/D4586M, asbestos free, of consistency required by roofing system manufacturer for application.
- F. Mastic Sealant: Polyisobutylene, plain or modified bitumen; nonhardening, nonmigrating, nonskinning, and nondrying.
- G. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing components to substrate; tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer.
- H. Roofing Granules: Ceramic-coated roofing granules, No. 11 screen size with 100 percent passing No. 8 (2.36-mm) sieve and 98 percent of mass retained on No. 40 (0.425-mm) sieve; color to match roof membrane.

2.10 SUBSTRATE BOARD (METAL DECK AREAS ONLY)

- A. Glass-Mat Gypsum Roof Substrate Board: ASTM C1177/C1177M, water-resistant gypsum board.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Georgia-Pacific Corporation; Dens Deck.
 - b. USG; Securock Glass-Matt Roof Board.
 - c. National Gypsum Company; DEXcell FA Glass Mat Roof Board
 - 2. Thickness: Type X, 5/8 inch (16 mm).
 - 3. Surface Finish: Unprimed.

- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate panel to roof deck.

2.11 VAPOR RETARDER

- A. Rubberized-Asphalt-Sheet Vapor Retarder, Self-Adhering: ASTM D1970/D1970M polyethylene film laminated to layer of rubberized asphalt adhesive, minimum 40-mil (1.0-mm) total thickness; maximum permeance rating of 0.1 perm (6 ng/Pa x s x sq. m); cold applied, with slip-resisting surface and release paper backing. Provide primer when recommended by vapor-retarder manufacturer.

2.12 ROOF INSULATION

- A. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.
 - 1. Basis-of-Design Product: GAF; EnergyGuard Polyisocyanurate.
 - 2. Compressive Strength: 20 psi (138 kPa).
 - 3. Size: 48 by 48 inches (1219 by 1219 mm).
 - 4. Thickness:
 - a. Base Layer: 4 inches (101.6 mm).
 - b. Upper Layer: 1/2 inch (12.7 mm).
- B. Tapered Insulation: Provide factory-tapered insulation boards.
 - 1. Material: Match roof insulation.
 - 2. Minimum Thickness: 1/4 inch (6 mm).
 - 3. Slope:
 - a. Roof Field: Field verify existing conditions.
 - b. Saddles and Crickets: Field verify existing conditions.

2.13 INSULATION ACCESSORIES AND COVER BOARD

- A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with other roofing system components.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.
- C. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:
 - 1. Modified asphaltic, asbestos-free, cold-applied adhesive.

2. Bead-applied, low-rise, one-component or multicomponent urethane adhesive.
 3. Full-spread spray-applied, low-rise, two-component urethane adhesive.
- D. Polyisocyanurate Insulation Cover Board: ASTM C1289 Type II, Class 4, Grade 1, 1/2 inch (13 mm) thick, with a minimum compressive strength of 80 psi (551 kPa).
- E. Wood Nailer Strips: Comply with requirements in Section 061000 "Rough Carpentry."
- F. Tapered Edge Strips: ASTM C208, Type II, Grade 1, cellulosic-fiber insulation board.

2.14 WALKWAYS

- A. Walkway Cap-Sheet Strips: ASTM D6163/D6163M, Type I or II, Grade G, SBS-modified asphalt sheet (reinforced with glass fibers); granule surfaced; suitable for application method specified, and as follows:
1. Size: 36 by 60 inches (914 mm by 1524 mm).
 2. Granule Color: As selected by the Architect from manufacturer's full range of colors.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
 2. Verify that wood cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
 3. Verify that concrete substrate is visibly dry and free of moisture, and that minimum concrete internal relative humidity is not more than 75 percent, or as recommended by roofing system manufacturer, when tested according to ASTM F2170.
 - a. Test Frequency: One test probe per each 1000 sq. ft. (93 sq. m), or portion thereof, of roof deck, with not less than three test probes.
 - b. Submit test reports within 24 hours of performing tests.
 4. Verify that concrete-curing compounds that impair adhesion of roofing components to roof deck have been removed.
 5. Verify that minimum curing period recommended by roofing system manufacturer for lightweight insulating concrete roof decks has passed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions.
 - 1. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction.
 - 1. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- C. Prime surface of concrete deck with asphalt primer at a rate of 3/4 gal./100 sq. ft. (0.3 L/sq. m), and allow primer to dry.
- D. Perform fastener-pullout tests according to roof system manufacturer's recommendations.
 - 1. Submit test result within 24 hours of performing tests.
 - a. Include manufacturer's requirements for any revision to previously submitted fastener patterns required to achieve specified wind uplift requirements.
- E. Install sound absorbing insulation strips in ribs of acoustical roof decks according to acoustical roof deck manufacturer's written instructions.

3.3 INSTALLATION OF ROOFING, GENERAL

- A. Install roofing system according to roofing system manufacturer's written instructions and SPRI's Directory of Roof Assemblies listed roof assembly requirements.
- B. Complete terminations and base flashings, and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast.
 - 1. Remove and discard temporary seals before beginning work on adjoining roofing.
- C. Install roof membrane and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition and to not void warranty for existing roofing system.
- D. Coordinate installation and transition of roofing system component serving as an air barrier with air barrier specified in Section 072726 "Fluid-Applied Membrane Air Barriers."
- E. Asphalt Heating:
 - 1. Heat asphalt to its equiviscous temperature, measured at the mop cart or mechanical spreader immediately before application.
 - a. For cap sheets, heat asphalt according to cap sheet manufacturer's recommendations.

2. Circulate asphalt during heating.
3. Do not raise asphalt temperature above equiviscous temperature range more than one hour before time of application.
 - a. For cap sheets, comply with cap sheet manufacturer's recommendations.
4. Do not exceed asphalt manufacturer's recommended temperature limits during asphalt heating.
5. Do not heat asphalt within 25 deg F (14 deg C) of flash point.
6. Discard asphalt maintained at a temperature exceeding finished blowing temperature for more than four hours.
7. Apply hot roofing asphalt within plus or minus 25 deg F (14 deg C) of equiviscous temperature.
 - a. For cap sheets, comply with cap sheet manufacturer's recommendations.

- F. Substrate-Joint Penetrations: Prevent roofing asphalt and adhesives from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.

3.4 INSTALLATION OF SUBSTRATE BOARD

- A. Install substrate board with long joints in continuous straight lines, with end joints staggered not less than 24 inches (610 mm) in adjacent rows.
1. At steel roof decks, install substrate board at right angle to flutes of deck.
 - a. Locate end joints over crests of steel roof deck.
 2. Tightly butt substrate boards together.
 3. Cut substrate board to fit tight around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 4. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to roofing system manufacturers' written instructions.

3.5 INSTALLATION OF VAPOR RETARDER

- A. Self-Adhering-Sheet Vapor Retarder: Prime substrate if required by manufacturer. Install self-adhering-sheet vapor retarder over area to receive vapor retarder, side and end lapping each sheet a minimum of 3-1/2 and 6 inches (90 and 150 mm), respectively.
1. Extend vertically up parapet walls and projections to a minimum height equal to height of the insulation and cover board.
 2. Seal laps by rolling.
- B. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into roofing system.

3.6 INSTALLATION OF INSULATION

- A. Coordinate installing roofing system components, so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.
- C. Insulation Cant Strips: Install and secure preformed 45-degree insulation cant strips at junctures of roofing system with vertical surfaces or angle changes greater than 45 degrees.
- D. Installation Over Lightweight Insulating Concrete Decks:
 - 1. Mechanically fasten vented base sheet to lightweight insulating concrete roof deck, with vented side down, using mechanical fasteners specifically designed and sized for fastening to lightweight insulating concrete decks.
 - a. Fasten vented base sheet to resist uplift pressure at corners, perimeter, and field of roof.
 - 2. Install base layer of insulation with joints staggered not less than 24 inches (600 mm) in adjacent rows.
 - a. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.
 - b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - c. Make joints between adjacent insulation boards not more than 1/4 inch (6 mm) in width.
 - d. At internal roof drains, slope insulation to create a square drain sump, with each side equal to the diameter of the drain bowl plus 24 inches (600 mm).
 - 1) Trim insulation, so that water flow is unrestricted.
 - e. Fill gaps exceeding 1/4 inch (6 mm) with insulation.
 - f. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.
 - g. Adhere base layer of insulation to vented base sheet according to SPRI's Directory of Roof Assemblies listed roof assembly requirements for specified Wind Uplift Load Capacity as follows:
 - 1) Set insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F (14 deg C) of equiviscous temperature.
 - 3. Install upper layers of insulation and tapered insulation, with joints of each layer offset not less than 12 inches (300 mm) from previous layer of insulation.
 - a. Staggered end joints within each layer not less than 24 inches (600 mm) in adjacent rows.

- b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
- c. Make joints between adjacent insulation boards not more than 1/4 inch (6 mm) in width.
- d. At internal roof drains, slope insulation to create a square drain sump, with each side equal to the diameter of the drain bowl plus 24 inches (600 mm).
 - 1) Trim insulation, so that water flow is unrestricted.
- e. Fill gaps exceeding 1/4 inch (6 mm) with insulation.
- f. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.
- g. Adhere each layer of insulation to substrate using adhesive according to SPRI's Directory of Roof Assemblies listed roof assembly requirements for specified Wind Uplift Load Capacity and manufacturer's requirements, as follows:
 - 1) Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F (14 deg C) of equiviscous temperature.

3.7 INSTALLATION OF COVER BOARDS

- A. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches (150 mm) in each direction.
 - 1. Trim cover board neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - 2. At internal roof drains, conform to slope of drain sump.
 - a. Trim cover board so that water flow is unrestricted.
 - 3. Cut and fit cover board tight to nailers, projections, and penetrations.
 - 4. Adhere cover board to substrate using adhesive according to roof manufacturer's requirements and FM Global Property Loss Prevention Data Sheet 1-29, as follows:
 - a. Set cover board in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

3.8 INSTALLATION OF ROOFING MEMBRANE, GENERAL

- A. Install roofing system according to roofing system manufacturer's written instructions and applicable recommendations in ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing."
- B. Start installation of roofing in presence of roofing system manufacturer's technical personnel.
- C. Where roof slope exceeds 1/2 inch per 12 inches (1:24), install roofing membrane sheets parallel with slope.

1. Backnail roofing sheets to nailer strips according to roofing system manufacturer's written instructions.
- D. Coordinate installation of roofing system so insulation and other components of the roofing system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.
 1. Provide tie-offs at end of each day's work to cover exposed roofing sheets and insulation with a course of coated felt set in roofing cement or hot roofing asphalt, with joints and edges sealed.
 2. Complete terminations and base flashings, and provide temporary seals to prevent water from entering completed sections of roofing system.
 3. Remove and discard temporary seals before beginning work on adjoining roofing.

3.9 INSTALLATION OF BASE SHEET

- A. Before installing, unroll base sheet, cut into workable lengths, and allow to lie flat for a time period recommended by manufacturer for the ambient temperature.
- B. Loosely lay one course of sheathing paper, lapping edges and ends a minimum of 2 inches (51 mm) and 6 inches (150 mm), respectively.
- C. Installation of SBS-Modified Fiberglass-Mat Base Sheet:
 1. Install base sheet according to roofing manufacturer's written instructions, starting at low point of roofing system.
 2. Extend roofing sheets over and terminate above cants.
 3. Install base sheet in a shingle fashion.
 4. Adhere to substrate in a uniform coating of cold-applied adhesive.
 5. Install base sheet without wrinkles, tears, and free from air pockets.
 6. Laps: Accurately align roofing sheets, without stretching, and maintain uniform side and end laps.
 - a. Lap side laps as recommended by roof membrane manufacturer but not less than 3 inches (76 mm).
 - b. Lap end laps as recommended by roof membrane manufacturer but not less than 12 inches (300 mm).
 - c. Stagger end laps not less than 18 inches (450 mm).
 - d. Heat-weld end laps, leaving no voids.
 - e. Roll laps with a 20-pound (9-kg) roller.
 7. Repair tears and voids in laps and lapped seams not completely sealed.
 8. Apply pressure to the body of the base sheet according to manufacturer's instructions, to remove air pockets and to result in complete adhesion of base sheet to substrate.

3.10 INSTALLATION OF INTERPLY SHEETS

- A. Install two ply sheets, starting at low point of roofing.
 - 1. Align ply sheets without stretching.
 - 2. Shingle side laps of ply sheets uniformly to achieve required number of plies throughout thickness of roofing membrane.
 - a. Shingle in direction to shed water.
 - 3. Extend ply sheets over and terminate above cants.

3.11 INSTALLATION OF SBS-MODIFIED BITUMINOUS CAP SHEET

- A. Before installing, unroll cap sheet, cut into workable lengths, and allow to lie flat for a time period recommended by manufacturer for the ambient temperature at which cap sheet will be installed.
- B. Install modified bituminous roofing cap sheet according to roofing manufacturer's written instructions, starting at low point of roofing system.
 - 1. Extend cap sheet over and terminate above cants.
 - 2. Install cap sheet in a shingle fashion.
 - 3. Install cap sheet as follows:
 - a. Adhere to substrate in a solid mopping of hot roofing asphalt applied at asphalt temperature recommended by cap sheet manufacturer.
 - 4. Install cap sheet without wrinkles or tears, and free from air pockets.
 - 5. Install cap sheet so side and end laps shed water.
- C. Laps: Accurately align roofing sheets, without stretching, and maintain uniform side and end laps.
 - 1. Lap side laps as recommended by roof membrane manufacturer but not less than 3 inches (76 mm).
 - 2. Lap end laps as recommended by roof membrane manufacturer but not less than 12 inches (300 mm).
 - 3. Stagger end laps not less than 18 inches (450 mm).
 - 4. Heat-weld laps, leaving no voids.
 - 5. Roll laps with a 20-pound (9-kg) roller.
 - 6. Repair tears and voids in laps and lapped seams not completely sealed.
- D. Apply pressure to the body of the cap sheet according to manufacturer's instructions, to remove air pockets and to result in complete adhesion of base sheet to substrate.
- E. Apply roofing granules of same color as roof membrane to cover exuded bead at laps while bead is hot, to provide a continuous color appearance.

3.12 INSTALLATION OF FLASHING AND STRIPPING

- A. Install base flashing over cant strips and other sloped and vertical surfaces, at roof edges, and at penetrations through roof, and secure to substrates according to roofing system manufacturer's written instructions and as follows:
 - 1. Prime substrates with asphalt primer if required by roofing system manufacturer.
 - 2. Backer Sheet Application: Adhere backer sheet to substrate in a solid mopping of hot roofing asphalt.
 - 3. Flashing Sheet Application, Hot: Adhere flashing sheet to substrate in a solid mopping of hot roofing asphalt applied at asphalt temperature recommended by flashing sheet manufacturer. Apply hot roofing asphalt to back of flashing sheet if recommended by roofing system manufacturer.
- B. Extend base flashing up walls or parapets a minimum of 8 inches (200 mm) above roofing membrane and 4 inches (100 mm) onto field of roofing membrane.
- C. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.
 - 1. Seal top termination of base flashing.
- D. Install liquid flashing system according to manufacturer's recommendations.
 - 1. Extend liquid flashing not less than 3 inches (76 mm) in all directions from edges of item being flashed.
 - 2. Embed granules, matching color of roof membrane, into wet compound.
- E. Install roofing cap-sheet stripping where metal flanges and edgings are set on roofing according to roofing system manufacturer's written instructions.
- F. Roof Drains: Set 30-by-30-inch- (760-by-760-mm-), 4-pound (1.8 kg) lead flashing in bed of asphaltic adhesive on completed roofing membrane.
 - 1. Cover lead flashing with roofing cap-sheet stripping, and extend a minimum of 6 inches (150 mm) beyond edge of metal flashing onto field of roofing membrane.
 - 2. Clamp roofing membrane, metal flashing, and stripping into roof-drain clamping ring.
 - 3. Install stripping according to roofing system manufacturer's written instructions.

3.13 INSTALLATION OF WALKWAYS

- A. Walkway Cap-Sheet Strips: Install walkway cap-sheet strips over roofing membrane, using same application method as used for roofing cap sheet.
 - 1. Install walkways strips between new roof hatch and nearest existing walkway path and as follows:
 - a. Locations indicated on Drawings.
 - b. As required by roof membrane manufacturer's warranty requirements.

2. Provide 3-inch (76-mm) clearance between adjoining strips.

3.14 FIELD QUALITY CONTROL

- A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion, in presence of Architect, and to prepare inspection report.
 1. Notify Architect and Owner 48 hours in advance of date and time of inspection.
- B. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.
- C. Roofing system will be considered defective if it does not pass tests and inspections.
 1. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.15 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period.
 1. When remaining construction does not affect or endanger roofing, inspect roofing system for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 075216

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Manufactured reglets with counterflashing.
 - 2. Formed low-slope roof sheet metal fabrications.
 - 3. Formed equipment support flashing.
- B. Related Sections: Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Division 6 Section "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.
 - 2. Division 7 Section "Styrene-Butadiene-Styrene (SBS)-Modified Bituminous Membrane Roofing" for specified low-slope roofing system and for installation of sheet metal flashing and trim integral with roofing.

1.3 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 ACTION SUBMITTALS

- A. Product Data: For each of the following
 - 1. Underlayment materials.
 - 2. Elastomeric sealant.
 - 3. Butyl sealant.
- B. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled Work.
3. Include identification of material, thickness, weight, and finish for each item and location in Project.
4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Include details of termination points and assemblies.
7. Include details of roof-penetration flashing.
8. Include details of edge conditions, including eaves, flashings, and counterflashings.
9. Include details of special conditions.
10. Include details of connections to adjoining work.
11. Detail formed flashing and trim at scale of not less than 3 inches per 12 inches (1:5).

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.
- B. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- C. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.
- B. Special warranty.

1.7 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
 1. For copings and roof edge flashings that are ANSI/SPRI/FM 4435/ES-1 tested, shop shall be listed as able to fabricate required details as tested and approved.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.
 1. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
 2. Protect stored sheet metal flashing and trim from contact with water.

- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.9 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. SPRI Wind Design Standard: Manufacture roof edge flashings tested in accordance with ANSI/SPRI/FM 4435/ES-1 and capable of resisting the following design pressure:
 - 1. Design Pressure: As indicated on Drawings.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 SHEET METALS

- A. Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Aluminum Sheet: ASTM B209 (ASTM B209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.
 - 1. Exposed Coil-Coated Finish:
 - a. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 2. Color: As selected by Architect from manufacturer's full range.
 - 3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil (0.013 mm).
- C. Stainless Steel Sheet: ASTM A240/A240M, Type 304, dead soft, fully annealed; with smooth, flat surface.
 - 1. Finish: ASTM A480/A480M, No. 2D (dull, cold rolled).
 - a. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

2.3 UNDERLAYMENT MATERIALS

- A. Felt: ASTM D226/D226M, Type II (No. 30), asphalt-saturated organic felt; nonperforated.
- B. Self-Adhering, High-Temperature Sheet Underlayment: Minimum 30 mils (0.76 mm) thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer in accordance with underlayment manufacturer's written instructions.
 - 1. Source Limitations: Obtain underlayment from single source from single manufacturer.
 - 2. Low-Temperature Flexibility: ASTM D1970/D1970M; passes after testing at minus 20 deg F (29 deg C) or lower.
- C. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. (0.16 kg/sq. m) minimum.

2.4 MISCELLANEOUS MATERIALS

- A. Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
 - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
 - b. Blind Fasteners: High-strength aluminum or stainless steel rivets suitable for metal being fastened.
 - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
 - 2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
 - 3. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.
- C. Solder:
 - 1. For Stainless Steel: ASTM B32, Grade Sn60, with acid flux of type recommended by stainless steel sheet manufacturer.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
- E. Elastomeric Sealant: ASTM C920, elastomeric polysulfide or silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- G. Bituminous Coating: Cold-applied asphalt emulsion in accordance with ASTM D1187/D1187M.
- H. Asphalt Roofing Cement: ASTM D4586, asbestos free, of consistency required for application.
- I. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions and with interlocking counterflashing on exterior face, of same metal as reglet.
 - 1. Subject to compliance with performance requirements, provide reglets from one of the following manufacturers, but not limited to:

- a. Cheney Flashing Company.
 - b. Fry Reglet Corporation.
 - c. Heckmanm Building Products, Inc.
 - d. Hohmann & Barnard, Inc.
 - e. OMG, Inc.
2. Source Limitations: Obtain reglets from single source from single manufacturer.
 3. Material: Stainless steel, 0.0188 inch (0.477 mm) thick.
 4. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
 5. Concrete Type: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
 6. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
 7. Accessories:
 - a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
 - b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing's lower edge.
 8. Finish: With manufacturer's standard color coating.

2.5 FABRICATION, GENERAL

- A. Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.
 1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
 2. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 3. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
 4. Form sheet metal flashing and trim to fit substrates without excessive oil-canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 5. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Fabrication Tolerances:
 1. Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.
 2. Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified.

- C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
 - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.
 - 2. Use lapped expansion joints only where indicated on Drawings.
- D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.
- E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- F. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.
- G. Seams:
 - 1. Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 - 2. Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
- H. Do not use graphite pencils to mark metal surfaces.

2.6 METAL FABRICATIONS

- A. Base Flashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
 - 1. Stainless Steel: 0.0188 inch (0.477 mm) thick.
- B. Counterflashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
 - 1. Aluminum: 0.032 inch (0.81 mm) thick.
 - 2. Stainless Steel: 0.0188 inch (0.477 mm) thick.
- C. Flashing Receivers: Fabricate from the following materials:
 - 1. Aluminum: 0.032 inch (0.81 mm) thick.
 - 2. Stainless Steel: 0.0156 inch (0.396 mm) thick.
- D. Roof-Penetration Flashing: Fabricate from the following materials:
 - 1. Stainless Steel: 0.0188 inch (0.477 mm) thick.
- E. Roof-Drain Flashing: Fabricate from the following materials:

1. Stainless Steel: 0.0156 inch (0.396 mm) thick.

2.7 MISCELLANEOUS SHEET METAL FABRICATIONS

- A. Equipment Support Flashing: Fabricate from the following materials:

1. Stainless Steel: 0.0188 inch (0.477 mm) thick.

- B. Overhead-Piping Safety Pans: Fabricate from the following materials:

1. Stainless Steel: 0.0250 inch (0.635 mm) thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
1. Verify compliance with requirements for installation tolerances of substrates.
 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF UNDERLAYMENT

- A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim.
1. Install in shingle fashion to shed water.
 2. Lap joints not less than 2 inches (50 mm).
- B. Self-Adhering, High-Temperature Sheet Underlayment:
1. Install self-adhering, high-temperature sheet underlayment; wrinkle free.
 2. Prime substrate if recommended by underlayment manufacturer.
 3. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures.
 4. Apply in shingle fashion to shed water, with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses.
 5. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps and edges with roller.
 6. Roll laps and edges with roller.
 7. Cover underlayment within 14 days.

- C. Install slip sheet, wrinkle free, over underlayment or directly on substrate if no underlayment is required before installing sheet metal flashing and trim.
 - 1. Install in shingle fashion to shed water.
 - 2. Lapp joints not less than 4 inches (100 mm).

3.3 INSTALLATION, GENERAL

- A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.
 - 1. Install fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds and sealant.
 - 3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
 - 5. Install continuous cleats with fasteners spaced not more than 12 inches (300 mm) o.c.
 - 6. Space individual cleats not more than 12 inches (300 mm) apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
 - 7. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
 - 8. Do not field cut sheet metal flashing and trim by torch.
 - 9. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
 - 1. Coat concealed side of uncoated-aluminum and stainless steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
 - 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.
 - 1. Space movement joints at maximum of 10 feet (3 m) with no joints within 24 inches (600 mm) of corner or intersection.
 - 2. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
 - 3. Use lapped expansion joints only where indicated on Drawings.
- D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction.
 - 1. Use sealant-filled joints unless otherwise indicated.
 - a. Embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant.
 - b. Form joints to completely conceal sealant.
 - c. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way.
 - d. Adjust setting proportionately for installation at higher ambient temperatures.
 - 1) Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
 - 2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."
- G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter.
 - 1. Pretin edges of sheets with solder to width of 1-1/2 inches (38 mm); however, reduce pretinning where pretinned surface would show in completed Work.
 - 2. Do not solder aluminum sheet.
 - 3. Do not pretin zinc-tin alloy-coated copper.
 - 4. Do not use torches for soldering.
 - 5. Heat surfaces to receive solder, and flow solder into joint.
 - a. Fill joint completely.
 - b. Completely remove flux and spatter from exposed surfaces.
 - 6. Stainless Steel Soldering:
 - a. Tin edges of uncoated sheets, using solder for stainless steel and acid flux.
 - b. Promptly remove acid-flux residue from metal after tinning and soldering.
 - c. Comply with solder manufacturer's recommended methods for cleaning and neutralization.

3.4 INSTALLATION OF ROOF FLASHINGS

- A. Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard.
 - 1. Provide concealed fasteners where possible, and set units true to line, levels, and slopes.
 - 2. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

- B. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches (100 mm) over base flashing. Install stainless steel draw band and tighten.
- C. Counterflashing: Coordinate installation of counterflashing with installation of base flashing.
 - 1. Insert counterflashing in reglets or receivers and fit tightly to base flashing.
 - 2. Extend counterflashing 4 inches (100 mm) over base flashing.
 - 3. Lap counterflashing joints minimum of 4 inches (100 mm).
 - 4. Secure in waterproof manner by means of interlocking folded seam or blind rivets and sealant or anchor and washer spaced at 12 inches (300 mm) o.c. along perimeter and 6 inches (150 mm) o.c. at corners areas unless otherwise indicated.
- D. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.5 INSTALLATION OF WALL FLASHINGS

- A. Install sheet metal wall flashing to intercept and exclude penetrating moisture in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches (100 mm) beyond wall openings.

3.6 INSTALLATION OF MISCELLANEOUS FLASHING

- A. Equipment Support Flashing:
 - 1. Coordinate installation of equipment support flashing with installation of roofing and equipment.
 - 2. Weld or seal flashing with elastomeric sealant to equipment support member.

3.7 INSTALLATION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.8 CLEANING

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.

- C. Clean off excess sealants.

3.9 PROTECTION

- A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended in writing by sheet metal flashing and trim manufacturer.
- C. Maintain sheet metal flashing and trim in clean condition during construction.
- D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Architect.

END OF SECTION 076200

SECTION 077200 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Manufactured units for the following applications:

1. Roof hatch.
2. Underlayment.
3. Miscellaneous materials.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for roof cants, nailers, blocking, and other pressure-preservative-treated wood.
2. Division 7 Section "Styrene-Butadiene-Styrene (SBS) Modified Bituminous Membrane Roofing" for intersecting roof membrane assembly.
3. Division 7 Section "Sheet Metal Flashing and Trim" for curb flashing.
4. Division 7 Section "Joint Sealants" for field-applied sealants between roof accessories and adjacent materials.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of roof accessory.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For roof accessories.

1. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.
2. Show method of attaching roof accessories to roof or building structure.
3. Show required clearances.

C. Samples: For each type of roof accessory and for each color and texture specified.

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For roof accessories.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Do not store roof accessories in contact with other materials that might cause staining, denting, or other surface damage. Store roof accessories in accordance with manufacturer's instructions.
- B. Store materials off ground in dry location and in accordance with manufacturer's instructions in well-ventilated area.
- C. Store and protect roof accessories from nicks, scratches, and blemishes.

1.5 FIELD CONDITIONS

- A. Field Measurements: Verify profiles and tolerances of roof-accessory substrates by field measurements before fabrication, and indicate measurements on Shop Drawings.

1.6 COORDINATION

- A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Roof accessories to withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

2.2 ROOF HATCHES

- A. Metal roof-hatch units with lids and insulated [single] [double]-walled curbs, welded or mechanically fastened and sealed corner joints, continuous lid-to-curb counterflashing and weathertight perimeter gasketing,[straight sides,] [integral metal cant,] [stepped integral metal cant to raise the thickness of roof insulation,] and integrally formed deck-mounting flange at perimeter bottom.
- B. Basis-of-Design: Bilco E-50TB thermally broken roof hatch, with insulated door and curb, with Bil-Guard 2.0 Safety Railing System and LadderUP Safety Post mounted to top two rungs of ladder below.
- C. Subject to conformance with requirements, provide products by one of the following manufacturers or approved equal:
 - 1. Bilco.
 - 2. Best Access Doors.

3. Acudor.
 4. Babcock Davis.
- D. Type and Size:
1. Single-leaf lid, 36 by 36 inches (900 by 900 mm). Verify load requirements with authorities having jurisdiction.
- E. Loads: Minimum 40 lbf/sq. ft. (1.9 kPa) external live load and 20 lbf/sq. ft. (0.95 kPa) internal uplift load.
- F. Hatch Material, Aluminum:
1. Thickness: Cover and frame are 11 gauge (2.3mm) minimum.
 2. Finish: Mill finish.
- G. Construction:
1. Insulation: 3-inch thick, polyisocyanurate board at cover and curb.
 - a. R-Value: 20, in accordance with ASTM C1363.
 2. Nailer: Factory-installed wood nailer continuous around hatch perimeter.
 3. Hatch Lid: Opaque, insulated, and double walled, with manufacturer's standard metal liner of same material and finish as outer metal lid.
 4. Curb Liner: Manufacturer's standard, of same material and finish as metal curb.
 5. Fabricate curbs to minimum height of 12 inches (305 mm) above roofing surface unless otherwise indicated.
 6. Sloping Roofs: Where slope or roof deck exceeds 1/4 inch per 12 inches (1:48), fabricate curb with perimeter curb height that is tapered to accommodate roof slope so that top surfaces of perimeter curb are level. Equip hatch with water diverter or cricket on side that obstructs water flow.
- H. Hardware: Spring operators, hold-open arm, galvanized stainless steel spring latch with turn handles, stainless steel butt- or pintle-type hinge system, and padlock hasps inside and outside.
- I. Safety Railing System: Roof-hatch manufacturer's standard system, including rails, clamps, fasteners, safety barrier at railing opening, and accessories required for a complete installation; attached to roof hatch and complying with 29 CFR 1910.23 requirements and authorities having jurisdiction.
1. Height: 42 inches (1060 mm) above finished roof deck.
 2. Posts and Rails: Manufacturer's standard powder-coated aluminum, safety yellow.
 3. Maximum Opening Size: System constructed to prevent passage of a sphere 21 inches (533 mm) in diameter.
 4. Self-Latching Gate: Fabricated of same materials and rail spacing as safety railing system. Provide manufacturer's standard hinges and self-latching mechanism.
 5. Post and Rail Tops and Ends: Weather resistant, closed or plugged with prefabricated end fittings.

6. Provide weep holes or another means to drain-entrapped water in hollow sections of handrail and railing members.
7. Fabricate joints exposed to weather to be watertight.
8. Fasteners: Manufacturer's standard, finished to match railing system.

J. Ladder-Assist Post: Roof-hatch manufacturer's standard device for attachment to roof-access ladder.

1. Operation: Post locks in place on full extension; release mechanism returns post to closed position.
2. Height: 42 inches (1060 mm) above finished roof deck.
3. Material: Aluminum.
4. Finish: Manufacturer's standard powder coating, safety yellow.

2.3 METAL MATERIALS

A. Aluminum Sheet: ASTM B209/B209M, manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.

1. Mill Finish: As manufactured.
2. Powder Coat Finish at safety railing systems: AAMA 2603. After cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat to a minimum dry film thickness of 2 mils (0.05 mm).

B. Aluminum Extrusions and Tubes: ASTM B221 (ASTM B221M), manufacturer's standard alloy and temper for type of use, finished to match assembly where used; otherwise mill finished.

2.4 MISCELLANEOUS MATERIALS

A. Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Polyisocyanurate Board Insulation: ASTM C1289, thickness and thermal resistivity as indicated.

C. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction, containing no arsenic or chromium, and complying with AWWA C2; not less than 1-1/2 inches (38 mm) thick.

D. Fasteners: Roof accessory manufacturer's recommended fasteners, designed to comply with performance requirements, suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:

1. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
2. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.

- E. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.
- F. Elastomeric Sealant: ASTM C920, elastomeric polyurethane or silicone polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
- B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- C. Verify dimensions of roof openings for roof accessories.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Install roof accessories in accordance with manufacturer's written instructions.
 - 1. Install roof accessories level; plumb; true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
 - 2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
 - 3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
 - 4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended in writing by manufacturer's written installation instructions.
 - 1. Coat concealed side of uncoated aluminum roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 - 2. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.

3.3 INSTALLATION OF ROOF ACCESSORIES

- A. Roof-Hatch:

1. Verify that roof hatch operates properly. Clean, lubricate, and adjust operating mechanism and hardware.
 2. Attach safety railing system to roof-hatch curb.
 3. Attach ladder-assist post in accordance with manufacturer's written instructions.
- B. Seal joints with elastomeric or butyl sealant as required by roof accessory manufacturer.

3.4 CLEANING AND PROTECTION

- A. On completion of installation, clean exposed surfaces in according with manufacturer's written instructions. Clean off excess sealants.
- B. Remove temporary protective coverings and strippable films as roof accessories are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof accessories in a clean condition during construction.
- C. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures, as determined by Architect.

END OF SECTION 077200

SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Penetration firestopping systems for the following applications:

- a. Penetrations in fire-resistance-rated walls, including existing corridors.
 - b. Penetrations in horizontal assemblies.
 - c. Penetrations in smoke barriers.

- B. Related Sections: Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:

- 1. Division 1 Section "Construction and Demolition Waste Management."
 - 2. Division 4 Section "Unit Masonry."
 - 3. Division 7 Section "Joint Firestopping" for joints in or between fire-resistance-rated construction, at exterior curtain-wall/floor intersections, and in smoke barriers.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.
 - 1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

- B. Product Test Reports: For each penetration firestopping system, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Approval according to FM Approval 4991, "Approval Standard for Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.
- B. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics:
 - 1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:
 - a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.

- 1) UL in its "Fire Resistance Directory."

2.2 PENETRATION FIRESTOPPING SYSTEMS

- A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
 1. 3M Fire Protection Products.
 2. Hilti, Inc.
 3. RectorSeal.
 4. Specified Technologies, Inc.
 5. Tremco, Inc.
- B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
 1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
 1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
 2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
- D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479, based on testing at a positive pressure differential of 0.30-inch wg (74.7 Pa).
 1. L-Rating: Not exceeding 5.0 cfm/sq. ft. (0.025 cu. m/s per sq. m) of penetration opening at and no more than 50-cfm (0.024-cu. m/s) cumulative total for any 100 sq. ft. (9.3 sq. m) at both ambient and elevated temperatures.
- E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E84.
- F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.
 1. Permanent forming/damming/backing materials.
 2. Substrate primers.
 3. Collars.
 4. Steel sleeves.

2.3 FILL MATERIALS

- A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer sleeve lined with an intumescent strip, a flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced intumescent elastomeric sheet bonded to galvanized-steel sheet.
- E. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.
- F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
- H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.
- I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.

2.4 MIXING

- A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Before installing penetration firestopping systems, clean out openings immediately to comply with manufacturer's written instructions and with the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping materials.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION

- A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.
- C. Install fill materials by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
 - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.

3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

- A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches (76 mm) high and with minimum 0.375-inch (9.5-mm) strokes.
 1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet (4.57 m) from end of wall and at intervals not exceeding 30 feet (9.14 m).
- B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
 1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
 2. Contractor's name, address, and phone number.
 3. Designation of applicable testing and inspecting agency.
 4. Date of installation.
 5. Manufacturer's name.
 6. Installer's name.

3.5 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E2174.
- B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
- C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are without damage or deterioration at time of Substantial

Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping material and install new materials to produce systems complying with specified requirements.

END OF SECTION 078413

SECTION 078443 - JOINT FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Joints in or between fire-resistance-rated constructions, including elevator shaft intersections with existing floors and corridor walls.
2. Joints at exterior wall framing/floor intersections.
3. Joints in smoke barriers.

- B. Related Sections: Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:

1. Division 1 Section "Construction and Demolition Waste Management."
2. Division 7 Section "Penetration Firestopping" for penetrations in fire-resistance-rated walls, horizontal assemblies, and smoke barriers and for wall identification.
3. Division 9 Section "Non-Structural Metal Framing" for firestop tracks for metal-framed partition heads.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- B. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.

1. Engineering Judgments: Where Project conditions require modification to a qualified testing agency's illustration for a particular joint firestopping system condition, submit illustration, with modifications marked, approved by joint firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

- B. Product Test Reports: For each joint firestopping system, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that joint firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Approvals according to FM Approvals 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements."

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install joint firestopping systems when ambient or substrate temperatures are outside limits permitted by joint firestopping system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Install and cure joint firestopping systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

- A. Coordinate construction of joints to ensure that joint firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of joints to accommodate joint firestopping systems.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics:
 - 1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:
 - a. Joint firestopping systems shall bear classification marking of a qualified testing agency.
 - 1) UL in its "Fire Resistance Directory."

2.2 JOINT FIRESTOPPING SYSTEMS

- A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.
- B. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E1966 or UL 2079.
 - 1. Available Manufacturers include but are not limited to the following:
 - a. 3M Fire Protection Products.
 - b. Hilti, Inc.
 - c. RectorSeal.
 - d. Specified Technologies, Inc.
 - e. Tremco, Inc.
 - 2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.
- C. Joints at Exterior Curtain-Wall/Floor Intersections: Provide joint firestopping systems with rating determined per ASTM E2307.
 - 1. Available Manufacturers include but are not limited to the following:
 - a. 3M Fire Protection Products.
 - b. Hilti, Inc.
 - c. RectorSeal.
 - d. Specified Technologies, Inc.
 - e. Tremco, Inc.
 - 2. F-Rating: Equal to or exceeding the fire-resistance rating of the floor assembly.
- D. Joints in Smoke Barriers: Provide joint firestopping systems with ratings determined per UL 2079 based on testing at a positive pressure differential of 0.30-inch wg (74.7 Pa).
 - 1. Available Manufacturers include but are not limited to the following:
 - a. 3M Fire Protection Products.
 - b. Hilti, Inc.
 - c. RectorSeal.
 - d. Specified Technologies, Inc.
 - e. Tremco, Inc.
 - 2. L-Rating: Not exceeding 5.0 cfm/ft. (0.00775 cu. m/s x m) of joint at both ambient and elevated temperatures.
- E. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E84.

- F. Accessories: Provide components of joint firestopping systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Before installing joint firestopping systems, clean joints immediately to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:
 - 1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of elastomeric fill materials or compromise fire-resistive rating.
 - 2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with elastomeric fill materials. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Prime substrates where recommended in writing by joint firestopping system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION

- A. General: Install joint firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming materials and other accessories of types required to support elastomeric fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.
- C. Install elastomeric fill materials for joint firestopping systems by proven techniques to produce the following results:

1. Elastomeric fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

- A. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of joint edge so labels are visible to anyone seeking to remove or joint firestopping system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
 1. The words "Warning - Joint Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
 2. Contractor's name, address, and phone number.
 3. Designation of applicable testing agency.
 4. Date of installation.
 5. Manufacturer's name.
 6. Installer's name.

3.5 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E2393.
- B. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.
- C. Proceed with enclosing joint firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

- A. Clean off excess elastomeric fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by joint firestopping system manufacturers and that do not damage materials in which joints occur.
- B. Provide final protection and maintain conditions during and after installation that ensure joint firestopping systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated joint firestopping systems immediately and install new materials to produce joint firestopping systems complying with specified requirements.

3.7 JOINT FIRESTOPPING SYSTEM SCHEDULE

- A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHBN or Category XHDG.
- B. Floor-to-Floor, Joint Firestopping Systems:
 - 1. UL-Classified Systems: FF-D-0000-0999.
 - 2. Assembly Rating: 1 and 2 hours as indicated by the Drawings.
 - 3. Nominal Joint Width: 2 inches.
 - 4. Movement Capabilities: Class II and Class III - 50 percent compression or extension.
- C. Wall-to-Wall (Metal Framing), Joint Firestopping Systems:
 - 1. UL-Classified Systems: WW-D-0000-0999.
 - 2. Assembly Rating: 1 hour.
 - 3. Nominal Joint Width: 2 inches.
 - 4. Movement Capabilities: Class II and Class III - 50 percent compression or extension.
- D. Wall-to-Wall (CMU), Joint Firestopping Systems:
 - 1. UL-Classified Systems: WW-D-0000-0999.
 - 2. Assembly Rating: 2 hours.
 - 3. Nominal Joint Width: 2 inches.
 - 4. Movement Capabilities: Class II and Class III - 50 percent compression or extension.
- E. Floor-to-Wall, Joint Firestopping Systems:
 - 1. UL-Classified Systems: FW-D-0000-0999.
 - 2. Assembly Rating: 1 hour and 2 hours as indicated by the Drawings.
 - 3. Nominal Joint Width: 2 inches.
 - 4. Movement Capabilities: Class II and Class III - 50 percent compression or extension.
- F. Head-of-Metal Stud Wall, Fire-Resistive Joint Firestopping Systems:
 - 1. UL-Classified Systems: HW-D-0000-0999.
 - 2. Assembly Rating: 1 hour.
 - 3. Nominal Joint Width: 3/4-inch maximum.
 - 4. Movement Capabilities: Class II and Class III - 33 percent compression or extension.
- G. Head-of-Unit Masonry Wall, Fire-Resistive Joint Firestopping Systems:
 - 1. UL-Classified Systems: HW-D-0000-0999.
 - 2. Assembly Rating: 2 hours.
 - 3. Nominal Joint Width: 3/4 -inch.
 - 4. Movement Capabilities: Class II 17 percent compression or extension.
 - 5. L-Rating at Ambient: Less than 1 cfm/ft. (cu. m/s x m).
 - 6. L-Rating at 400 Deg F (204 Deg C): Less than 1 cfm/ft. (cu. m/s x m).
- H. Head-of-Shaft Wall, Fire-Resistive Joint Firestopping Systems:

1. UL-Classified Systems: HW-D-0000-0999.
 2. Assembly Rating: 1 hour.
 3. Nominal Joint Width: 5/8 inch maximum.
 4. Movement Capabilities: Class II – 25 percent compression or extension.
- I. Bottom-of-Shaft-Wall, Joint Firestopping System:
1. UL-Classified Systems: BW-S-0000-0999.
 2. Assembly Rating: 1 hour.
 3. Nominal Joint Width: 1/2-inch maximum.
- J. Bottom-of-Metal Stud Wall, Joint Firestopping Systems:
1. UL-Classified Systems: BW-S-0000-0999.
 2. Assembly Rating: 1 hour.
 3. Nominal Joint Width: 3/4 inch maximum.
 4. L-Rating at Ambient: Less than 1 cfm/ft. (cu. m/s x m).
 5. L-Rating at 400 Deg F (204 Deg C): Less than 1 cfm/ft. (cu. m/s x m).

END OF SECTION 078443

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Silicone joint sealants.
 - 2. Nonstaining silicone joint sealants.
 - 3. Urethane joint sealants.
 - 4. Mildew-resistant joint sealants.
 - 5. Butyl joint sealants.
 - 6. Latex joint sealants.
- B. Related Sections: Examine Contract Documents for requirements that affect work of this Section.

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.
- B. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- C. Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- B. Product Testing: Test joint sealants using a qualified testing agency.

1. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

1.5 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F (5 deg C).
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.6 WARRANTY

A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range; up to four (4) colors of each type.

2.2 SILICONE JOINT SEALANTS

- A. Silicone, S, NS, 25, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.
- B. Basis of Design: GE Construction Sealants; Momentive Performance Materials, Inc.; UltraGlaze SSG4000.
- C. Subject to compliance with the requirements of this section, available manufacturers include, but are not limited to:
 - 1. Dow Corning Corporation.
 - 2. GE Construction Sealants; Momentive Performance Materials, Inc.
 - 3. Percora Corporation.
 - 4. Tremco Incorporated.

2.3 NONSTAINING SILICONE JOINT SEALANTS

- A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C 1248.
- B. Silicone, Nonstaining, S, NS, 50, NT: Nonstaining, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.
 - 1. Dow Corning Corporation.
 - 2. GE Construction Sealants; Momentive Performance Materials, Inc.
 - 3. Percora Corporation.
 - 4. Tremco Incorporated.

2.4 URETHANE JOINT SEALANTS

- A. Urethane, M, NS, 25, T, NT: Multicomponent, nonsag, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade NS, Class 25, Uses T and NT.
 - 1. Basis of Design: Percora Corporation; Dynatrol II.
 - 2. Subject to compliance with the requirements of this section, available manufacturers include, but are not limited to:
 - a. BASF Corp. – Construction Chemicals.
 - b. Bostik, Inc.
 - c. Percora Corporation.

- d. Sika Corporation, Joint Sealants.

2.5 MILDEW-RESISTANT JOINT SEALANTS

- A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.
- B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.
 - 1. Dow Corning Corporation.
 - 2. GE Construction Sealants; Momentive Performance Materials, Inc.
 - 3. Percora Corporation.
 - 4. Tremco Incorporated.

2.6 BUTYL JOINT SEALANTS

- A. Butyl-Rubber-Based Joint Sealants: ASTM C 1311.
 - 1. Bostik, Inc.
 - 2. Percora Corporation.

2.7 LATEX JOINT SEALANTS

- A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
 - 1. Percora Corporation.
 - 2. Sherwin-Williams Company (The).
 - 3. Tremco Incorporated.

2.8 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), Type O (open-cell material), Type B (bicellular material with a surface skin), or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.9 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

- a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 1. Do not leave gaps between ends of sealant backings.
 2. Do not stretch, twist, puncture, or tear sealant backings.
 3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 1. Place sealants so they directly contact and fully wet joint substrates.
 2. Completely fill recesses in each joint configuration.
 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 1. Remove excess sealant from surfaces adjacent to joints.

2. The use of tooling agents is prohibited.
3. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.
4. Provide flush joint profile at locations indicated on Drawings according to Figure 8B in ASTM C 1193.
5. Provide recessed joint configuration of recess depth and at locations indicated on Drawings according to Figure 8C in ASTM C 1193.
 - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.4 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.
 1. Joint Locations:
 - a. Isolation and contraction joints in cast-in-place concrete slabs.
 - b. Joints between different materials listed above.
 - c. Other joints as indicated on Drawings.
 2. Joint Sealant: Urethane, M, NS, 25, T, NT.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
 1. Joint Locations:
 - a. Construction joints in cast-in-place concrete.
 - b. Joints between plant-precast architectural concrete units.
 - c. Control and expansion joints in unit masonry.
 - d. Joints between metal panels.
 - e. Joints between different materials listed above.
 - f. Perimeter joints between materials listed above and frames of doors, windows and louvers.

- g. Control and expansion joints in ceilings and other overhead surfaces.
 - h. Other joints as indicated on Drawings.
 - 2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- C. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
 - 1. Joint Locations:
 - a. Isolation joints in cast-in-place concrete slabs.
 - b. Other joints as indicated on Drawings.
 - 2. Joint Sealant: Urethane, M, P, 25, T, NT.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Locations:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Vertical joints on exposed surfaces of unit masonry, concrete walls and partitions.
 - c. Other joints as indicated on Drawings.
 - 2. Joint Sealant: Urethane, M, NS, 25, T, NT.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- E. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement.
 - 1. Joint Locations:
 - a. Control joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
 - c. Other joints as indicated on Drawings.
 - 2. Joint Sealant: Acrylic latex.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- F. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Locations:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - b. Other joints as indicated on Drawings.
 - 2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT.

3. Joint-Sealant Color: Multiple colors as selected by Architect from manufacturer's full range of colors.

G. Joint-Sealant Application: Concealed mastics.

1. Joint Locations:
 - a. Thresholds.
 - b. Sill plates.
 - c. Other joints as indicated on Drawings.
2. Joint Sealant: Butyl-rubber based.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 079200

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes:
 - 1. Interior and exterior custom hollow-metal doors and frames.
- B. Related Requirements:
 - 1. Division 1 Section "Construction and Demolition Waste Management."
 - 2. Division 8 Section "Security Glazing" for glass used for vision and borrowed lites.
 - 3. Division 8 Section "Door Hardware" for door hardware for hollow-metal doors.
 - 4. Division 8 Section "Automatic Door Operators" for main entry doors as noted.

1.3 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.4 COORDINATION

- A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.
- B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.
- B. Shop Drawings: Include the following:

1. Elevations of each door type.
2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
7. Details of anchorages, joints, field splices, and connections.
8. Details of accessories.
9. Details of moldings, removable stops, and glazing.
10. Details of the air barrier connected with the door frame.

C. Samples:

1. Finishes: For each type of exposed finish required, prepared on Samples of not less than 3 by 5 inches (75 by 127 mm).

D. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

1.6 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.
- B. Oversize Construction Certification: For assemblies required to be fire-rated and exceeding limitations of labeled assemblies.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow-metal doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
 1. Provide additional protection to prevent damage to factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow-metal doors and frames vertically under cover at Project site with head up. Place on minimum 4-inch- (102-mm-) high wood blocking. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Members of the Steel Door Institute (SDI) and of the Hollow Metal Manufacturers Association (HMMA) division of National Association of Architectural Metal Manufacturers or members of both, subject to compliance with the specified requirements.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Amweld Building Products, Inc.
 - 2. Ceco Door Products; an Assa Abloy Group Company.
 - 3. Curries Company; an Assa Abloy Group Company.
 - 4. Copco Door Co.
 - 5. Pioneer Industries Inc.
 - 6. Republic Builders Products.
 - 7. Steelcraft; an Allegion brand.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
 - 1. Smoke- and Draft-Control Assemblies: Provide assemblies with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.
 - 2. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
- B. Fire-Rated, Borrowed-Lite Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.
- C. Thermally Rated Door Assemblies (exterior doors): Provide door assemblies with U-factor of not more than 0.0 deg Btu/F x h x sq. ft. (2.27 W/K x sq. m) when tested according to ASTM C 518.

2.3 STEEL DOORS AND FRAMES

- A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Extra-Heavy-Duty Doors and Frames, typical for all doors and frames: SDI A250.8, Level 3; SDI A250.4, Level A.

1. Doors and side panels:

- a. Type: As indicated in the Door and Frame Schedule.
- b. Thickness: 1-3/4 inches (44.5 mm).
- c. Face: Uncoated steel sheet, minimum thickness of 0.053 inch (1.3 mm).
- d. Edge Construction: Model 2 Seamless.
- e. Edge Bevel: Provide manufacturer's standard beveled or square edges.
- f. Core: Manufacturer's standard.
- g. Provide applied trim, Curries or equal, profile similar to raised panel detail as coordinated with Architect, at Door 1V1 (Exterior Front Door) and side panels. Refer to Drawings for configuration of applied trim.
- h. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration at exterior door locations.
- i. Bottom Edges: Close bottom edges of doors where required for attachment of exterior weather stripping with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.

2. Frames:

- a. Materials: Uncoated steel sheet, minimum thickness of 0.053 inch (1.3 mm).
- b. Sidelite and Transom Frames: Fabricated from same thickness material as adjacent door frame.
- c. Construction: Full profile welded.
- d. All frames at masonry construction shall be fully grouted.
- e. All frames at metal-framed drywall construction shall be packed with mineral fiber insulation.
- f. Provide decorative frame profile, Curries "MH" or equal as coordinated with Architect, at Door 1V1 (Exterior Front Door) and side panels. Refer to Drawings for configuration.

3. Exposed Finish: Prime.

2.4 FRAME ANCHORS

A. Jamb Anchors:

1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches (610 mm) of frame height above 7 feet (2.1 m).
3. Postinstalled Expansion Anchor: Minimum 3/8-inch- (9.5-mm-) diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.

B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.

- C. Material: ASTM A 879/A 879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.
 - 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M; hot-dip galvanized according to ASTM A 153/A 153M, Class B.

2.5 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.
- D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- E. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.
- F. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
- G. Glazing: Comply with requirements in Division 8 Section "Glazing."

2.6 FABRICATION

- A. Door Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch (19 mm) beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.
- B. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.
 - 1. Sidelite and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by welding.
 - 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 - 3. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.

- a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- C. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
- 1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
 - 2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.

2.7 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
- 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory-applied finishes where spreaders are removed.
- B. Drill and tap doors and frames to receive non-templated, mortised, and surface-mounted door hardware.

3.2 INSTALLATION

- A. General: Install hollow-metal doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.
- B. Hollow-Metal Frames: Comply with SDI A250.11.
- 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.
 - a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.

- b. Install frames with removable stops located on secure side of opening.
- 2. Fire-Rated Openings: Install frames according to NFPA 80.
- 3. Floor Anchors: Secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
- 4. Solidly pack mineral-fiber insulation inside frames.
- 5. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout or mortar.
- 6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
- 7. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.
- C. Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.
 - 1. Non-Fire-Rated Steel Doors: Comply with SDI A250.8.
 - 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
 - 3. Smoke-Control Doors: Install doors according to NFPA 105.
- D. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

3.3 CLEANING AND TOUCHUP

- A. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- B. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.
- C. Factory-Finish Touchup: Clean abraded areas and repair with same material used for factory finish according to manufacturer's written instructions.
- D. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 081113

SECTION 081416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Solid-core doors with wood-veneer faces.
 - 2. Factory finishing flush wood doors.
 - 3. Factory fitting flush wood doors to frames and factory machining for hardware.

- B. Related Sections: Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:

- 1. Division 1 Section "Construction and Demolition Waste Management."
 - 2. Division 8 Section "Fire-Resistant Glazing" for glazing in fire rated door assemblies.
 - 3. Division 8 Section "Door Hardware."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of door. Include details of core and edge construction, louvers, and trim for openings. Include factory-finishing specifications.

- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:

- 1. Dimensions and locations of blocking.
 - 2. Dimensions and locations of mortises and holes for hardware.
 - 3. Dimensions and locations of cutouts.
 - 4. Undercuts.
 - 5. Requirements for veneer matching.
 - 6. Doors to be factory finished and finish requirements.
 - 7. Fire-protection ratings for fire-rated doors.

- C. Samples for Verification:

- 1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches (200 by 250 mm), for each material and finish. For each wood species and transparent finish,

provide set of three Samples showing typical range of color and grain to be expected in finished Work.

1.4 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.
- B. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.
- C. Product test certificates for acoustically rated door assemblies.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in cardboard cartons and wrap bundles of doors in plastic sheeting.
- C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 25 and 55 percent during remainder of construction period.

1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Warping (bow, cup, or twist) more than 1/4 inch (6.4 mm) in a 42-by-84-inch (1067-by-2134-mm) section.
 - b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 76.2-mm) span.
 - 2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
 - 3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain flush wood doors from single manufacturer.
- B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Masonite Architectural (formerly Algoma Hardwoods Inc.)
 - 2. Chappell Door Co.
 - 3. Eagle Plywood & Door Manufacturing, Inc.
 - 4. VT Industries (formerly Eggers Industries; Architectural Door Division.)
 - 5. Graham Wood Doors, an Assa Abloy Group Company.
 - 6. Weyerhaeuser Company.
- C. Source Limitations: Obtain flush wood doors from single manufacturer.

2.2 FLUSH WOOD DOORS, GENERAL

- A. Quality Standard: In addition to requirements specified, comply with AWI's, AWMAC's, and WI's "Architectural Woodwork Standards."
 - 1. Provide AWI Quality Certification Labels indicating that doors comply with requirements of grades specified.
 - 2. Contract Documents contain selections chosen from options in quality standard and additional requirements beyond those of quality standard. Comply with those selections and requirements in addition to quality standard.
- B. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.
- C. Fire-Rated Wood and Plastic Laminate-faced Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
 - 1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
 - 2. Cores: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
 - 3. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
 - 4. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
 - 5. Pairs: Provide formed-steel edges and astragals with intumescent seals.

- a. Finish steel edges and astragals with baked enamel same color as doors.
 - b. Finish steel edges and astragals to match door hardware (locksets or exit devices).
- D. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.
- E. Structural-Composite-Lumber-Core Doors:
 - 1. Structural Composite Lumber: WDMA I.S.10.
 - a. Screw Withdrawal, Face: 700 lbf (3100 N).
 - b. Screw Withdrawal, Edge: 400 lbf (1780 N).
- F. Mineral-Core Doors:
 - 1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
 - 2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as follows:
 - a. 5-inch (125-mm) top-rail blocking.
 - b. 5-inch (125-mm) bottom-rail blocking, in doors indicated to have protection plates.
 - c. 5-inch (125-mm) midrail blocking, in doors indicated to have armor plates.
 - d. 5-inch (125-mm) midrail blocking, in doors indicated to have exit devices.
 - 3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.
 - a. Screw-Holding Capability: 550 lbf (2440 N) per WDMA T.M.-10.

2.3 VENEER-FACED DOORS FOR TRANSPARENT FINISH

- A. Interior Solid-Core Doors:
 - 1. Grade: Custom (Grade A faces).
 - 2. Species: Red Oak.
 - 3. Cut: Plain Sliced.
 - 4. Match between Veneer Leaves: Book match.
 - 5. Assembly of Veneer Leaves on Door Faces: Running match.
 - 6. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
 - 7. Room Match: Match door faces within each separate room or area of building. Corridor-door faces do not need to match where they are separated by 10 feet (3 m) or more.
 - 8. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.
 - 9. Transom Match: Continuous match.
 - 10. Blueprint Match: Where indicated, provide doors with faces produced from same flitches as adjacent wood paneling and arranged to provide blueprint match with wood paneling.

11. Exposed Vertical and Top Edges: Same species as faces - edge Type A.
12. Core: Structural composite lumber.
13. Construction: Five plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering.
14. Construction: Seven plies, either bonded or nonbonded construction.
15. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.

2.4 LIGHT FRAMES

- A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads unless otherwise indicated.
 1. Wood Species: Same species as door faces.
 2. Profile: Manufacturer's standard shape.
 3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.
- B. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of 0.048-inch- (1.2-mm-) thick, cold-rolled steel sheet; factory primed for paint finish; and approved for use in doors of fire-protection rating indicated.

2.5 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
 1. Comply with NFPA 80 requirements for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.
 1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
 2. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.
- C. Transom and Side Panels: Fabricate matching panels with same construction, exposed surfaces, and finish as specified for associated doors. Finish bottom edges of transoms and top edges of rabbeted doors same as door stiles.
 1. Fabricate door and transom panels with full-width, solid-lumber, rabbeted, meeting rails. Provide factory-installed spring bolts for concealed attachment into jambs of metal door frames.
- D. Openings: Factory cut and trim openings through doors.
 1. Light Openings: Trim openings with moldings of material and profile indicated.

2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 "Glazing."
3. Louvers: Factory install louvers in prepared openings.

2.6 FACTORY FINISHING

- A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
 1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.
- B. Factory finish doors.
- C. Transparent Finish:
 1. Grade: Custom.
 2. Finish: WDMA TR-6 catalyzed polyurethane.
 3. Staining: As selected by Architect from manufacturer's full range.
 4. Effect: Filled finish.
 5. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and installed door frames, with Installer present, before hanging doors.
 1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Hardware: For installation, see Section 087100 "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
 1. Install fire-rated doors according to NFPA 80.
 2. Install smoke- and draft-control doors according to NFPA 105.
- C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-

rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.

1. Clearances: Provide 1/8 inch (3.2 mm) at heads, jambs, and between pairs of doors. Provide 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch (6.4 mm) from bottom of door to top of threshold unless otherwise indicated.
 - a. Comply with NFPA 80 for fire-rated doors.
 - b. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.
 2. Bevel fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock edge; trim stiles and rails only to extent permitted by labeling agency.
- D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416

SECTION 084113 - ALUMINUM-FRAMED STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Interior storefront framing.
 - 2. Interior manual-swing entrance doors and door-frame units.
- B. Related Sections: Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Division 1 Section "Construction and Demolition Waste Management."
 - 2. Division 7 Section "Joint Sealants."
 - 3. Division 8 Section "Glazing."
 - 4. Division 8 Section "Fire-Resistant Glazing."
 - 5. Division 8 Section "Security Glazing."
 - 6. Refer to Drawings for Main Office Security Transaction Window, Model SFWS as manufactured by Architectural Armor, or approved equal. Unit must be 1-hour fire rated, with fire-resistant, EN 356 security glazing and welded stainless steel counter with EI60 tray.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.

1. Include full-size isometric details of each vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:
 - a. Joinery, including concealed welds.
 - b. Anchorage.
 - c. Expansion provisions.
 - d. Glazing.
 - e. Flashing and drainage.
2. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
3. Detail glazing methods, framing and tolerances to accommodate thermal movement.

C. Samples: For each type of exposed finish required, in manufacturer's standard sizes.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.
- C. Structural-Sealant Glazing: Comply with ASTM C 1401 for design and installation of storefront systems.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Noise or vibration created by wind and thermal and structural movements.
 - c. Deterioration of metals and other materials beyond normal weathering.
 - d. Water penetration through fixed glazing and framing areas.
 - e. Failure of operating components.
 2. Warranty Period: 10 years from date of Substantial Completion.
- B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.
1. Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain all components of aluminum-framed entrance and storefront system, including framing and accessories, from single manufacturer.
- B. Basis-of-Design Product at Interior: The design for aluminum-framed systems is based on EFCO Corporation 1-3/4" x 4-1/2" Series 402 NT, Non-Thermal Storefront Framing system.
1. Provide 1/4-inch clear tempered safety glass or security glass as specified in Division 8 Section "Glazing," unless noted otherwise.
- C. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
1. EFCO Corporation.
 2. Kawneer North America, an Alcoa Company.
 3. Wausau Window and Wall Systems.

4. Architectural Window Manufacturing Corporation

2.2 FRAMING

- A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
 1. Construction: Framing members are composite assemblies of two separate extruded-aluminum components permanently bonded by an elastomeric material of low thermal conductance.
- B. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.
- C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- D. Materials:
 1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - a. Sheet and Plate: ASTM B 209 (ASTM B 209M).
 - b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
 - c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
 - d. Structural Profiles: ASTM B 308/B 308M.
 2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.
 - a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
 - b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
 - c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.3 ENTRANCE DOOR SYSTEMS

- A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.
 1. Door Construction: Minimum 0.125-inch- (3.2-mm-) thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
 - a. Overall Thickness: 1 ¼ inches at interior doors.
 2. Door Design: As indicated.

3. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.
 - a. Provide nonremovable glazing stops on outside of door.

2.4 ENTRANCE DOOR HARDWARE

- A. Entrance Door Hardware: Hardware not specified in this Section is specified in Division 8 Section "Door Hardware."
- B. General: Provide entrance door hardware and entrance door hardware sets indicated in door and frame schedule for each entrance door to comply with requirements in this Section.
 1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products.
 2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
 3. Opening-Force Requirements:
 - a. Egress Doors: Not more than 15 lbf (67 N) to release the latch and not more than 30 lbf (133 N) to set the door in motion and not more than 15 lbf (67 N) to open the door to its minimum required width.
 - b. Accessible Interior Doors: Not more than 5 lbf (22.2 N) to fully open door.
- C. Continuous-Gear Hinges: Manufacturer's standard with stainless-steel bearings between knuckles, fabricated to full height of door and frame.
- D. Mortise Auxiliary Locks: BHMA A156.5, Grade 1.
- E. Manual Flush Bolts: BHMA A156.16, Grade 1.
- F. Automatic and Self-Latching Flush Bolts: BHMA A156.3, Grade 1.
- G. Panic Exit Devices: BHMA A156.3, Grade 1, listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.
- H. Cylinders: As specified in Section 087100 "Door Hardware."
 1. Keying: Master key system. Permanently inscribe each key with a visual key control number and include notation "DO NOT DUPLICATE".
- I. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.
- J. Operating Trim: BHMA A156.6.

- K. Closers: BHMA A156.4, Grade 1, with accessories required for a complete installation, sized as required by door size, exposure to weather, and anticipated frequency of use; adjustable to comply with field conditions and requirements for opening force.
- L. Concealed Overhead Holders: BHMA A156.8, Grade 1.
- M. Surface-Mounted Holders: BHMA A156.16, Grade 1.
- N. Door Stops: BHMA A156.16, Grade 1, floor or wall mounted, as appropriate for door location indicated, with integral rubber bumper.
- O. Silencers: BHMA A156.16, Grade 1.
- P. Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch (12.7 mm).

2.5 GLAZING

- A. Glazing: Comply with Division 8 Section "Glazing."
- B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
- C. Glazing Sealants: As recommended by manufacturer.
- D. Weatherseal Sealants: ASTM C 920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and structural-sealant-glazed storefront manufacturers for this use.
 - 1. Color: Match structural sealant.

2.6 ACCESSORIES

- A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
 - 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 - 2. Reinforce members as required to receive fastener threads.
 - 3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system, fabricated from 300 series stainless steel.
- B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch (25.4 mm) that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

2.7 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:
 - 1. Profiles that are sharp, straight, and free of defects or deformations.
 - 2. Accurately fitted joints with ends coped or mitered.
 - 3. Physical and thermal isolation of glazing from framing members.
 - 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - 5. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- E. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.
- F. Storefront Framing: Fabricate components for assembly using screw-spline system.
- G. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
 - 1. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.
- H. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
- I. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
- J. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.8 ALUMINUM FINISHES

- A. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent FEVE resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General:

- 1. Comply with manufacturer's written instructions.
- 2. Do not install damaged components.
- 3. Fit joints to produce hairline joints free of burrs and distortion.
- 4. Rigidly secure nonmovement joints.
- 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
- 6. Seal perimeter and other joints watertight unless otherwise indicated.

B. Metal Protection:

- 1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
- 2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Shim subsills on substrate with properly configured sealant joint between subsill and substrate as specified in Division 7 Section "Joint Sealants" to produce weathertight installation.

D. Install components plumb and true in alignment with established lines and grades.

E. Install glazing as specified in Division 8 Section "Glazing."

F. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.

- 1. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

3.3 ERECTION TOLERANCES

A. Erection Tolerances: Install aluminum-framed entrances and storefronts to comply with the following maximum tolerances:

- 1. Plumb: 1/8 inch in 10 feet (3.2 mm in 3 m); 1/4 inch in 40 feet (6.35 mm in 12.2 m).

2. Level: 1/8 inch in 20 feet (3.2 mm in 6 m); 1/4 inch in 40 feet (6.35 mm in 12.2 m).
3. Alignment:
 - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch (12.7 mm) wide, limit offset from true alignment to 1/16 inch (1.6 mm).
 - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch (12.7 to 25.4 mm) wide, limit offset from true alignment to 1/8 inch (3.2 mm).
 - c. Where surfaces are separated by reveal or protruding element of 1 inch (25.4 mm) wide or more, limit offset from true alignment to 1/4 inch (6 mm).
4. Location: Limit variation from plane to 1/8 inch in 12 feet (3.2 mm in 3.6 m); 1/2 inch (12.7 mm) over total length.

END OF SECTION 084113

SECTION 087100
DOOR HARDWARE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hardware for wood, aluminum, and hollow metal doors.
- B. Hardware for fire-rated doors.
- C. Electrically operated and controlled hardware.
- D. Thresholds.
- E. Weatherstripping and gasketing.

1.02 RELATED REQUIREMENTS

- A. Section 081113 - Hollow Metal Doors and Frames.
- B. Section 084113 – Aluminum-Framed Storefronts.
- C. Section 081416 - Flush Wood Doors.
- D. Section 087113- Automatic Door Operators
- E. Section 260000- Electrical; refer to drawings.
- F. Section 281000 - Access Control: Electronic access control devices. Refer to drawings.

1.03 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design 2010.
- B. 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.
- C. BHMA A156.1 - Standard for Butts and Hinges 2021.
- D. BHMA A156.3 - Exit Devices 2020.
- E. BHMA A156.4 - Door Controls - Closers 2019.
- F. BHMA A156.6 - Standard for Architectural Door Trim 2021.
- G. BHMA A156.7 - Template Hinge Dimensions 2016.
- H. BHMA A156.8 - Door Controls - Overhead Stops and Holders 2021.
- I. BHMA A156.13 - Mortise Locks & Latches Series 1000 2017.
- J. BHMA A156.15 - Release Devices - Closer Holder, Electromagnetic and Electromechanical 2021.
- K. BHMA A156.16 - Auxiliary Hardware 2018.
- L. BHMA A156.18 - Materials and Finishes 2020.
- M. BHMA A156.21 - Thresholds 2019.
- N. BHMA A156.22 - Standard for Gasketing 2021.
- O. BHMA A156.26 - Standard for Continuous Hinges 2021.
- P. BHMA A156.28 - Standard for Recommended Practices for Mechanical Keying Systems 2018.
- Q. BHMA A156.36 - Auxiliary Locks 2020.
- R. BHMA A156.115 - Hardware Preparation in Steel Doors and Steel Frames 2016.
- S. BHMA A156.115W - Hardware Preparation in Wood Doors with Wood or Steel Frames 2006.
- T. DHI (H&S) - Sequence and Format for the Hardware Schedule 2019.
- U. DHI (KSN) - Keying Systems and Nomenclature 2019.

- V. ICC (IBC) - International Building Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- W. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.
- X. ITS (DIR) - Directory of Listed Products Current Edition.
- Y. MIL-STD-810 - Environmental Engineering Considerations and Laboratory Tests 2019h.
- Z. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- AA. NFPA 80 - Standard for Fire Doors and Other Opening Protectives 2022.
- BB. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives 2022.
- CC. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies 2022.
- DD. UL (DIR) - Online Certifications Directory Current Edition.
- EE. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies Current Edition, Including All Revisions.
- FF. UL 294 - Access Control System Units Current Edition, Including All Revisions.
- GG. UL 1034 - Standard for Safety Burglary-Resistant Electrical Locking Mechanisms Current Edition, Including All Revisions.
- HH. UL 1784 - Standard for Air Leakage Tests of Door Assemblies Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the manufacture, fabrication, and installation of products that door hardware is installed on.
- B. Sequence installation to ensure facility services 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; require attendance by affected installers and the following:
 - 1. Architect.
 - 2. Installer's Architectural Hardware Consultant (AHC).
 - 3. Hardware Installer.
 - 4. Owner's Security Consultant.
- D. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.
- E. Keying Requirements Meeting:
 - 1. Schedule meeting at project site prior to Contractor occupancy.
 - 2. Attendance Required:
 - a. Contractor.
 - b. Owner.
 - c. Architect.
 - d. Door Hardware Supp.
 - 3. Agenda:
 - a. Establish keying requirements.
 - b. Verify locksets and locking hardware are functionally correct for project requirements.
 - c. Verify that keying and programming complies with project requirements.
 - d. Establish keying submittal schedule and update requirements.
 - 4. Incorporate "Keying Requirements Meeting" decisions into keying submittal upon review of door hardware keying system including, but not limited to, the following:
 - a. Access control requirements.
 - b. Key control system requirements.

- c. Schematic diagram of preliminary key system.
- d. Flow of traffic and extent of security required.
- 5. 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.
- 6. Deliver established keying requirements to manufacturers.

1.05 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: A detailed listing that includes each item of hardware to be installed on each door.
 - 1. Prepared by or under supervision of Architectural Hardware Consultant (AHC) as certified by the Door & Hardware Institute (DHI).
 - 2. Comply with DHI (H&S) using door numbering scheme and hardware set numbers as indicated in Contract Documents.
 - a. Submit in vertical format.
 - 3. List groups and suffixes in proper sequence.
 - 4. Include complete description for each door listed.
 - 5. Include 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. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- E. Manufacturer's qualification statement.
- F. Installer's qualification statement.
- G. Supplier's qualification statement.
- H. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
- I. Keying Schedule:
 - 1. Submit three (3) copies of Keying Schedule in compliance with requirements established during Keying Requirements Meeting unless otherwise indicated.
- J. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- K. Project Record Documents: Record actual locations of concealed equipment, services, and conduit.
- L. Maintenance Materials and Tools: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.

1.06 QUALITY ASSURANCE

- A. Standards for Fire-Rated Doors: Maintain one copy of each referenced standard on site, for use by Architect and Contractor.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.
- C. Installer Qualifications: Company specializing in performing work of the type specified for commercial door hardware with at least three years of documented experience.

- D. Supplier Qualifications: Company with certified Architectural Hardware Consultant (AHC) as certified by the Door & Hardware Institute (DHI) to assist in work of this section.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Package hardware items individually; label and identify each package with door opening code to match door hardware schedule.

1.08 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Manufacturer Warranty: Provide manufacturer warranty against defects in material and workmanship for period indicated, from Date of Substantial Completion. Complete forms in Owner's name and register with manufacturer.
1. Closers: Limited Lifetime, minimum.
 2. Exit Devices: Five years, mechanical; One year, electrical, minimum.
 3. Mortise Locksets: Limited Lifetime, mechanical; Five years, electrical, minimum.
 4. Other Hardware: One year, minimum.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- 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. Closers:
1. Provide door closer on each exterior door, unless otherwise indicated.
 2. Provide door closer on each fire-rated and smoke-rated door.
 3. Spring hinges are not an acceptable self-closing device, unless otherwise indicated.
- D. Overhead Stops:
1. Provide stop for every swinging door, unless otherwise indicated.
 2. Overhead Stop is not required if positive stop feature is specified for door closer; positive stop feature of door closer is not an acceptable substitute for a stop, unless otherwise indicated.
 3. Overhead stop is not required if a floor or wall stop has been specified for the door.
- E. Drip Guards: Provide at head of outswinging exterior doors unless protected by roof or canopy directly overhead.
- F. Thresholds:
1. Interior Applications: Provide when specified at interior doors for transition between two different floor types, and over building expansion joints, unless otherwise indicated.
 2. Exterior Applications: Provide at each exterior door, unless otherwise indicated.
- G. Weatherstripping and Gasketing:
1. Provide weatherstripping on each exterior door at head, jambs, and meeting stiles of door pairs, unless otherwise indicated.
 2. Provide door bottom sweep on each exterior door, unless otherwise indicated.
- H. 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.
- I. See Section 281000 for additional access control system requirements.
- J. Fasteners:
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.
5. Fire-Resistance-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 PERFORMANCE REQUIREMENTS

- A. Provide door hardware products that comply with the following requirements:
 1. **Subject to compliance with public bid requirements, Greenwich Public Schools requests the use of Sargent and other Assa Abloy products as included in this specification, even if not specifically written into the Door Hardware Schedule.**
 2. Applicable provisions of federal, state, and local codes.
 - a. ICC (IBC).
 3. Accessibility: ADA Standards and ICC A117.1.
 4. Fire-Resistance-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-Resistance-Rated Doors: Listed and classified by UL (DIR), ITS (DIR), testing firm acceptable to authorities having jurisdiction, or _____ 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.
 7. Hardware Preparation for Steel Doors and Steel Frames: BHMA A156.115.
 8. Hardware Preparation for Wood Doors with Wood or Steel Frames: BHMA A156.115W.
 9. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified.

2.03 HINGES

- A. Manufacturers: Conventional butt hinges.
 1. BEST; dormakaba Group.
 2. McKinney.
 3. Hager.
 4. Bommer.
- B. Properties:
 1. Butt Hinges: As applicable to each item specified.
 - a. Standard Weight Hinges: Minimum of two (2) permanently lubricated non-detachable bearings.
 - b. Heavy Weight Hinges: Minimum of four (4) permanently lubricated bearings on heavy weight hinges.
 - c. Template screw hole locations.
 - d. Bearing assembly installed after plating.
 - e. Bearings: Exposed fully hardened bearings.
 - f. Bearing Shells: Shapes consistent with barrels.
 - g. Pins: Easily seated, non-rising pins.

- 1) Fully plate hinge pins.
 - 2) Non-Removable Pins: Slotted stainless steel screws.
 - h. UL 10C listed for fire-resistance-rated doors.
 - i. Electrified Hardware Functions: Use hinges similar to conventional hinges used at the door leaf and designed to facilitate power transfer.
- 2. Continuous Hinges: As applicable to each item specified.
 - a. Geared Continuous Hinges: As applicable to each item specified.
 - 1) Non-handed.
 - 2) Anti-spinning through-fastener.
 - 3) UL 10C listed for fire-resistance-rated doors.
 - (a) Metal Door Installation: Rated up to 90 minutes.
 - (b) Wood Door Installation: Rated up to 60 minutes.
 - 4) Sufficient size to permit door to swing 180 degrees
- C. Sizes: See Door Hardware Schedule.
 - 1. Hinge Widths: As required to clear surrounding trim.
 - 2. Sufficient size to allow 180 degree swing of door.
- D. Finishes: See Door Hardware Schedule.
 - 1. Fully polish hinges; front, back, and barrel.
- E. Grades:
 - 1. Butt Hinges: Comply with BHMA A156.1 and BHMA A156.7 for templated hinges.
 - 2. Continuous Hinges: Comply with BHMA A156.26, Grade 1.
- F. Material: Base metal as indicated for each item by BHMA material and finish designation.
- G. Types:
 - 1. Butt Hinges: Include full mortise hinges.
 - 2. Continuous Hinges: Include geared and pin and barrel hinges.
- H. Options: As applicable to each item specified.
 - 1. Provide electric power transfer (EPT) as listed in hardware sets.
- I. Quantities:
 - 1. Butt Hinges: Three (3) hinges per leaves up to 90 inches in height. Add one (1) for each additional 30 inches in height or fraction thereof.
 - a. Hinge weight and size unless otherwise indicated in hardware sets:
 - 1) For doors up to 36 inches wide and up to 1-3/4 inches thick provide hinges with a minimum thickness of 0.134 inch and a minimum of 4-1/2 inches in height.
 - 2) For doors from 36 inches wide up to 42 inches wide and up to 1-3/4 inches thick provide hinges with a minimum thickness of 0.180 inch and a minimum of 4-1/2 inches in height.
 - 2. Continuous Hinges: One per door leaf.
- J. Applications: At swinging doors.
 - 1. Provide non-removable pins at out-swinging doors with locking hardware and all exterior doors.
- K. Products:
 - 1. Butt Hinges:
 - a. Ball Bearing, Five (5) Knuckle.
 - 2. Continuous Hinges:
 - a. Aluminum geared hinges.
 - b. Pin and barrel hinges.

2.04 EXIT DEVICES

- A. Manufacturers:
 - 1. BEST, dormakaba Group.

2. Von Duprin.
3. **Sargent.**
- B. Properties:
 1. Actuation: Touchpad.
 2. Chassis:
 - a. Construction: Investment cast steel, zinc dichromate plated.
 - b. Compatibility: Standard Stile and Narrow Stile doors.
 3. Touchpads: 'T' style metal touchpads and rail assemblies with matching chassis covers end caps.
 4. Latch Bolts: Stainless steel deadlocking with 3/4 inch projection using latch bolt.
 5. Lever Design: Match project standard lockset trims.
 6. Cylinder: Include where cylinder dogging or locking trim is indicated.
 7. Strike as recommended by manufacturer for application indicated.
 8. Sound dampening on touch bar.
 9. Dogging:
 - a. Non-Fire-Resistance-Rated Devices: Cylinder dogging or less dogging.
 - b. Fire-Resistance-Rated Devices: Manual dogging not permitted.
 10. Touch bar assembly on wide style exit devices to have a 1/4 inch clearance to allow for vision frames.
 11. All exposed exit device components to be of architectural metals and "true" architectural finishes.
 12. Handing: Field-reversible.
 13. Fasteners on Back Side of Device Channel: Concealed - exposed fasteners not allowed.
 14. Vertical Latch Assemblies' Operation: Gravity, without use of springs.
- C. Grades: Complying with BHMA A156.3, Grade 1.
 1. Provide exit devices tested and certified by UL or by a recognized independent laboratory for mechanical operational testing to 10 million cycles minimum with inspection confirming Grade 1 Loaded Forces have been maintained.
- D. Code Compliance: As required by authorities having jurisdiction in the State in which the Project is located.
- E. Options:
 1. Electrified Devices:
 2. Internally mounted switch used to signal other components.
 3. MLR: Motorized latch retraction.
- F. Products:
 1. BEST 2000 series.
 2. Von Duprin 98 series.
 3. **Sargent 80 series with 19 and GL options.**

2.05 MORTISE LOCKS

- A. Manufacturers:
 1. BEST, dormakaba Group.
 2. dormakaba, dormakaba Group.
 3. Schlage.
 4. **Sargent.**
- B. Properties:
 1. Mechanical Locks: Manufacturer's standard.
 - a. Fitting modified ANSI A115.1 door preparation.
 - b. Door Thickness Coordination Fitting 1-3/4 inch to 2-1/4 inch thick doors.
 - c. Latch: Solid, one-piece, anti-friction, self-lubricating stainless steel.

- 1) Latchbolt Throw: 3/4 inch, minimum.
- d. Auxiliary Deadlatch: One piece stainless steel, permanently lubricated.
- e. Backset: 2-3/4 inch.
- f. Cylinders:
 - 1) Cylinder Core Types: Locks capable of supporting manufacturers' cores, as applicable.
 - (a) Small format interchangeable.
- g. Lever Trim:
 - 1) Functionality: Allow the lever handle to move up to 45 degrees from horizontal position prior to engaging the latchbolt assembly.
 - 2) Strength: Locksets outside locked lever designed to withstand minimum 1,400 inch-lbs of torque. In excess of that, a replaceable part will shear. Key from outside and/or inside lever will still operate lockset.
 - 3) Spindle: Designed to prevent forced entry from attacking of lever.
 - 4) Independent spring mechanism for each lever.
 - (a) Trim to be self-aligning and thru-bolted.
 - 5) Handles: Made of forged or cast brass, bronze, or stainless steel construction. Levers that contain a hollow cavity are not acceptable.
 - 6) Levers to operate a roller bearing spindle hub mechanism.
- 2. Electrified Locks: Same properties as standard locks, and as follows:
 - a. Voltage: 24 VDC.
 - b. Function: Electrically locked (Fail Safe) or unlocked (Fail Secure), as indicated for each lock in Door Hardware Schedule.
 - c. Internal request-to-exit feature.
- C. Finishes: See Door Hardware Schedule.
 - 1. Core Faces: Match finish of lockset.
- D. Grades:
 - 1. Comply with BHMA A156.13, Grade 1, Security; Grade 2.
- E. Options:
 - 1. Provide locksets made in a manufacturing facility to compliant with ISO 9001-Quality Management and ISO 14001-Environmental Management.
 - 2. Regulatory Compliance: As required by authorities having jurisdiction the State in which the Project is located.
- F. Products: Mortise locks, including standard and electrified types.
 - 1. BEST 45H series.
 - 2. dormakaba, dormakaba Group M9000 series (faculty restroom lock only).
 - 3. Schlage L9000 series.
 - 4. Sargent 8200 series.

2.06 DOOR PULLS AND PUSH PLATES

- A. Manufacturers:
 - 1. Trimco.
 - 2. **Rockwood.**
 - 3. Burns.
 - 4. Don-Jo Mfg.
- B. Properties:
 - 1. Pull Type: Straight, unless otherwise indicated.
 - 2. Push Plate Type: Flat, with square corners, unless otherwise indicated.
 - a. Edges: Beveled, unless otherwise indicated.
- C. Grades: Comply with BHMA A156.6.

D. Material: Stainless steel, unless otherwise indicated.

E. Products:

1. Push-Pull Plates.

2.07 LADDER PULLS

A. Manufacturers:

1. Trimco.
2. Rockwood.
3. Burns.
4. Don-Jo Mfg.

B. Properties:

1. Proper number of support fixings to accommodate length of pull as recommended by the manufacturer.
2. Flat tops at pulls projecting past support fittings.
3. Non-locking Ladder Pulls: Manufacturer's standard.
 - a. Bar diameter: 1-1/4 inch.
 - b. Pull Projection off Door Face: 3-23/32 inches.

C. Material: Stainless steel, unless otherwise indicated.

D. Types:

1. Offset.

E. Installation:

1. Pull Handles Mounting Style: Use single-sided - SNG or back-to-back - B2B mounting methods, as appropriate for item specified and in coordination with door type and other hardware items.

F. Products:

1. Trimco AP400 series.

2.08 CLOSERS

A. Manufacturers:

1. dormakaba commercial, dormakaba Group.
2. LCN.
3. Sargent.

B. Properties:

1. Surface Mounted Closers: Manufacturer's standard.
 - a. Construction: Cast iron.
 - b. Maximum Projection from Face of Door: 2-7/16 inches.
 - c. Mechanism: Separate tamper-resistant adjusting valves for closing and latching speeds.
 - 1) Include delayed action feature.
 - d. Hydraulic Fluid: All-weather type.
 - e. Arm Assembly: Standard for product specified.
 - 1) Material: Steel.
 - 2) Include hold-open, integral stop, or spring-loaded stop feature, as specified in Door Hardware Schedule.
 - 3) Parallel arm to be a heavy-duty rigid arm.
 - f. Covers:
 - 1) Type: Standard for product selected.
 - (a) Full.
 - 2) Material: Plastic.
 - 3) Finish: Painted.

- C. Grades:
 - 1. Closers: Comply with BHMA A156.4, Grade 1.
 - a. Underwriters Laboratories Compliance:
 - 1) Product Listing: UL (DIR) and ULC for use on fire-resistance-rated doors.
- D. Code Compliance: As required by authorities having jurisdiction in the State in which the Project is located.
 - 1. Devices listed with California Department of Forestry and Fire Protection, Office of the State Fire Marshal.
- E. Types:
 - 1. Rack-and-pinion, surface-mounted. 1-1/2 inches minimum bore.
- F. Installation:
 - 1. Mounting: Includes surface mounted installations.
 - 2. Mount closers on non-public side of door and stair side of stair doors unless otherwise noted in hardware sets.
 - 3. At outswinging exterior doors, mount closer on interior side of door.
 - 4. Provide adapter plates, shim spacers, and blade stop spacers as required by frame and door conditions.
- G. Products:
 - 1. Surface Mounted:
 - a. dormakaba commercial; dormakaba Group QDC100 series.
 - b. LCN 4040XP series.
 - c. Sargent 280 series, with no PRV.

2.09 OVERHEAD STOPS

- A. Manufacturers:
 - 1. Architectural Builders Hardware Mfg (ABH).
 - 2. Rixson.
 - 3. Glynn Johnson.
- B. Properties:
 - 1. Stop Settings: At 90 degrees opening.
 - a. Adjustable friction tension.
- C. Sizes: Manufacturer's standard for the application.
- D. Finishes:
 - 1. Arms and Brackets: Zinc-plated.
- E. Grades: As applicable to item specified.
 - 1. Comply with BHMA A156.8, Grade 1.
- F. Underwriters Laboratories Compliance:
 - 1. Product Listing: UL (DIR) and ULC for use on fire-resistance-rated doors.
- G. Material: Base metal as indicated for each item by BHMA material and finish designation.
 - 1. Track Channel: Extruded aluminum alloy.
 - 2. Slide Block: Machined from solid brass alloy.
- H. Types:
 - 1. Concealed.
- I. Products:
 - 1. Concealed Overhead Stops:
 - a. ABH: Heavy Duty 1020 SL series.

2.10 PROTECTION PLATES

- A. Manufacturers:

1. Trimco.
 2. Burns.
 3. Don-Jo Mfg.
- B. Properties:
1. Plates:
 - a. 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: 36 inches high by 1 inch less door width (LDW) on push side of door.
 - b. Kick Plates: Provide along bottom edge of push side of every wood door with closer, except aluminum storefront and glass entry doors, unless otherwise indicated.
 - 1) Size: 10 inches high by 2 inch less door width (LDW) on push side of door and 1 inch less LDW on pull side of door.
 - c. Edges: Beveled, on four (4) unless otherwise indicated.
- C. Grades: Comply with BHMA A156.6.
- D. Material: As indicated for each item by BHMA material and finish designation.
1. Metal Properties: Stainless steel.
 - a. Metal, Standard Duty: Thickness 0.050 inch, minimum.
- E. Installation:
1. Fasteners: Countersunk screw fasteners
- F. Products:
1. Protection Plates.

2.11 STOPS

- A. Manufacturers:
1. Trimco.
 2. Burns.
 3. Don-Jo Mfg.
- B. General: Provide overhead stop/holder when wall or floor stop is not feasible.
- C. Grades:
1. Wall Bumpers and Floor Stops: Comply with BHMA A156.16 and Resilient Material Retention Test as described in this standard.
- D. Material: Base metal as indicated for each item by BHMA material and finish designation.
- E. Types:
1. Wall Bumpers: Bumper, concave, wall stop.
 2. Floor Stops: Provide with bumper floor stop.
- F. Installation:
1. Non-Masonry Walls: Confirm adequate wall reinforcement has been installed to allow lasting installation of wall bumpers.
- G. Products:
1. Wall Bumpers.
 2. Floor Stops.

2.12 ELECTROMAGNETIC DOOR HOLDERS

- A. Manufacturers:
1. Architectural Builders Hardware Mfg (ABH).
 2. dormakaba; dormakaba Group.
 3. LCN.
- B. Properties:
1. Holding Force, Standard Duty: 40 lbs-force, minimum.

2. Power Loss Status: Fail safe; door released to close.
 3. Life Safety Interface: With fire detectors, fire-alarm system, and smoke detectors for fire-resistance-rated door assemblies.
- C. Grades: Comply with BHMA A156.15.
- D. Types: Wall mounted, single unit, standard duty, with strike plate attached to door.
- E. Options: As applicable to each item specified.
1. Voltage: 24 VDC.
- F. Products:
1. ABH 2100 series.
 2. dormakaba; dormakaba Group EM series.
 3. LCN SEM7800 series

2.13 THRESHOLDS

- A. Manufacturers:
1. National Guard Products, Inc.
 2. Reese.
 3. Zero International.
- B. Properties:
1. Threshold Surface: Fluted horizontal grooves across full width.
- C. Grades: Thresholds: Comply with BHMA A156.21.
- D. Material: Base metal as indicated for each item by BHMA material and finish designation.
- E. Types: As applicable to project conditions. Provide barrier-free type at every location where specified.
1. Saddle Thresholds: Without thermal break.
 2. Bumper Seal Thresholds with Gasket: Use TPV gaskets.
- F. Products:
1. Thresholds.

2.14 WEATHERSTRIPPING AND GASKETING

- A. Manufacturers:
1. National Guard Products, Inc.
 2. Reese.
 3. Zero International.
- B. Properties:
1. Weatherstripping Air Leakage Performance: Not exceeding 0.3 cfm/sq ft of door opening at 0.3 inches of water pressure differential for single doors, and 0.5 cfm/sq ft of door area at 0.3 inches of water pressure differential for double doors for gasketing other than smoke control, as tested according to ASTM E283/E283M; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.
 2. Adhesive-Backed Perimeter Gasketing: Silicone gasket material applied to frame with self- adhesive.
 3. Rigid, Housed, Perimeter Gasketing: Nylon brush, silicone or neoprene gasket material held in place by aluminum housing; fastened to frame stop with screws.
 4. Overlapping Astragals for Meeting Stiles: Neoprene strip gasket material held in place by aluminum housing and overlapping when doors are closed; mounted to face of meeting stile with screws; surface mounted to door.
 5. Door Sweeps: Nylon brush gasket material held in place by flat aluminum housing or flange; surface mounted to face of door with screws.

- 6. Door Shoes: Thermoplastic elastomer gasket material held in place by metal retainer; mounted to bottom edge of door with screws.
 - a. Mounting: Surface mounted on bottom edge of door.
- 7. Automatic Door Bottoms: Sponge neoprene or silicone gasket material held in place by aluminum housing that automatically drops to form seal when door is closed.
 - a. Mounting: Surface mounted with screws on bottom edge of door.
- C. Grades: Comply with BHMA A156.22.
- D. Products:
 - 1. Weatherstripping: See Door Hardware Schedule.
 - 2. Smoke Seals: See Door Hardware Schedule.
 - 3. Meeting Stile Seals: See Door Hardware Schedule.
 - 4. Door Bottom Seals:
 - a. Door Sweeps: See Door Hardware Schedule.
 - b. Door Shoes: See Door Hardware Schedule.
 - c. Automatic Door Bottoms: See Door Hardware Schedule.

2.15 MISCELLANEOUS ITEMS

- A. Manufacturers:
 - 1. Trimco.
 - 2. Burns.
 - 3. Don-Jo Mfg.
- B. Properties:
 - 1. Silencers: Provide at equal locations on door frame to mute sound of door's impact upon closing.
 - a. Single Door: Provide three on strike jamb of frame.
 - b. Pair of Doors: Provide two on head of frame, one for each door at latch side.
 - c. Material: Rubber, gray color.
- C. Products:
 - 1. Silencers.

2.16 ELECTRIFIED HARDWARE

- A. Manufacturers:
 - 1. BEST, dormakaba Group.
 - 2. dormakaba; dormakaba Group.
 - 3. RCI; dormakaba Group.
 - 4. Von Duprin.
 - 5. Sargent.
- B. Properties:
 - 1. Power Supply Units: Manufacturer's standard.
 - a. Regulatory Compliance:
 - 1) United States Compliance:
 - (a) UL listed for Class II Output.
 - (b) Comply with UL 294 Standards incorporating enhanced Access Control communications capabilities.
 - b. Enclosures: Lockable NEMA Type 1, with hinged cover and knockouts.
 - c. Power: 24 VAC, 10 Amp; field-selectable.
 - d. Emergency Release Terminals: Designed to release devices upon activation of fire alarm system.
 - e. Auxiliary contacts for remote signaling.
 - f. User-selectable time delay from 0 to 4 minutes.
 - g. Fire Alarm System Interface: Standard.

- 1) Fire alarm terminal with green LED indicating power is available.
 - h. Output Distribution Board with indicator LEDs.
 - i. On/Off LED power indicator.
- 2. Power Transfers: Manufacturer's standard.
 - a. Mortised Type with Wires & Connectors:
 - 1) Listed by UL and ULC.
 - 2) Stainless steel housing and spring conduit.
 - 3) Wire Harness: Pre-installed, twelve wire, equipped with ten (10) 24 gauge wires and two 18 gauge wires.
 - 4) Accommodate 180 degree door swing.
 - 5) Quick-Connect Plugs: Pre-installed.
- 3. Wire Harnesses: Of sufficient length, with quick connectors.
 - a. Wire Harness End Connection to Power Supply or Junction Box: One end with bare leads.
- C. Products:
 - 1. Power Supplies:
 - a. BEST RPSMLR2.
 - b. dormakaba, dormakaba Group DKPS series.
 - 2. Power Transfers:
 - a. BEST EPT-12C.
 - 3. Wire Harnesses:
 - a. BEST wire harnesses.

2.17 KEYS AND CORES

- A. Manufacturers:
 - 1. BEST, dormakaba Group.
 - 2. Substitutions: Not permitted.
- B. Properties: Complying with guidelines of BHMA A156.28.
 - 1. Provide small format interchangeable core.
 - 2. Provide Patented Medeco keys and cores in compliance with Greenwich Public Schools' keying standards and as required to match existing keying in the building.
 - 3. Provide keying information in compliance with DHI (KSN) standards.
 - 4. Keying Schedule: Arrange for a keying meeting, with Architect, Owner and hardware supplier, and other involved parties to ensure locksets and locking hardware, are functionally correct and keying complies with project requirements.
 - 5. Keying: Master keyed.
 - 6. Include construction keying and control keying with removable core cylinders.
 - 7. Supply keys in following quantities:
 - a. Master Keys: 4 each.
 - b. Construction Master Keys: 6 each.
 - c. Construction Keys: 15 each.
 - d. Construction Control Keys: 2 each.
 - e. Control Keys if New System: 2 each.
 - 8. Provide key collection envelopes, receipt cards, and index cards in quantity suitable to manage number of keys.
 - 9. Deliver keys with identifying tags to Owner by security shipment direct from manufacturer.
 - 10. Permanent Keys and Cores: Stamped with applicable key marking for identification. Do not include actual key cuts within visual key control marks or codes. Stamp permanent keys "Do Not Duplicate."
 - 11. Include installation of permanent cores and return construction cores to hardware supplier. Construction cores and keys to remain property of hardware supplier.

- C. Products:
 - 1. Patented:
 - a. CORMAX.

2.18 FINISHES

- A. Finishes: Provide door hardware of same finish, unless otherwise indicated.
 - 1. Finish: 630; satin stainless steel, with stainless steel 3000 series base material (former US equivalent 32D), 652; satin chromium plated over nickel, with steel base material (former US equivalent 26D), and 689; aluminum painted, with any base material (former US equivalent US28); BHMA A156.18.

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. Correct all defects prior to proceeding with installation.
- C. 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.
 - 1. Prior to installation of hardware, schedule and hold a meeting for the purpose of instructing installers on proper installation and adjustment of finish hardware. Representatives of locks, exit devices, closers, automatic operators, and electrified hardware shall conduct training; provide at least 10 days' notice to representatives. After training a letter of compliance, indicating when the training was held and who was in attendance, shall be sent to the Architect.
- B. Hardware will be installed by qualified tradesmen, skilled in the application of commercial grade hardware. For technical assistance, if necessary, installers may contact the manufacturer's rep for the item in question, as listed in the hardware schedule.
- C. Mount hardware units at heights indicated in "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute (DHI).
- D. Install hardware using the manufacturer's fasteners provided. Drill and tap all screw holes located in metallic materials. Do not use "Riv-Nuts" or similar products.
- E. Install hardware on fire-rated doors and frames in accordance with applicable codes and NFPA 80.
- F. Install hardware for smoke and draft control doors in accordance with NFPA 105.
- G. Use templates provided by hardware item manufacturer.
- H. Do not install surface mounted items until application of finishes to substrate are fully completed.
- I. Wash down masonry walls and complete painting or staining of doors and frames.
- J. Complete finish flooring prior to installation of thresholds.
- K. 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.
- L. Include in installation for existing doors and frames any necessary field modification and field preparation of doors and frames for new hardware. Provide necessary fillers, reinforcements, and fasteners for mounting new hardware and to cover existing door and frame preparations.

3.03 FIELD QUALITY CONTROL

- A. Perform field inspection and testing under provisions of Section 014000 - Quality Requirements.

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.

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 activities.
- 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.

Option list:

<u>Code</u>	<u>Description</u>
4	1-3/4" Door Thickness
B4E-HEAVY-KP	BEVELED 4 EDGES - KICK PLATES
BF	Barrier Free
C	QUICK CONNECT WIRING OPTION
CSK	COUNTER SINKING OF KICK and MOP PLATES
E	Thru-Bolted
EPT PREP	EPT Prep (full mortise)
FL	Fire Exit Hardware
LBR	LESS BOTTOM ROD
LD	Less Dogging
MLR	MOTORIZED LATCH RETRACTION
NRP	NON REMOVEABLE PIN STD/HEAVY WT HINGE
R	Full Size Rounded Plastic Cover
RQE	REQUEST TO EXIT
TS	TOUCHBAR MONITORING SWITCH
VIB	Double Visual Indicator Option

Finish List:

<u>Code</u>	<u>Description</u>
26D	Satin Chrome
32D	Satin Stainless Steel
626	Satin Chromium Plated
630	Satin Stainless Steel
689	Aluminum Painted
AL	Aluminum
GR	Grey
S1	Sprayed Aluminum Finish

Manufacturers List:

<u>Code</u>	<u>Name</u>
AB	ABH Manufacturing Inc.
BE	Best Access Systems
DM	Dorma Door Controls
NA	National Guard
PR	BEST Precision Exit Devices
RC	RCI
SH	dormakaba Commercial Hardware
ST	BEST Hinges and Sliding
TR	Trimco

Hardware Sets:

Set #01 - CORRIDOR - SINGLE - FIRE EXIT HARDWARE

3	Butt Hinge	CB168 NRP SERIES AS SPECIFIED	26D	ST
1	Exit Device	FL 2103 X 4903A	630	PR
1	Rim Cylinder	AS REQUIRED	626	BE
1	Magnetic Hold Open	2100 SERIES (EXTENSIONS/ARMATURES AS REQ.)	S1	AB
1	Door Closer	QDC115 BF R	689	SH
1	Kick Plate	K0050 10" X 2" LDW B4E-HEAVY-KP CSK	630	TR
1	Door Stop	1211/1270WV AS REQUIRED	626	TR
1	Smoke Seal	5020 CL (HEADER ONLY - SINGLE)		NA
2	Smoke Seal	5020 CL (JAMBS ONLY)		NA

NOTE: ALL WIRING AND CONNECTIONS BY DIVISION 26. COORDINATE PLACEMENT OF MAGNETIC HOLDER WITH DIVISION 26.

OPERATIONAL DESCRIPTION:

DOOR NORMALLY HELD OPEN BY MAGNETIC HOLDER. MAGNETIC HOLDER TO BE CONNECTED TO BUILDING'S FIRE/SMOKE ALARM SYSTEM TO RELEASE IMMEDIATELY UPON ACTIVATION

Set #02 - EXTERIOR - ENTRY- CR/INTERCOM - AUTO OPERATOR

1	Continuous Hinge	661HD UL EPT PREP	AL	ST
1	Exit Device	C MLR TS 2103 CA-03 LD	630	PR
1	Rim Cylinder	AS REQUIRED	626	BE
1	Offset Door Pull	AP423 40" O.A. 4 E	630	TR
1	Auto Operator/Accessories	SPECIFIED/PROVIDED UNDER SECTION 087113		
1	Overhead Stop	CONCEALED HEAVY DUTY 1020 SL SERIES	US32D	
	AB			
1	Door Contact	PROVIDED/SPECIFIED BY SECURITY VENDOR		
1	Power Supply	RPSMLR2		PR
1	Harness	WH-6E		ST
1	Harness	WHXX-P (LENGTH AS REQUIRED)		ST
1	Card Reader/Intercom	EXISTING TO REMAIN		
1	Power Transfer	EPT-12C	628	PR
1	Door Sweep	C627 A (DOOR WIDTH)		NA
1	Perimeter Seal	706 E (HEAD & JAMBS - SINGLE)		NA
1	Threshold - Bumper Seal	1/2" HIGH X JAMB DEPTH X OPENING WIDTH - SINGLE	AL	NA

NOTE: ALL WIRING AND CONNECTIONS BY DIVISION 26 & 28. AUTO OPERATOR TO BE MOUNTED ON PUSH SIDE OF DOOR.

OPERATIONAL DESCRIPTION:

IMMEDIATE EGRESS ALWAYS ALLOWED. DOOR CAN BE MANUALLY OR AUTOMATICALLY OPERATED. ACCESS CONTROL SYSTEM TO RETRACT AND HOLD EXIT DEVICE LATCHBOLT AND ENABLE EXTERIOR AUTOMATIC OPERATOR ACTUATOR. DOOR CAN BE MANUALLY PULLED OPEN OR AUTOMATICALLY OPERATED. INTERIOR ACTUATOR TO SIGNAL AUTOMATIC OPERATOR TO OPEN DOOR. LOCATE ACTUATORS AS DIRECTED BY ARCHITECT.

SECURE OPERATION:

ACCESS CONTROL SYSTEM TO RELEASE EXIT DEVICE LATCHBOLT AND TAKE CONTROL OF EXTERIOR ACTUATOR TO CONTROL ENTRY. IMMEDIATE EGRESS ALWAYS ALLOWED. AUTOMATIC OPERATION BY PUSHING INTERIOR ACTUATOR WHICH WILL RETRACT EXIT DEVICE LATCHBOLT THEN SIGNAL AUTOMATIC OPERATOR TO OPEN DOOR. ACCESS BY KEY OR BY CARD READER. CARD READER WILL RETRACT EXIT DEVICE LATCHBOLT AND ALLOW ACCESS, AND TEMPORARILY ENABLE EXTERIOR ACTUATOR TO ALLOW AUTOMATIC OPERATION. REQUEST TO EXIT AND DOOR CONTACT TO BE CONNECTED TO BUILDING'S SECURITY SYSTEM.

Set #03 - INTERIOR VEST. - CARD READER/AUTO OPERATOR

1	Continuous Hinge	661HD UL EPT PREP	AL	ST
1	Exit Device	C FL MLR TS 2103 CA-03	630	PR
1	Rim Cylinder	AS REQUIRED	626	BE
1	Offset Door Pull	AP423 40" O.A. 4 E	630	TR
1	Auto Operator/Accessories	SPECIFIED/PROVIDED UNDER SECTION 087113		
1	Overhead Stop	CONCEALED HEAVY DUTY 1020 SL SERIES	US32D	
	AB			
1	Card Reader	PROVIDED/SPECIFIED BY SECURITY VENDOR		
1	Door Contact	PROVIDED/SPECIFIED BY SECURITY VENDOR		
1	Power Supply	RPSMLR2		PR
1	Harness	WH-6E		ST
1	Harness	WHXX-P (LENGTH AS REQUIRED)		ST
1	Power Transfer	EPT-12C	628	PR
1	Door Seals	PROVIDED AS PART OF DOOR/FRAME ASSEMBLY		

NOTE: ALL WIRING AND CONNECTIONS BY DIVISION 26 & 28. AUTO OPERATOR TO BE MOUNTED ON PULL SIDE OF DOOR.

OPERATIONAL DESCRIPTION:

IMMEDIATE EGRESS ALWAYS ALLOWED. DOOR CAN BE MANUALLY OR AUTOMATICALLY OPERATED. ACCESS CONTROL SYSTEM TO RETRACT AND HOLD EXIT DEVICE LATCHBOLT AND ENABLE VESTIBULE AUTOMATIC OPERATOR ACTUATOR. DOOR CAN BE MANUALLY PULLED OPEN OR AUTOMATICALLY OPERATED. CORRIDOR ACTUATOR TO SIGNAL AUTOMATIC OPERATOR TO OPEN DOOR. LOCATE ACTUATORS AS DIRECTED BY ARCHITECT.

SECURE OPERATION:

ACCESS CONTROL SYSTEM TO RELEASE EXIT DEVICE LATCHBOLT AND TAKE CONTROL OF VESTIBULE ACTUATOR TO CONTROL ENTRY. IMMEDIATE EGRESS ALWAYS ALLOWED. AUTOMATIC OPERATION BY PUSHING CORRIDOR ACTUATOR WHICH WILL RETRACT EXIT DEVICE LATCHBOLT THEN SIGNAL AUTOMATIC OPERATOR TO OPEN DOOR. ACCESS BY KEY OR BY CARD READER. CARD READER WILL RETRACT EXIT DEVICE LATCHBOLT AND ALLOW ACCESS, AND TEMPORARILY ENABLE VESTIBULE ACTUATOR TO ALLOW AUTOMATIC OPERATION. REQUEST TO EXIT AND DOOR CONTACT TO BE CONNECTED TO BUILDING'S SECURITY SYSTEM.

Set #04 - SINGLE - WAITING - REMOTE BUZZ IN

2	Butt Hinge	CB168 NRP SERIES AS SPECIFIED	26D	ST
1	Electric Hinge	CECB168-12C SERIES AS REQUIRED	26D	ST
1	Electric Lock - Fail Secure	45HW-7DEU15R C RQE	626	BE
1	Door Closer	QDC113 BF R	689	SH
1	Kick Plate	K0050 8" X 2" LDW B4E-HEAVY-KP CSK	630	TR

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1	Card Reader	PROVIDED/SPECIFIED BY SECURITY VENDOR	
1	Door Contact	PROVIDED/SPECIFIED BY SECURITY VENDOR	
1	Harness	WH-192	ST
1	Harness	WH-6E	ST
1	Harness	WHXX-P (LENGTH AS REQUIRED)	ST
1	Power Supply	DKPS-2A	RC
1	Remote Release	PROVIDED/SPECIFIED BY SECURITY VENDOR	
1	Door Seals	PROVIDED AS PART OF DOOR/FRAME ASSEMBLY	
3	Silencer	1229A	GR TR

NOTE: ALL WIRING AND CONNECTIONS BY DIVISION 26 & 28.

OPERATIONAL DESCRIPTION:

IMMEDIATE EGRESS ALWAYS ALLOWED. ACCESS BY KEY, CARD READER OR BY REMOTE RELEASE. SIGNAL FROM CARD READER OR REMOTE RELEASE WILL UNLOCK LOCKSET AND ALLOW ACCESS. REQUEST TO EXIT AND DOOR CONTACT TO BE CONNECTED TO BUILDING'S SECURITY SYSTEM.

Set #05 - SINGLE - WAITING - REMOTE BUZZ IN

2	Butt Hinge	CB179 SERIES AS SPECIFIED	26D ST
1	Electric Hinge	CECB179-12C SERIES AS SPECIFIED	26D ST
1	Electric Lock - Fail Secure	45HW-7DEU15R C RQE	626 BE
1	Door Closer	QDC113 BF R	689 SH
1	Kick Plate	K0050 8" X 2" LDW B4E-HEAVY-KP CSK	630 TR
1	Card Reader	PROVIDED/SPECIFIED BY SECURITY VENDOR	
1	Door Contact	PROVIDED/SPECIFIED BY SECURITY VENDOR	
1	Harness	WH-192	ST
1	Harness	WH-6E	ST
1	Harness	WHXX-P (LENGTH AS REQUIRED)	ST
1	Power Supply	DKPS-2A	RC
1	Remote Release	PROVIDED/SPECIFIED BY SECURITY VENDOR	
3	Silencer	1229A	GR TR

NOTE: ALL WIRING AND CONNECTIONS BY DIVISION 26 & 28.

OPERATIONAL DESCRIPTION:

IMMEDIATE EGRESS ALWAYS ALLOWED. ACCESS BY KEY, CARD READER OR BY REMOTE RELEASE. SIGNAL FROM CARD READER OR REMOTE RELEASE WILL UNLOCK LOCKSET AND ALLOW ACCESS. REQUEST TO EXIT AND DOOR CONTACT TO BE CONNECTED TO BUILDING'S SECURITY SYSTEM.

Set #06 - SINGLE - MAIN OFFICE - CARD READER

2	Butt Hinge	CB179 NRP SERIES AS SPECIFIED	26D ST
1	Electric Hinge	CECB179-12C SERIES AS SPECIFIED	26D ST
1	Electric Lock - Fail Secure	45HW-7DEU15R C RQE	626 BE
1	Door Closer	QDC113 BF R	689 SH
1	Kick Plate	K0050 8" X 2" LDW B4E-HEAVY-KP CSK	630 TR
1	Card Reader	PROVIDED/SPECIFIED BY SECURITY VENDOR	
1	Door Contact	PROVIDED/SPECIFIED BY SECURITY VENDOR	
1	Harness	WH-192	ST
1	Harness	WH-6E	ST
1	Harness	WHXX-P (LENGTH AS REQUIRED)	ST
1	Power Supply	DKPS-2A	RC
3	Silencer	1229A	GR TR

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ADA RENOVATIONS PHASE I & II
GREENWICH, CT**

NOTE: ALL WIRING AND CONNECTIONS BY DIVISION 26 & 28.

OPERATIONAL DESCRIPTION:

IMMEDIATE EGRESS ALWAYS ALLOWED. ACCESS BY KEY, OR BY CARD READER. SIGNAL FROM CARD READER WILL UNLOCK LOCKSET AND ALLOW ACCESS. REQUEST TO EXIT AND DOOR CONTACT TO BE CONNECTED TO BUILDING'S SECURITY SYSTEM.

Set #07 - SINGLE - OFFICE LOCK - KITCHEN/OFFICE

3	Butt Hinge	CB179 SERIES AS SPECIFIED	26D	ST
1	Office Lock	45H-7AT15R	626	BE
1	Door Closer	QDC111 BF R	689	SH
1	Kick Plate	K0050 8" X 2" LDW B4E-HEAVY-KP CSK	630	TR
1	Door Stop	1211/1270WV AS REQUIRED	626	TR
3	Silencer	1229A	GR	TR

Set #08 - SINGLE - MAIN OFFICE - STAFF TOILET

3	Butt Hinge	CB179 SERIES AS SPECIFIED	26D	ST
1	Privacy Set	45H-0L15R VIB	626	BE
1	Door Closer	QDC111 BF R	689	SH
1	Kick Plate	K0050 8" X 2" LDW B4E-HEAVY-KP CSK	630	TR
1	Door Stop	1211/1270WV AS REQUIRED	626	TR
3	Silencer	1229A	GR	TR

Set #09 - SINGLE - BOYS/GIRLS TOILET - PASSAGE SET

3	Hinges	CB199 SERIES AS SPECIFIED	630	ST
1	Passage Set	45H-0N15R	626	BE
1	Door Closer	QDC113 BF R	689	SH
1	Kick Plate	K0050 8" X 2" LDW B4E-HEAVY-KP CSK	630	TR
3	Silencer	1229A	GR	TR

Set #10 - SINGLE - STAFF TOILET AT CORRIDOR

3	Butt Hinge	CB179 NRP SERIES AS SPECIFIED	26D	ST
1	Faculty Restroom Lock	M1986T LRA	626	DM
1	Cormax Core	AS REQUIRED	626	BE
1	Door Closer	QDC113 BF R	689	SH
1	Kick Plate	K0050 8" X 2" LDW B4E-HEAVY-KP CSK	630	TR
3	Silencer	1229A	GR	TR

Set #11 - SINGLE - OFFICE LOCK - KITCHEN

3	Butt Hinge	CB179 NRP SERIES AS SPECIFIED	26D	ST
1	Office Lock	45H-7AT15R	626	BE
1	Door Closer	QDC113 BF R	689	SH
1	Kick Plate	K0050 8" X 2" LDW B4E-HEAVY-KP CSK	630	TR
3	Silencer	1229A	GR	TR

Set #12 - SINGLE - STOREROOM LOCK - ROOF ACCESS

3	Butt Hinge	CB179 NRP SERIES AS SPECIFIED	26D	ST
1	Storeroom Lock	45H-7D15R	626	BE
1	Door Closer	QDC113 BF R	689	SH
1	Kick Plate	K0050 8" X 2" LDW B4E-HEAVY-KP CSK	630	TR
3	Silencer	1229A	GR	TR

END OF SECTION

SECTION 087113
AUTOMATIC DOOR OPERATORS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This section includes the following types of automatic door operators:
 - 1. Low-energy door operators for swinging doors.
- B. Related Sections:
 - 1. Division 7 Sections for caulking to the extent not specified in this section.
 - 2. Division 8 Sections for "Aluminum-Framed Entrances and Storefronts" for entrances furnished and installed separately in Division 8 Section.
 - 3. Division 8 Section "Door Hardware" for hardware to the extent not specified in this section.
 - 4. Division 8 Section "Glazing" for materials and installation requirements of glazing for automatic entrances.
 - 5. Division 26 and 28 Sections for electrical connections including conduit and wiring for automatic entrance operators and access-control devices.

1.3 REFERENCES

- A. References: Comply with the version year adopted by the Authority Having Jurisdiction.
 - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
 - 2. ICC/IBC - International Building Code.
 - 3. CUL – Approved for use in Canada.
 - 4. NFPA 70 - National Electrical Code.
 - 5. NFPA 80 - Fire Doors and Windows.
 - 6. NFPA 101 - Life Safety Code.
 - 7. NFPA 105 - Installation of Smoke Door Assemblies.
- B. American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA).
 - 1. ANSI/BHMA A156.19 Standards for Power Assist and Low Energy Power Operated Doors.
- C. Underwriters Laboratories (UL).
 - 1. UL10C – Positive Pressure Fire Tests of Door Assemblies.
 - 2. UL 325 - Standard for Safety for Door, Drapery, Gate, Louver, and Window Operators and Systems.

- D. American Association of Automatic Door Manufacturers (AAADM).
- E. American Society for Testing and Materials (ASTM).
 - 1. ASTM B221 Standard Specification for Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.
 - 2. ASTM B209 Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate.
- F. American Architectural Manufacturers Association (AAMA).
 - 1. AAMA 611 Voluntary Specification for Anodized Architectural Aluminum.
- G. National Association of Architectural Metal Manufacturers (NAAMM).
 - 1. Metal Finishes Manual for Architectural Metal Products.
- H. International Code Council (IBC).
 - 1. IBC: International Building Code Building Code.

1.4 DEFINITIONS

- A. Activation device: Device that, when actuated, sends an electrical signal to the door operator to initiate the door operation.
- B. Monitored Safety Devices: A tested system that works in conjunction with the automatic door control that detects the presence of a person or an object within a zone where contact could occur and provides a signal to stop the movement of the door.
- C. AAADM: American Association of Automatic Door Manufacturers.
- D. Operating ambient Temperature Range: 5 Degrees F to plus 122 degrees F (minus 15 C to 50 degrees C).
- E. For automatic door terminology, refer to ANSI/BHMA A 156.19 for definitions of terms.

1.5 PERFORMANCE REQUIREMENTS

- A. General: Provide automatic doors that have been designed and fabricated to comply with specified performance requirements, as demonstrated by testing manufacturers corresponding systems.
- B. Compliance:
 - 1. ICC/IBC International Building Code
 - 2. ANSI/BHMA A 156.19 American National Standard for Power Operated Doors Pedestrian Doors.
 - 3. UL 325 Listed
 - 4. NFPA 70 National Electrical Code.
 - 5. NFPA 101 Life Safety Code
 - 6. CUL Approved for use in Canada
 - 7. UL Listed Fire Door Operator with Automatic Closer
- C. Automatic Door equipment accommodates medium to heavy pedestrian traffic.

- D. Opening Force Requirements:
 - 1. Power-Operated swinging doors shall open with a manual force not to exceed 30 lbf (133N) to set the door in motion and 15 lbf to fully open the door with force applied at 1" (25mm) from the latched edge of the door. The required force to prevent a stopped door from opening or closing shall exceed 15 lbf (67N) measured 1" (25mm) from the latch edge of the door at any point during the opening or closing.
- E. Closing Time:
 - 1. Door operators shall be field adjustable to close 90 degrees to 10 degrees in 3 seconds or longer per ANSI/BHMA A 156.19 standard.
 - 2. Door shall be field adjusted to close from 10 degrees to fully closed position in not less than 1.5 seconds.

1.6 SUBMITTALS

- A. Comply with Division 01 – Submittal Procedures.
- B. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles fabrication, operational descriptions and finishes.
- C. Shop Drawings: For automatic entrances. Include plans, elevations, sections, details, hardware mounting heights, additional accessories and attachments to other work.
- D. Samples: color samples of exposed finish as required.
- E. Informational Submittals: Manufacturers product information and applicable sustainability program credits that are available towards a LEED rated product certification.
 - 1. Credit MR 4.1 and 4.2: Manufacture's or fabricator's certificate indicating percentage of post-consumer recycled content by weight and pre-consumer recycled content by weight for each product specified under this section.
- F. Manufacturers Field Reports: Submit manufacturer's field reports from AAADM certified technician of inspection and approval of doors for compliance with ANSI/BHMA A 156.19 after completion of installation.
- G. Operating and Maintenance Manuals: Provide manufacturers operating, owners and maintenance manuals for each item specified as required in Division 01, Closeout Submittals.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: 10 years minimum of documented experience in manufacturing door equipment similar to that indicated within this specification with a proven record of successful service performance. A manufacturer with company certificate issued by AAADM.
- B. Installer Qualifications: Installers, trained by the primary product manufacturers, with a minimum 5 years documented experience installing and maintenance of units similar in material, design, and extent to that indicated in this specification and whose work has resulted in construction with

a record of successful in-service performance. Manufacturer's authorized representative who is trained and approved for installation and maintenance of units by AAADM required for this Project

- C. Source Limitations for Automatic Operators: Obtain each type of automatic door operator and sensor components specified in this section from single source from single manufacturer.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- E. Power-Operated Door Standard: ANSI/BHMA A 156.19 Current year.
- F. Emergency-Exit Door Requirements: Comply with requirements of authorities having jurisdiction for automatic entrances serving as a required means of egress.

1.8 PROJECT CONDITIONS

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

1.9 COORDINATION

- A. Coordinate door operators with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish. Coordinate hardware for automatic entrances with hardware required for rest of project.
- B. Electrical System Roughing-in: Coordinate layout and installation of automatic power door operator with connections to power supplies and access-control system.

1.10 WARRANTY

- A. Automatic Door Operators to be free of defects in material and workmanship for a period of Two (2) years from the date of substantial completion.
- B. During the warranty period a factory trained technician shall preform service and affect repairs. A safety inspection shall be performed after each adjustment or repair and a completed inspection form submitted to the owner.
- C. During the warranty period all warranty work shall be performed during normal working hours.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. dormakaba • Reamstown, PA • 1-844-SPEC-NOW (1-844-773-2669) • Website:
www.dormakaba.us

- B. Substitutions: Requests for substitution and product approval in compliance with the specification must be submitted in writing and in accordance with the procedures outlined in Division 1, Section "Substitution Procedures". Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 AUTOMATIC SWING DOOR OPERATOR

- A. Model: dormakaba, ED Series ED250 (Basis of Design) An Integrated, self-learning automatic swing door operator with an advanced CPU, a multistage gearbox with real time adaptive software and available user interface.
1. Automatic Door Configuration:
 - a. Configuration: Single swing door or pair of doors swinging.
 - b. Traffic Pattern: two-way.
 - c. Mounting: Surface applied
- B. Control Features
1. Power-hold Close
 2. Built in Lock Delay
 3. On-Off-Hold Open switch control to control door function, (Automatic-Hold Open- Exit Only)
 4. On-Off Power Switch
 5. Fire Alarm Integration
 6. Field Adjustable Handing
 7. Push and Go
 8. Power Assist Opening Activation
 9. Intergraded Connections for Monitored Safety Sensors and other accessories.
 10. Integrated access control
- C. Door Control Features
1. Wind Load and Stack Pressure microprocessor monitored with power boost to ensure secure opening and closing in changing conditions.
 2. Door Weight Max. ED 250 - 800 lbs.
- D. Header Size: Fine header height at 2 3/4" by 5-1/8" depth.

2.3 ACTIVATION DEVICES

- A. Activation Device:
1. Push Plate: Hard wired, 4-3/4 inch square stainless steel push plate engraved with "Push to Open" with a handicap logo.
 2. Access control activator: as selected by architect.

2.4 SAFETY DEVICES

- A. Provide door controls in accordance with ANSI/BHMA standards A 156.19 and complying with cited BHMA standard for condition of exposure and for long-term, maintenance-free operation under normal traffic load. When presence sensors are used, they shall be monitored in accordance with ANSI/BHMA A 156.10. Coordinate controls with door operation and door operators.

2.5 ELECTRICAL

- A. Electrical 115 V AC +/- 10% 50/60 Hz 6.6 A max.

2.6 ALUMINUM FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Anodized Finish:
 - 1. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and frames with Installer present, for compliance with requirements for installation tolerances, wall and floor construction and other conditions affecting performance of automatic entrances.
- B. Examine roughing in for electrical source power to verify actual locations of wiring connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure non-movement joints.
- B. Entrances: Install automatic entrances plumb and true in alignment with established lines and grades without warp or rack of framing members and doors. Anchor securely in place.
 - 1. Install surface-mounted hardware using concealed fasteners to greatest extent possible.
 - 2. Set headers, carrier assemblies, tracks, operating brackets, and guides level and true to location with anchorage for permanent support.
- C. Door Operators: Connect door operators to electrical power distribution system as specified in Division 26 Sections [including smoke evacuation and/or fire detection system.]
- D. Sealants: Comply with requirements specified in Division 07 Section "Joint Sealants" to provide seal between the operator housing and wall surface. installation.
- E. Signage: Apply signage on both sides of each door and each sidelight as required by ANSI/BHMA A 156.19

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's representative shall provide technical assistance and guidance for installation of automatic doors.
 - 1. Factory trained and AAADM certified representative shall test and inspect each automatic door to determine compliance of the installed system to ANSI/BHMA A 156.19

3.4 ADJUSTING

- A. Adjust door operators and controls for smooth and safe operation.

3.5 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by automatic operator installation promptly after installation .

3.6 DEMONSTRATION

- A. Engage a factory authorized representative to train Owner's maintenance personnel to adjust, operate, and maintain safe operation of automatic entrances.

END OF SECTION

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes:
 - 1. Glass for doors, interior borrowed lites, and storefront framing.
 - 2. Glazing sealants and accessories.
- B. Related Sections: Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Division 1 Section "Construction and Demolition Waste Management."
 - 2. Division 8 Section "Flush Wood Doors" for vision panels.
 - 3. Division 8 Section "Aluminum-Framed Entrances & Storefronts" for glazing framing and vision panels.
 - 4. Division 8 Section "Fire-Resistant Glazing."
 - 5. Division 8 Section "Security Glazing."

1.3 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- C. IBC: International Building Code.
- D. Interspace: Space between lites of an insulating-glass unit.

1.4 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Review temporary protection requirements for glazing during and after installation.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Glass Samples: For each type of the following products; 12 inches (300 mm) square.
- C. Glazing Accessory Samples: For sealants, in 12-inch (300-mm) lengths. Install sealant Samples between two strips of material representative in color of the adjoining framing system.
- D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, manufacturers of insulating-glass units with sputter-coated, low-E coatings and sealant testing agency.
- B. Product Certificates: For glass.
- C. Product Test Reports: For glass and glazing sealants, for tests performed by a qualified testing agency.
 - 1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.
- D. Preconstruction adhesion and compatibility test report.
- E. Sample Warranties: For special warranties.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F (4.4 deg C).

1.10 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
1. Warranty Period: 10 years from date of Substantial Completion.
- B. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to the requirements of this section, provide glass from one of the following manufacturers:
1. AGC Glass Company North America, Inc.
 2. GGI, General Glass International.
 3. Guardian Glass, SunGard.
 4. Pilkington North America.
 5. Viracon, Inc.
 6. Vitro Architectural Glass (formerly PPG Industries).
- B. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.
- C. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

2.2 PERFORMANCE REQUIREMENTS

- A. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
- B. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
 - 1. For monolithic-glass lites, properties are based on units with lites of thickness indicated.
 - 2. For laminated-glass lites, properties are based on products of construction indicated.

2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. GANA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."
 - 2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR A7, "Sloped Glazing Guidelines."
 - 3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
 - 4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
- D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.
- E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

- A. Clear Annealed Float Glass: ASTM C 1036, Type I, Class 1 (clear), Quality-Q3.
- B. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
- C. Heat-Strengthened Float Glass: ASTM C 1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

2.5 LAMINATED GLASS

- A. Laminated Glass: ASTM C 1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
 1. Construction: Laminate glass with polyvinyl butyral interlayer, ionomeric polymer interlayer or cast-in-place and cured-transparent-resin interlayer to comply with interlayer manufacturer's written instructions.
 2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
 3. Interlayer Color: Clear unless otherwise indicated.

2.6 GLAZING SEALANTS

- A. General:
 1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.
 1. Dow Corning Corporation.
 2. GE Construction Sealants; Momentive Performance Materials, Inc.
 3. Percora Corporation.
 4. Sika Corporation.
 5. Tremco Incorporated.

2.7 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
 - 1. AAMA 804.3 tape, where indicated.
 - 2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 - 3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
 - 1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
 - 2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.8 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.9 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
 - a. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
- C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 2. Presence and functioning of weep systems.
 3. Minimum required face and edge clearances.
 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 CLEANING AND PROTECTION

- A. Immediately after installation remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
 - 1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
- C. Remove and replace glass that is damaged during construction period.
- D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.8 MONOLITHIC GLASS SCHEDULE

- A. Glass Type **GL-1**: Clear security glass. Typical at all locations not indicated to be fire-resistant glazing.
 - 1. Refer to Division 8 Section "Security Glazing" for security glass requirements.
- B. Glass Type **GL-3**: Clear fire-resistant glass. For use at door 101 and all surrounding glass per frame type 2; refer to Drawings.

END OF SECTION 088000

SECTION 088813 - FIRE-RESISTANT GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Fire-protection-rated glazing for fire rated door lites up to 100 square inches.
 - 2. Fire-resistance-rated assembly consisting of frames, glazing and door.
- B. Related Sections: Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Division 1 Section "Construction and Demolition Waste Management."
 - 2. Division 7 Section "Joint Sealants."
 - 3. Division 8 Section "Hollow Metal Doors and Frames."
 - 4. Division 8 Section "Flush Wood Doors."
 - 5. Division 8 Section "Glazing."

1.3 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

1.4 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Glass Samples: For each type of glass product; 12 inches (300 mm) square.

- C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For installers.
- B. Product Certificates: For each type of glass and glazing product, from manufacturer.
- C. Sample Warranties: For special warranties.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install fire-resistant glazing until spaces are enclosed and weathertight and temporary HVAC system is operating and maintaining ambient temperature conditions at occupancy levels during the remainder of the construction period.

1.10 WARRANTY

- A. Manufacturer's Special Warranty on Tempered Glazing Units with Clear Intumescent Interlayer: Manufacturer agrees to replace units that deteriorate within specified warranty period. Refer to manufacturer's warranty document and inspection guidelines for more information. Verify available warranties and warranty periods with manufacturers listed in Part 2 articles. Revise "Warranty Period" Subparagraph below if glass manufacturers insist on warranty beginning on date of manufacture. See the Evaluations.

- 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.
- B. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

2.2 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; deterioration of glazing materials; or other defects in construction.

2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organization below unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. GANA Publications: "Glazing Manual."
- B. Safety Glazing Labeling: Permanently mark glazing with certification label of the Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, glass thickness, and safety glazing standard with which glass complies.

2.4 FIRE-PROTECTION-RATED GLAZING

- A. Fire-Protection-Rated Glazing: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on positive-pressure testing according to NFPA 257 or UL 9, including the hose-stream test, and shall comply with NFPA 80.
 - 1. Fire-protection-rated glazing required to have a fire-protection rating of 20 minutes shall be exempt from the hose-stream test.
- B. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name; test standard; whether glazing is permitted to be used in doors or openings; if permitted in openings, whether or not glazing has passed the hose-stream test; whether or not glazing meets 450 deg F (250 deg C) temperature-rise limitation; and the fire-resistance rating in minutes.

- C. Tempered Glazing Units with Clear Intumescent Interlayer: Double glazing units made from two lites of uncoated, fully tempered, float glass; with a perimeter edge seal enclosing a cavity filled with optically clear, intumescent interlayer; and complying with 16 CFR 1201, Category II.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide SAFTI FIRST Fire Rated Glazing Solutions; SuperLite X-60 or a comparable product by one of the following:
 - a. AGC Glass Company North America, Inc.
 - b. Pilkington North America.
 - c. Technical Glass Products.
 - d. Vetrotech Saint-Gobain.

2.5 FIRE-RESISTANCE-RATED GLAZING

- A. Fire-Resistance-Rated Glazing: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-resistance ratings indicated, based on testing according to ASTM E 119 or UL 263.
- B. Fire-Resistance-Rated Glazing Labeling: Permanently mark fire-resistance-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, that the glazing is approved for use in walls, and the fire-resistance rating in minutes.
- C. Tempered Glazing Units with Clear Intumescent Interlayer: Double glazing units made from two lites of uncoated, fully tempered, float glass; with a perimeter edge seal enclosing a cavity filled with optically clear, intumescent interlayer; and complying with 16 CFR 1201, Category II.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide SAFTI FIRST Fire Rated Glazing Solutions; SuperClear 45-HS-LI or a comparable product by one of the following:
 - a. AGC Glass Company North America, Inc.
 - b. Pilkington North America.
 - c. Technical Glass Products.
 - d. Vetrotech Saint-Gobain.
 - 2. Alternate: SAFTI FIRST Fire Rated Glazing Solutions; SuperSecure II-XLS 45-minute system with compatible frames, or a comparable product by one of the previously listed manufacturers.

2.6 FIRE-RESISTANCE-RATED FRAMES

- A. Fire-Resistance-Rated Glazing Assembly: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for 45-minute fire-resistance opening rating.

1. Basis-of-Design Product: Subject to compliance with requirements, provide SAFTI FIRST Fire Rated Glazing Solutions; GPX Architectural Series framing and doors, or a comparable product by one of the following:
 - a. Technical Glass Products.
 - b. Greenlite Glass Systems.
2. Structural Members: W/D ratio of beams shall not be less than 0.35. Engineering verification is required for connections and anchorage for all spans.
 - a. Span: As indicated in Drawings.
 - 1) Dead Load: 35 lb/sq. ft. (1.68 kPa).
 - 2) Live Load: 100 lb/sq. ft. (4.79 kPa).
 - b. Minimum Steel Yield Stress: 50 ksi (345 kPa).
3. Window/Wall Frame thickness: 4 inches nominal.
4. Door profile: As indicated on Drawings.
5. Door construction: Fire resistive aluminum door capable of accommodating concealed hardware.
6. Door Hardware: Refer to Door and Hardware schedules.
7. Insulation: The framing system shall insulate against the effects of fire, smoke and heat transfer from either side. The perimeter of the framing system to the rough opening shall be firmly packed with mineral wool fire stop insulation or appropriately rated intumescent sealant.
8. Fasteners: Type recommended by manufacturer. No exposed fasteners allowed.
9. Framing Cover/Closure: Minimum 0.0635-inch- (1.6129-mm-) thick, 16-gage, galvanized steel.
10. Silicone Block: 1/4 inch (6.4 mm) thick.
11. Joints: Equal to or less than 1/4 inch (6.4 mm) wide.
 - a. Intumescent Tape: 1/8 inch thick by 1-3/4 inches wide (3.2-mm-thick by 44.4 mm wide), double row.
 - 1) Basis-of-Design Product: Subject to compliance with requirements, provide Zero International, Inc.; FS3003 Soft Puff.
 - b. Sealant: Silicone.
 - 1) Basis-of-Design Product: Subject to compliance with requirements, provide Dow Corning; 795 Silicone Sealant.
12. Joints: Greater than 1/4 inch (6.4 mm) thick and less than 5/8 inch (16 mm) wide.
 - a. Foam Seal:
 - 1) Basis-of-Design Product: Subject to compliance with requirements, provide WillSeal; 600.

- b. Backer Rod: 1/2-inch (12.7-mm) foam.
- c. Sealant: Silicone.

- 1) Basis-of-Design Product: Subject to compliance with requirements, provide Dow Corning; 121 Structural Sealant.

13. Fire Caulk: For use between gypsum board and dried cementitious mix.

- a. Basis-of-Design Product: Subject to compliance with requirements, provide 3M Company 3M Fire Protection Products; Type CP 25WB+ Caulk.

14. Gypsum Board: 1-1/2-inch- (38-mm-) thick strips with protective wrap adhered with caulk to dried-filler material top surfaces.

2.7 GLAZING ACCESSORIES

- A. Provide glazing gaskets, glazing sealants, glazing tapes, setting blocks, spacers, edge blocks, and other glazing accessories that are compatible with glazing products and each other and are approved by testing agencies that listed and labeled fire-resistant glazing products with which products are used for applications and fire-protection ratings indicated.
- B. Glazing Sealants for Fire-Rated Glazing Products: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT. Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Dow Corning Corporation.
 - b. GE Construction Sealants; Momentive Performance Materials Inc.
 - c. Tremco Incorporated.
- C. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
 - 1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 - 2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- D. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
 - 1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
 - 2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.8 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

2.9 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
- B. Assemblies shall be furnished assembled (should configurations and job site conditions allow).
- C. Door assemblies shall be factory prepared for field mounting of hardware.

2.10 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designing finishes.
- B. Covers shall be chemically cleaned and pretreated; then, finished with manufacturer's high performance fluoropolymer finish. Color to be selected by Architect from manufacturer's full range.
- C. Protect finishes on exposed surfaces from damage by applying strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with manufacturing and installation tolerances, including those for size, squareness, and offsets at corners, and for compliance with minimum required face and edge clearances.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate fire side and protected side. Label or mark units as needed so that fire side and protected side are readily identifiable. Do not use materials that leave visible marks in the completed work.

3.3 GLAZING, GENERAL

- A. Use methods approved by testing agencies that listed and labeled fire-resistant glazing products.
- B. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials unless more stringent requirements are indicated, including those in referenced glazing publications.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Set glass lites with proper orientation so that coatings face fire side or protected side as specified.

- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- G. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop, so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- D. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial washaway from glass.

3.7 CLEANING AND PROTECTION

- A. Immediately after installation, remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
 - 1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.
- C. Remove and replace glass that is damaged during construction period.
- D. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 088813

SECTION 088853 – SECURITY GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Carefully review and examine all other Contract Documents for requirements therein affecting the work of this Section. Furthermore, coordinate and sequence the work of this Section with all other trades affected

1.2 SUMMARY

- A. This Section includes glass and glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
 - 1. Interior Aluminum doors and frames.
 - 2. Interior Aluminum store front windows.
- B. Related Sections: Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Division 1 Section "Construction and Demolition Waste Management."
 - 2. Division 7 Section "Joint Sealants."
 - 3. Division 8 Section "Glazing" for requirements regarding assembly of insulating glass units and glazing schedules.
 - 4. Division 8 Section "Aluminum-Framed Entrances and Storefronts" for aluminum doors and fixed framed openings receiving glass and glazing.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Division 01 Section "References". Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM C 1036 - Flat Glass.
 - 2. ASTM C 1048 - Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass.
 - 3. ANSI Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Used in Buildings.
 - 4. Federal Safety Standards for Architectural Glazing Materials 16CFR1201-I.II.

1.4 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Review temporary protection requirements for glazing during and after installation.

1.6 ACTION SUBMITTALS

- A. Product data sheets on glazing products: Provide chemical, functional, and environmental characteristics, size limitations, special application requirements. Identify available colors.
- B. Glass Samples: For each type of the following products:
 - 1. 12 by 12-inch pieces of each specified type and thickness of glass, bearing labels indicating locations where each type of glass will be used.
 - 2. Glazing tape: 12-inch length of specified type and size.

1.7 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For glass.
- B. Product Test Reports: For security glass and glazing sealants, for tests performed by a qualified testing agency.
 - 1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.
- C. Preconstruction adhesion and compatibility test report.
- D. Sample Warranties: For special warranties.

1.8 QUALITY ASSURANCE

- A. Source: For each glass and glazing type required for work of this Section, provide primary materials which are products of one manufacturer. Provide secondary or accessory materials which are acceptable to manufacturers of primary materials.
- B. Installer Qualifications: A firm with a minimum of three years experience in type of work required by this Section and which is acceptable to manufacturers of primary materials.

- C. Glass Thickness: Determine and provide size and thickness of glass products that are certified to meet or exceed performance requirements specified in this Section. Provide units with proper thickness, edge clearance and tolerance to comply with recommendations of glass manufacturer.
- D. Perform work in accordance with FGMA Glazing Manual Sealant Manual.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
 - 1. Protect materials from moisture, sunlight, excess heat, sparks and flame.
 - 2. Sequence deliveries to avoid delays, but minimize on-site storage.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 - 1. Do not install liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 50°F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.11 WARRANTY

- A. General: Warranties are in addition to, and not a limitation of, other rights the Owner may have under the Contract Documents.
- B. Manufacturer's Special Project Warranty on Laminated Glass Products:
 - 1. Warranty Period: Manufacturer's standard but not less than 10 years after date of Substantial Completion.
- C. Manufacturer's Special Project Warranty on Insulating Glass Products:
 - 1. Warranty Period: Manufacturer's standard but not less than 10 years after date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with security glazing performance requirements, provide products by one of the following manufacturers:
1. Basis of Design: Laminated Technologies, Inc.; School Guard Glass, SG4.
 2. Armoured One Glass; 5/16-inch Shooter Attack Glass.
 3. Oldcastle Building Envelope; ArmorGarde Laminated Security Glass, 7/16-inch.

2.2 SECURITY GLASS PERFORMANCE REQUIREMENTS

- A. Security Glazing: Security glass and surrounding frames shall demonstrate the ability, through independent third-party testing, to provide the following attributes:
1. Products will be tested as a whole system, including glass and doors or frames.
 2. Products tested shall be tested in full size, actual doors and framing members usable in a commercial setting, as applicable to project requirements, with security glazing installed as prescribed by the security glazing manufacturer. Testing shall not be done in framing other than what is specified in regards to quality or manufacturer as stated in the Contract Documents.
 3. Glass bite during testing shall be no more than the allowable glass bite in the specified door or framing system for this project.
 4. The security glass shall resist attack for a minimum of 6 minutes or greater to meet the desired level of protection required by the owner.
 5. Attack duration shall be continuous. Breaks between testing phases shall not be counted or timed for total duration.
 6. Security glass will be integrated into a framing system in such a way that the frame and glass are able to withstand a constant attack for 6 minutes.
 7. Attack resistance shall mean the security glazing is subjected to the following without failure:
 - a. Withstand a minimum of 5 shots from a military style assault rifle with a minimum caliber of 7.62mm.
 - b. Withstand a minimum of abuse as applied by a single assailant at full force and including strikes with feet, bricks, hammers, baseball bats, and sledgehammers without stoppage for 6 or 12 minutes.
 8. Failure is defined as a tear in the security glass large enough to allow an object 4-inches in diameter or more to pass through or separation made between the glass and surrounding door frame, storefront or curtain wall framing materials.

9. Product shall not be damaged or scratched by scissors, writing implements, razor blades or the use of any similar sharp object.
 10. Glass shall not have an optical haze of more than 1.8 percent so glass is indistinguishable from standard tempered glass.
- B. Test reports from a recognized independent testing company shall show testing means and methodology consistent or similar to the 5-aa1 assault test.

2.3 GLASS PRODUCTS, GENERAL

- A. General requirements for glass: Of domestic manufacture, conforming to the referenced standards and with the additional requirements specified herein; factory labeled on each pane stating the strength, type, thickness and quality; with all labels remaining on glass until final cleaning.
- B. Fabricate glass as required to openings with edge clearances and bite on glass as recommended by the manufacturer with clean-cut edges where concealed, and smooth ground, polished and seamed edges where exposed to view. Do not cut, seam, nip or abrade glass after tempering.
1. For non-tempered to be cut at site, provide glass larger than required so as to obtain clean cut edges without seaming or nipping. Laminated glass products should not be cut on site.
- C. Glass thickness shown and heat treatment specified are minimum requirements. Provide glass thickness and heat treatment as required to meet specified performance criteria, State and local codes and ordinances.

2.4 SINGLE PANE SECURITY GLASS PRODUCTS

- A. Product established as performance standard. Substitution must provide certified independent testing of performance data equal to specified Security Glass Performance Requirements.
- B. Security Glazing.
1. Provide security glazing with the following characteristics:
 - a. No more than 4.1 lbs. per square foot.
 - b. 5-aa1 rated for a minimum of 6 minutes.
 - c. Glass clad on interior and exterior surfaces.
 - d. Optical Haze of no more than 1.8 percent.

2.5 GLAZING SEALANTS

- A. General:

1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Glazing Sealant: Silicone Rubber Glazing Sealant; silicone rubber one-part elastomeric sealant; FS TT-S-001543, Class A; acid-type for non-porous channel surfaces, and nonacid type where any of the channel surfaces are porous.
1. Basis of Design: Dow Corning Corporation; 995.
- C. Preformed Butyl Rubber Glazing Sealant; tape or ribbon (coiled on release paper) of polymerized butyl, or mixture of butyl and polyisobutylene, compounded with inert fillers and pigments, solvent-based with minimum 95 percent solids, thread or fabric reinforcement, tack-free within 24 hours, paintable, non-staining.

2.6 GLAZING TAPES

- A. Preformed Butyl Rubber Glazing Sealant; tape or ribbon (coiled on release paper) of polymerized butyl, or mixture of butyl and polyisobutylene, compounded with inert fillers and pigments, solvent-based with minimum 95 percent solids, thread or fabric reinforcement, tack-free within 24 hours, paintable, non-staining.
- B. Pure silicone caulk, closed cell PVC tape, or DAP 33 putty as recommended by Technical Glass Products to comply with U.L. Listing. Must be used for fire-rated glass to meet fire rated labeling requirements.

2.7 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Type recommended by glazing material manufacturer.
- C. Glazing Gaskets: Molded Neoprene Glazing Gaskets; molded or extruded neoprene gaskets of the profile and hardness required for watertight construction; ASTM D 2000 designation 2BC 415 to 3BC 620.
- D. Setting Blocks: Neoprene, 70-90 durometer hardness, with proven compatibility with sealants used.

- E. Spacers: Neoprene, 40-50 durometer hardness, with proven compatibility with glazing materials used.
- F. Compressible Filler Rod: Closed-cell or waterproof-jacketed rod stock of synthetic rubber or plastic foam, proven to be compatible with glazing materials used, flexible and resilient, with 5-10 psi compression strength for 25 percent deflection.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect receiving surfaces and ensure that are dry and free from dust, or other foreign materials before glazing. Clean all surfaces with cloth saturated with mineral spirits of high-flash naphtha as recommended by glazing tape manufacturer, before glazing.
- B. Verify all openings, prior to glazing, to make certain that the opening is square, plumb and secure in order that uniform face and edge clearances are maintained.
- C. Determine the actual sizes required by measuring the receiving openings. Size glass to permit required clearance and bite around full perimeter of glass, as set forth in the referenced FGMA standards, or as recommended by the glass manufacturer. Do not nip edges, to remove flares or to reduce oversize dimensions, under any circumstance.
- D. Perform glazing work in accordance with FGMA Glazing Manual SIGMA and LSGA standards for glazing and installations methods.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Each installation shall withstand normal temperature changes, applicable wind loading, and impact loading (for operating sash and doors) without failure of any kind including loss or breakage of glass, failure of sealants or gaskets to remain watertight and airtight, deterioration of glazing materials and other defects in the Work.
- B. Install glass in accordance with the standards detailed in the "Glazing Manual" of the Glass Association of North America and the "Sealant Manual" of the Flat Glass Marketing Association except as shown and specified otherwise, and except as specifically recommended otherwise by the manufacturers of the glass and glazing materials.
- C. Unify appearance of each series of lights by setting each piece to match others as nearly as possible. Inspect each piece and set with pattern, draw and bow oriented in the same direction as other pieces.
- D. Install glazing materials in accordance with the manufacturer's printed instructions.

3.3 GLAZING, GENERAL

- A. Install setting blocks of proper size at quarter points of sill rabbet. If required to keep in place set blocks in thin course of the heel-bead compound.
- B. Provide spacers inside and out, and of proper size and spacing, for all glass sizes larger than 50 united inches, except where gaskets are used for glazing. Provide 1/8 inch minimum bite of spacers on glass and use thickness equal to sealant width, except with sealant tape use thickness slightly less than final compressed thickness of tape.
- C. Voids and Filler Rods: Prevent exudation of sealant or compound by forming voids or installing filler rods in the channel at the heel of jambs and head (do not leave voids in the sill channels) except as otherwise indicated, depending on light sizes, thickness and type of glass, and complying with manufacturer's recommendations.
- D. Do not cut, seam, nip, or abrade glass which is tempered, heat strengthened, or coated.
- E. Force glazing materials into channel to eliminate voids and to ensure complete "wetting" or bond of glazing material to glass and channel surfaces.
- F. Tool exposed surfaces of glazing sealants and compounds to provide a substantial "wash" away from the glass. Install pressurized tapes and gaskets to protrude slightly out of the channel, so as to eliminate dirt and moisture pockets.
- G. Where wedge-shaped gaskets are driven into one side of the channel to pressurize the sealant or gasket on the opposite side, provide adequate anchorage to ensure that gasket will not "walk" out when subjected to dynamic movement. Anchor gasket to stop with matching ribs, or by proven adhesives, including embedment of gasket tail in cured heel bead.
- H. Gasket Glazing: Miter cut and bond ends together at corners where gaskets are used for channel glazing, so that gaskets will not pull away from corners and result in voids or leaks in the glazing system.

3.4 CURE, PROTECTION AND CLEANING

- A. Cure glazing materials in accordance with manufacturer's printed instructions and recommendations, to obtain high early bond strength, internal cohesive strength, and surface durability.
- B. Mark glazed openings immediately upon installation of glass by attaching crossed streamers to framing. Do not apply markers of any type to surfaces of glass.
- C. Replace glass included in the work which is broken, or otherwise damaged, from the time Work is started at the site until the date of physical completion.
- D. Maintain glass in a reasonably clean condition during construction to protect from buildup of harmful construction contaminants.

1. Clean and trim excess glazing material from the glass and stops or frames promptly after installation.
- E. Coordinate with the Contractor prior to Substantial Completion, remove dirt and other foreign material and wash and polish glass included in the work on both sides.

END OF SECTION 088853

SECTION 092216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Non-load-bearing steel framing systems for interior partitions.
 - 2. Suspension systems for interior ceilings and soffits.
 - 3. Grid suspension systems for gypsum board ceilings.
- B. Related Sections: Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Division 1 Section "Construction and Demolition Waste Management."
 - 2. Division 9 Section "Gypsum Board" for facing of interior partitions, gypsum board ceilings and soffits.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Studs and Runners: Provide documentation that framing members' certification is according to SIFA's "Code Compliance Certification Program for Cold-Formed Steel Structural and Non-Structural Framing Members."

1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For embossed steel studs and runners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.
- C. Horizontal Deflection: For wall assemblies, limited to 1/360 of the wall height based on horizontal loading of 5 lbf/sq. ft. (239 Pa).

2.2 MANUFACTURERS

- A. Source Limitations: Obtain non-structural metal framing from a single source manufacturer.
- B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. ClarkDietrich Building Systems.
 - 2. CEMCO.
 - 3. MBA Metal Framing.
 - 4. SCAFCO Steel Stud Company.
 - 5. Super Stud Building Products.

2.3 FRAMING SYSTEMS

- A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
 - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
 - 2. Protective Coating: ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized unless otherwise indicated.
- B. Studs and Runners: ASTM C 64. Use either steel studs and runners or embossed steel studs and runners.
 - 1. Steel Studs and Runners:
 - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - i. ClarkDietrich Building Systems: ProSTUD Drywall Framing System.

- ii. SCAFCO Steel Stud Company: Steel Fraig Studs and Track.
 - b. Minimum Base-Metal Thickness: As required by performance requirements for horizontal deflection.
 - c. Depth: As indicated on Drawings.
- 2. Embossed Steel Studs and Runners:
 - a. Minimum Base-Metal Thickness: As required by horizontal deflection performance requirements.
 - b. Depth: As indicated on Drawings.
- C. Slip-Type Head Joints: Where indicated, provide one of the following:
 - 1. Clip System: Clips designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to runners while allowing 1-1/2-inch (38-mm) minimum vertical movement.
 - 2. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch- (51-mm-) deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches (305 mm) of the top of studs to provide lateral bracing.
 - 3. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch- (51-mm-) deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
 - 4. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
- D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
 - 1. Minimum Base-Metal Thickness: 0.0296 inch (0.752 mm).
- E. Cold-Rolled Channel Bridging: Steel, 0.0538-inch (1.367-mm) minimum base-metal thickness, with minimum 1/2-inch- (13-mm-) wide flanges.
 - 1. Depth: As indicated on Drawings.
 - 2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches (38 by 38 mm), 0.068-inch- (1.72-mm-) thick, galvanized steel.
- F. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
 - 1. Minimum Base-Metal Thickness: 0.0296 inch (0.752 mm).
 - 2. Depth: As indicated on Drawings.
- G. Resilient Furring Channels: 1/2-inch- (13-mm-) deep, steel sheet members designed to reduce sound transmission.
 - 1. Configuration: Hat shaped.

- H. Cold-Rolled Furring Channels: 0.053-inch (1.34-mm) uncoated-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges.
 - 1. Depth: As indicated on Drawings.
 - 2. Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of 0.0329 inch (0.8 mm).
 - 3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.
- I. Bracing for low walls (Waiting 101): PonyWall heavy duty plate and tube assembly, or approved equal, 24 inches nominal height, spaced at 48 inches on center unless noted otherwise.
 - 1. Plate Material: ASTM A36 1/2" thick hot rolled steel.
 - 2. Stud Material: Structural Grade 50 Type H (ST50H), 50ksi (340 MPa)
 - 3. 12ga (97mil), 0.1017" Design thickness, 0.0966" Min. thickness
 - 4. ASTM: A36, A653/A653M, A1003

2.4 SUSPENSION SYSTEMS

- A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.
- B. Hanger Attachments to Concrete:
 - 1. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E 488/E 488M conducted by a qualified testing agency.
 - 2. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
- C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch (4.12 mm) in diameter.
- D. Flat Hangers: Steel sheet, 1 by 3/16 inch (25 by 5 mm) by length indicated.
- E. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch (1.367 mm) and minimum 1/2-inch- (13-mm-) wide flanges.
 - 1. Depth: As indicated on Drawings.
- F. Furring Channels (Furring Members):
 - 1. Cold-Rolled Channels: 0.0538-inch (1.367-mm) uncoated-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges, 3/4 inch (19 mm) deep.
 - 2. Steel Studs and Runners: ASTM C 645.

- a. Minimum Base-Metal Thickness: As indicated on Drawings.
 - b. Depth: As indicated on Drawings.
- 3. Embossed Steel Studs and Runners: ASTM C 645.
 - a. Minimum Base-Metal Thickness: 0.0190 inch (0.483 mm).
 - b. Depth: As indicated on Drawings.
- 4. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch (22 mm) deep.
 - a. Minimum Base-Metal Thickness: As indicated on Drawings.
- 5. Resilient Furring Channels: 1/2-inch- (13-mm-) deep members designed to reduce sound transmission.
 - a. Configuration: Hat shaped.
- G. Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.

2.5 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
 - 1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls: Provide the following:
 - 1. Asphalt-Saturated Organic Felt: ASTM D 226/D 226M, Type I (No. 15 asphalt felt), nonperforated.
 - 2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch (3.2 mm) thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
 - 1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.
- B. Coordination with Sprayed Fire-Resistive Materials:
 - 1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches (610 mm) o.c.
 - 2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that are required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754.
 - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.
- C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- D. Install bracing at terminations in assemblies.
- E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
 - 1. Single-Layer Application: As required by horizontal deflection performance requirements unless otherwise indicated.
 - 2. Multilayer Application: As required by horizontal deflection performance requirements unless otherwise indicated.

3. Tile Backing Panels: As required by horizontal deflection performance requirements unless otherwise indicated.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.
 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
 - a. Install two studs at each jamb unless otherwise indicated.
 - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (13-mm) clearance from jamb stud to allow for installation of control joint in finished assembly.
 - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
 4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
 5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
 6. Curved Partitions:
 - a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
 - b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches (150 mm) o.c.
- E. Direct Furring:
 1. Screw to wood framing.
 2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.
- F. Z-Shaped Furring Members:
 1. Erect insulation, specified in Section 072100 "Thermal Insulation," vertically and hold in place with Z-shaped furring members spaced 24 inches (610 mm) o.c.

2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.
 3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches (305 mm) from corner and cut insulation to fit.
- G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

3.5 INSTALLING SUSPENSION SYSTEMS

- A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
1. Hangers: 48 inches (1219 mm) o.c.
 2. Carrying Channels (Main Runners): 48 inches (1219 mm) o.c.
 3. Furring Channels (Furring Members): 24 inches (610 mm) o.c.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
 - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
 - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 5. Do not attach hangers to steel roof deck.
 6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.

7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
 8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- E. Seismic Bracing: Sway-brace suspension systems with hangers used for support.
- F. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
- G. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Interior gypsum board.
 - 2. Tile backing panels.
 - 3. Sound Attenuation Blankets
- B. Related Sections: Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Division 1 Section "Construction and Demolition Waste Management."
 - 2. Division 9 Section "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. American Gypsum.
 - b. Georgia-Pacific Building Products.
 - c. National Gypsum Company.
 - d. USG Building Products.
 - e. Continental Building Products.
- B. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

- A. Gypsum Board, Type X: ASTM C 1396/C 1396M.
 1. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. American Gypsum: FireBloc Type X.
 - b. Georgia-Pacific Building Products: Toughrock Fireguard X.
 - c. National Gypsum Company: Fire Shield Type X.
 - d. USG Building Products: Sheetrock Firecode.
 - e. Continental Building Products: Firecheck Type X.
 2. Thickness: 5/8 inch (15.9 mm).
 3. Long Edges: Tapered.

B. Gypsum Ceiling Board: ASTM C 1396/C 1396M.

1. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. American Gypsum: Interior Ceiling Board.
 - b. Georgia Pacific: ToughRock Span24 Ceiling Board.
 - c. National Gypsum Company: High-Strength Ceiling Board.
 - d. USG Building Products: Sheetrock Interior Ceiling Board.
 - e. Continental Building Products: Sagcheck.
2. Thickness: 5/8 inch (15.9 mm).
3. Long Edges: Tapered.

C. Impact-Resistant Gypsum Board: ASTM C 1396/C 1396M gypsum board, tested according to ASTM C 1629/C 1629M.

1. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. American Gypsum: M-Bloc Impact Resistant.
 - b. Georgia-Pacific Building Products: Dens Armor Plus.
 - c. National Gypsum Company: Hi-Impact XP.
 - d. USG Building Products: Mold Tough VHI.
 - e. Continental Building Products: Protecta HIR 300.
2. Core: 5/8 inch (15.9 mm), Type X.
3. Surface Abrasion: ASTM C 1629/C 1629M, meets or exceeds Level 3 requirements.
4. Indentation: ASTM C 1629/C 1629M, meets or exceeds Level 1 requirements.
5. Soft-Body Impact: ASTM C 1629/C 1629M, meets or exceeds Level 3 requirements.
6. Hard-Body Impact: ASTM C 1629/C 1629M, meets or exceeds Level 3 requirements according to test in Annex A1.
7. Long Edges: Tapered.
8. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

D. Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.

1. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. American Gypsum: Mold Defense Type X.
 - b. Georgia-Pacific Building Products: ToughRock Fireguard X Mold Guard.
 - c. National Gypsum Company: XP Fire Shield Type X.
 - d. USG Building Products: Mold Tough.
 - e. Continental Building Products: Mold Defense Type X.
2. Core: 5/8 inch (15.9 mm), Type X.
3. Long Edges: Tapered.
4. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.4 SPECIALTY GYPSUM BOARD

- A. Gypsum Board, Type C: ASTM C 1396/C 1396M. Manufactured to have increased fire-resistive capability.
1. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. American Gypsum: FireBloc Type C.
 - b. Georgia-Pacific Building Products: ToughRock Fireguard C.
 - c. National Gypsum Company: Fire Shield Type C.
 - d. USG Building Products: Sheetrock Firecode Type C.
 - e. Continental Building Products: Firecheck Type C.
 2. Thickness: As required by fire-resistance-rated assembly indicated on Drawings.
 3. Long Edges: Tapered.

2.5 TILE BACKING PANELS

- A. Glass-Mat, Water-Resistant Backing Board: ASTM C 1178/C 1178M, with manufacturer's standard edges.
1. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Georgia-Pacific Building Products: DensShield Tile Backer.
 - b. National Gypsum Company: Gold Bond eXP Tile Backer.
 - c. USG Building Products: Durock Brand Glass-Mat Tile Backerboard.
 2. Core: 5/8 inch (15.9 mm), Type X.
 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.6 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
 2. Shapes:
 - a. Cornerbead.
 - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - c. L-Bead: L-shaped; exposed long flange receives joint compound.
 - d. Expansion (control) joint.
 - e. Provide special trim shapes as shown on the Drawings.

2.7 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
 - 1. Interior Gypsum Board: Paper.
 - 2. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 - 3. Fill Coat: For second coat, use drying-type, all-purpose compound.
 - 4. Finish Coat: For third coat, use drying-type, all-purpose compound.
- D. Joint Compound for Tile Backing Panels:
 - 1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.
 - 2. Cementitious Backer Units: As recommended by backer unit manufacturer.
 - 3. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.

2.8 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
- C. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.
 - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
 - 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- D. Sound-Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 - 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

- E. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
 - 1. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Pecora Corporation: AC-20 FTR Acoustical & Insulation Sealant.
 - b. Tremco Commercial Sealants & Waterproofing: Acoustical Sealant.
 - c. USG Building Products: Sheetrock Brand Acoustical Sealant.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
 2. Fit gypsum panels around ducts, pipes, and conduits.
 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
1. Wallboard Type X: As inner layer of multi-layer wall assemblies.
 2. Ceiling Type: Non-rated ceiling assemblies in areas other than wet locations.
 3. Impact-Resistant Type X: Vertical surfaces unless otherwise indicated.
 4. Mold-Resistant Type: For use at gypsum board faced partitions and ceilings in wet locations including, but not limited to: toilet rooms, locker rooms, adjacent to all sink counters, art rooms, family consumer science rooms, and at all other wet locations not scheduled to receive Tile Backing Units.
 5. Type C: At all fire-resistance-rated ceiling assemblies; and at fire rated wall assemblies where indicated by the Drawings.
 6. Tile Backing Panels: Vertical surfaces scheduled to receive tile finish.
- B. Single-Layer Application:
1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
 2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.

- b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
 3. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
 4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- C. Multilayer Application:
 1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches (400 mm) minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
 2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
 3. On Z-shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
 4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.
- D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written instructions and temporarily brace or fasten gypsum panels until fastening adhesive has set.
- E. Curved Surfaces:
 1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch- (300-mm-) long straight sections at ends of curves and tangent to them.
 2. For double-layer construction, fasten base layer to studs with screws 16 inches (400 mm) o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches (300 mm) o.c.

3.4 APPLYING TILE BACKING PANELS

- A. Glass-Mat, Water-Resistant Backing Panels: Comply with manufacturer's written installation instructions and install at locations indicated to receive tile. Install with 1/4-inch (6.4-mm) gap where panels abut other construction or penetrations.
- B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.5 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect or as otherwise indicated by the Drawings.
- C. Interior Trim: Install in the following locations:
 - 1. Cornerbead: Use at outside corners unless otherwise indicated.
 - 2. LC-Bead: Use at exposed panel edges.
 - 3. L-Bead: Use where indicated.

3.6 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
 - 1. Avoid installing corner beads where Interior wall panels specified under Section 097700 are clad around outside corners of a room.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 - 2. Level 2: Panels that are substrate for tile.
 - 3. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
 - a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."
 - 4. Level 5: At panel surfaces scheduled to receive wall coverings specified in Division 9 Section "Wallcoverings."
 - a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."
- E. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.
- F. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.7 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

SECTION 093013 - CERAMIC TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

1. Ceramic Wall Tile
2. Porcelain Wall Tile
3. Porcelain Tile flooring and base.
4. Quarry Tile flooring and base.
5. Waterproofing & Crack Isolation Membrane
6. Tile backing panels.
7. Metal edge strips.

- B. Related Sections: Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:

1. Division 1 Section "Construction and Demolition Waste Management."
2. Division 7 Section "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
3. Division 9 Section "Gypsum Board" for cementitious backer units.

1.3 DEFINITIONS

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
- B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in its "Specifications for Installation of Ceramic Tile."
- C. ISO 13007-International Standards Organization; classification for Adhesives and Grout.
- D. Module Size: Actual tile size plus joint width indicated.
- E. Face Size: Actual tile size, excluding spacer lugs.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
- C. Samples for Initial Selection: For tile, grout, and accessories involving color selection.
- D. Samples for Verification:
 - 1. Full-size units of each type and composition of tile and for each color and finish required.
 - 2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required. Make samples at least 12 inches (300 mm) square, but not fewer than four tiles. Use grout of type and in color or colors approved for completed Work.
 - 3. Full-size units of each type of trim and accessory for each color and finish required.
 - 4. Metal edge strips in 6-inch (150-mm) lengths.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.
- C. Product Certificates: For each type of product.
- D. Product Test Reports: For tile-setting and -grouting products.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
 - 2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Installer's supervisor for Project holds the International Masonry Institute's Foreman Certification.

2. Installer employs Ceramic Tile Education Foundation Certified Installers or installers recognized by the U.S. Department of Labor as Journeyman Tile Layers.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Tile: Obtain tile of each type and color or finish from single source or producer.
 1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.
 1. Obtain setting and grouting materials, except for unmodified Portland cement and aggregate, from single manufacturer.
 2. Obtain waterproof membrane and crack isolation membrane, except for sheet products, from manufacturer of setting and grouting materials.
- C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer:
 1. Cementitious backer units.
 2. Metal edge strips.

2.2 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
 - 1. Provide tile complying with Standard grade requirements.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods and other requirements specified.
- C. ISO 13007-International Standards Organization; classification for Adhesives and Grout. Materials must comply with ISO 13007 whenever possible.
- D. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
- E. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.
 - 1. Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.

2.3 TILE PRODUCTS

- A. Ceramic Wall Tile Type (**ALL CWT and CWB TYPES PER FINISH LEGEND**): Glazed ceramic tile and base.
 - 1. Basis of Design: Linear Collection as manufactured by Daltile.
 - 2. Composition: Glazed Ceramic.
 - 3. Certification: Match Design Product.
 - 4. Certification: Match Design Product. Match or exceed performance characteristics.
 - 5. Sizes: As indicated on Finish Legend.
 - 6. Thickness: 5/16 inch.
 - 7. Face: Pattern of design indicated, with cushion edges.
 - 8. Finish: Semi-Gloss.
 - 9. Tile Color and Pattern: Match existing adjacent or replaced pattern as; colors as indicated on Finish Legend.
 - 10. Grout Color: As selected by Architect from manufacturer's full range.
 - 11. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
 - a. External Corners and terminations for Thinset Mortar Installations: Schluter stainless steel trim profiles as indicated on Drawings.
 - b. Internal Corners: Field-butt square corners. For coved base and cap use angle pieces designed to fit with stretcher shapes.

- B. Porcelain Wall Tile Type (**ALL PWT TYPES PER FINISH LEGEND**): Glazed porcelain tile and base.
1. Basis of Design: Colorform as manufactured by Creative Materials Corporation.
 2. Composition: Glazed Non-color-body Porcelain.
 3. Certification: Match Design Product.
 4. Certification: Match Design Product. Match or exceed performance characteristics.
 5. Size: 2 inches by 6 inches
 6. Thickness: 8mm
 7. Face: Pattern of design indicated, with cushion edges.
 8. Finish: Matte or Glossy, as selected by Architect by manufacturer's full range.
 9. Tile Color and Pattern: Pattern as indicated; colors as selected by Architect from manufacturer's full range.
 10. Grout Color: As selected by Architect from manufacturer's full range.
 11. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
 - a. External Corners for Thinset Mortar Installations: Schluter stainless steel trim profiles as indicated on Drawings.
 - b. Internal Corners: Field-buttet square corners. For coved base and cap use angle pieces designed to fit with stretcher shapes.
- C. Porcelain Floor Tile (**ALL PFT TYPES PER FINISH LEGEND**): Medium-bed large format floor tile installation over crack and isolation membrane; Thinset wall tile. Provide manufacturer's recommended joint sizes.
1. Basis-of-Design Product and Manufacturer: Volume 1.0 as manufactured by Daltile.
 2. Composition: Glazed Porcelain with manufacturer's anti-slip technology (Basis-of-Design: Stepwise by Daltile).
 3. Certification: Match Design Product. Match or exceed performance characteristics.
 4. Size: 12 inches by 24 inches.
 5. Thickness: 5/16 inch.
 6. Dynamic Coefficient of Friction: Not less than 0.42.
 7. Color: As selected by Architect from manufacturer's full range. Provide microban treatment if available with selected color.
 8. Tile Pattern: Running bond; continuous joints parallel to door wall; starter course at door wall.
 9. Grout Color: As selected by Architect from manufacturer's full range. Provide one color per Type.
 10. Trim Units: Per Finish Legend. Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes selected from manufacturer's standard shapes:
 11. Transition to adjacent finishes: Schluter Reno-U Profile, ADA-Compliant size based on tile thickness.
- D. Quarry Tile (**ALL QFT AND QBT TYPES PER FINISH LEGEND**): Unglazed square-edged quarry tile and cove base. Thinset tile installation over crack and isolation membrane with manufacturer's recommended joint sizes.

1. Basis-of-Design Product and Manufacturer: Quarry Tile "Paver" by Daltile.
2. Face Size: 6 by 6 inches.
3. Wearing Surface: Abrasive aggregate embedded in surface.
4. Dynamic Coefficient of Friction: Not less than 0.42.
5. Finish: Matte.
6. Tile Color: Match existing, as selected by Architect from manufacturer's full range.
7. Grout Color: As selected by Architect from manufacturer's full range.
8. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
 - a. Base: Coved with surface bullnose top edge, face size 6 by 6 inches. Basis-of-Design: Daltile P-3665 with inside corner PB-3665 and outside corner PCR-L-3665.
9. Transition to adjacent finishes: Provide flush finish to existing adjacent quarry tile. Elsewhere, provide Schluter Reno-U Profile, ADA-Compliant size based on tile thickness.

2.4 TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A118.9 or ASTM C1325, Type A, in maximum lengths available to minimize end-to-end butt joints. For use with wall tile.
 1. Thickness: 5/8 inch.

2.5 WATERPROOFING & CRACK ISOLATION MEMBRANE

- A. General: Manufacturer's standard product that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Fluid-Applied Membrane: Liquid-latex rubber or elastomeric polymer.
 1. Basis of Design: Mapei Corporation; AquaDefense.
 2. Alternate Manufacturers:
 - a. Laticrete.
 - b. Custom Building Products.
 - c. Bostik.

2.6 SETTING MATERIALS

- A. Modified Dry-Set Mortar (Thinset; Medium Set at tile with any edge 15 inches in length or greater): ANSI A118.4.

1. Basis of Design: Mapei Corporation; Kerabond T / Keralastic System.
2. Provide prepackaged, dry-mortar mix combined with styrene-butadiene-rubber liquid-latex additive at Project site.
3. Alternate Manufacturers:
 - a. Laticrete.
 - b. Custom Building Products.
 - c. Bostik.
4. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

2.7 GROUT MATERIALS

- A. High-Performance Tile Grout: ANSI A118.7.
 1. Basis of Design: Mapei Corporation; Ultracolor Plus FA.
 2. Polymer Type: Ethylene vinyl acetate or acrylic additive, in dry, redispersible form, prepackaged with other dry ingredients.

2.8 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Metal Edge Strips: Angle or L-shaped, height to match tile and setting-bed thickness, metallic, designed specifically for flooring applications; stainless-steel, ASTM A 666, 300 Series exposed-edge material.
 1. Basis of Design: Schluter Systems, Schluter -SCHIENE.
- C. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints that does not change color or appearance of grout.
 1. Available Products:
 - a. MAPEI Ultracare Tile and Grout Sealer.
 - b. Bostik; CeramaSeal Grout Sealer.
 - c. C-Cure; Penetrating Sealer 978.
 - d. Southern Grouts & Mortars, Inc.; Silicone Grout Sealer.
 - e. Summitville Tiles, Inc.; SL-15, Invisible Seal Penetrating Grout and Tile Sealer.
- D. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

2.9 MIXING MORTARS, ADHESIVES AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.
- D. Mix individually packaged two-part adhesive components in accordance with manufacturer's instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 - 2. Verify that concrete substrates for tile floors installed with adhesives, bonded mortar bed or thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
 - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
 - c. Verify that surfaces that will receive tile or stone smaller than 15 inches (127 mm) on any one side, are within the 1/4-inch (6mm) in 120 inches (3048 mm) from the required plane with no more than 1/16-inch (1. mm) variation in 144 inches (3658 mm) from the high points in the surface and surfaces that will receive tile or stone larger than 15 inches (127 mm) on any one side are within the 1/8-inch (3 mm) in 120 inches (3048 mm) from the required plane with no more than 1/16-inch (1.6 mm) in 24 feet (7.32 m) when measured from the high points in the surface.
 - 3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
 - 4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 TILE INSTALLATION

- A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation Legends. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation Legends, and apply to types of setting and grouting materials used.
- B. Comply with ISO 13007 standards whenever possible.
- C. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- E. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- F. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.
- G. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
 - 1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
 - 2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
 - 3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
- H. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
 - 1. Glazed Wall Tile: 1/16 inch.
 - 2. Mosaic Floor Tile: 1/8 inch.

- I. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials and tile. Do not saw-cut joints after installing tiles.
 - 1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
- J. Metal Edge Strips: Install at locations indicated and where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile.

3.4 TILE BACKING PANEL INSTALLATION

- A. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated.

3.5 WATERPROOFING INSTALLATION

- A. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate.
- B. Allow waterproofing to cure and verify by testing that it is watertight before installing tile or setting materials over it.

3.6 ADJUSTING AND CLEANING

- A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.
- B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove grout residue from tile as soon as possible.
 - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3.7 PROTECTION

- A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.

- B. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

END OF SECTION 093013

SECTION 095113 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This section includes:
 - 1. Acoustical panels and exposed suspension systems for interior ceilings.
- B. Related Requirements:
 - 1. Division 1 Section "Construction and Demolition Waste Management."
 - 2. Division 9 Section "Non-Structural Metal Framing."
 - 3. Division 9 Section "Gypsum Board."
- C. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified, 6 inches (150 mm) in size.
 - 1. Acoustical Panels: Set of 6-inch- (150-mm-) square Samples of each type, color, pattern, and texture.
 - 2. Exposed Suspension-System Members, Moldings, and Trim: Set of 6-inch- (150-mm-) long Samples of each type, finish, and color.
 - 3. Clips: Full-size seismic clips.
- C. Delegated-Design Submittal: For seismic restraints for ceiling systems.
 - 1. Include design calculations for seismic restraints including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Ceiling suspension-system members.
 2. Structural members to which suspension systems will be attached.
 3. Method of attaching hangers to building structure.
 4. Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.
 5. Size and location of initial access modules for acoustical panels.
 6. Items penetrating finished ceiling and ceiling-mounted items including the following:
 - a. Lighting fixtures.
 - b. Diffusers.
 - c. Grilles.
 - d. Speakers.
 - e. Access panels.
 - f. Perimeter moldings.
 - g. Wireless access points (WAP)
 7. Minimum Drawing Scale: 1/8 inch = 1 foot (1:96).
- B. Qualification Data: For testing agency.
- C. Product Test Reports: For each acoustical panel ceiling, for tests performed by a qualified testing agency.
- D. Evaluation Reports: For each acoustical panel ceiling suspension system and anchor and fastener type, from ICC-ES.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Acoustical Ceiling Units: Full-size panels equal to 2 percent of quantity installed.
 2. Suspension-System Components: Quantity of each exposed component equal to 2 percent of quantity installed.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
 - 1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of acoustical ceiling panel and its supporting suspension system from single source from single manufacturer.
- A. Basis-of-Design Manufacturer:
 - 1. Armstrong World Industries.
- B. Acceptable Manufacturers: The design for each tile type is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the following manufacturers:
 - 1. Armstrong World Industries
 - 2. Certainteed
 - 3. USG Interiors, Inc.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Division 1 Section "Quality Requirements," to design seismic restraints for ceiling systems.
- B. Seismic Performance: Suspended ceilings shall withstand the effects of earthquake motions determined according to ASCE/SEI 7-10.

- C. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: Class A according to ASTM E 1264.
 - 2. Smoke-Developed Index: 450 or less.
- D. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL or from the listings of another qualified testing agency.

2.3 ACOUSTICAL PANELS – CEILING TYPE: **CLG-1**

- A. Basis of Design: Ultima High NRC Tegular Series as manufactured by Armstrong World Industries. See Finish Legend in Drawings for Product Types.
- B. Acoustical Panel Standard: Provide manufacturer's standard panels according to ASTM E 1264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.
- C. Classification (ASTM E1264): Provide panels as follows:
 - 1. Type and Form: Type IV, mineral base with membrane-faced overlay; Form 2, water felted. Wet-formed mineral fiber with acoustically transparent membrane, factory applied latex paint.
 - 2. Pattern: Pattern E, lightly textured.
- D. Color: As indicated in Finish Legend.
- E. Light Reflectance (LR): Not less than 0.88.
- F. Ceiling Attenuation Class (CAC): Not less than 35.
- G. Noise Reduction Coefficient (NRC): Not less than 0.80
- H. Edge/Joint Detail: Beveled Tegular.
- I. Thickness: As indicated in Finish Legend.
- J. Modular Size: As indicated in Finish Legend.
- K. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273, ASTM D 3274, or ASTM G 21 and evaluated according to ASTM D 3274 or ASTM G 21.

2.4 ACOUSTICAL PANELS – CEILING TYPE: **CLG-2**

- A. Basis of Design: Ultima Health Zone Tegular Series, washable, as manufactured by Armstrong World Industries. See Finish Legend in Drawings for Product Type.
- B. Acoustical Panel Standard: Provide manufacturer's standard panels according to ASTM E 1264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.
- C. Classification (ASTM E1264): Provide panels as follows:
 - 1. Type and Form: Type IV, mineral base with membrane-faced overlay; Form 2, water felted. Wet-formed mineral fiber with acoustically transparent membrane, factory applied latex paint.
 - 2. Pattern: Pattern E, lightly textured.
- D. Color: As indicated in Finish Legend.
- E. Light Reflectance (LR): Not less than 0.86.
- F. Ceiling Attenuation Class (CAC): Not less than 35.
- G. Noise Reduction Coefficient (NRC): Not less than 0.80
- H. Edge/Joint Detail: Square, lay-in type.
- I. Thickness: As indicated in Finish Legend.
- J. Modular Size: As indicated in Finish Legend.
- K. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273, ASTM D 3274, or ASTM G 21 and evaluated according to ASTM D 3274 or ASTM G 21.

2.5 METAL SUSPENSION SYSTEM

- A. Basis of Design:
 - 1. CLG-1: Suprafine XL 9/16-inch Exposed Tee System as manufactured by Armstrong World Industries.
 - 2. CLG-2: Prelude XL 15/16-inch Exposed Tee System as manufactured by Armstrong World Industries.
- B. Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C 635/C 635M and designated by type, structural classification, and finish indicated.

- C. Narrow-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 (Z90) coating designation; with prefinished 9/16-inch- (15-mm-) wide metal caps on flanges.
1. Structural Classification: Intermediate-duty system.
 2. End Condition of Cross Runners: Override (stepped) type.
 3. Face Design: Flat, flush.
 4. Cap Material: Cold-rolled steel.
 5. Cap Finish: Painted white.

2.6 ACCESSORIES

- A. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
1. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing according to ASTM E 1190, conducted by a qualified testing and inspecting agency.
- B. Wire Hangers, Braces, and Ties: Provide wires as follows:
1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 2. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.106-inch- (2.69-mm-) diameter wire.
- C. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.
- D. Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.
- E. Angle Hangers: Angles with legs not less than 7/8 inch (22 mm) wide; formed with 0.04-inch- (1-mm-) thick, galvanized-steel sheet complying with ASTM A 653/A 653M, G90 (Z275) coating designation; with bolted connections and 5/16-inch- (8-mm-) diameter bolts.
- F. Seismic Clips: Manufacturer's standard seismic clips designed to secure acoustical panels in place during a seismic event.
- G. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.
- H. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.

2.7 METAL EDGE MOLDINGS AND TRIM

- A. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.
 - 1. Edge moldings shall fit acoustical panel edge details and suspension systems indicated and match width and configuration of exposed runners unless otherwise indicated.
 - 2. At all tegular-edge tile, install perimeter trim with "Teg-Tabs" or approved equal to allow cut tile to lay level. Alternatively, all cut perimeter tiles must be tegularized to match factory cut and painted finish.

2.8 ACOUSTICAL SEALANT

- A. Acoustical Sealant: As specified in Division 7 Section "Acoustical Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.
- B. Layout openings for penetrations centered on the penetrating items.

3.3 INSTALLATION

- A. Install acoustical panel ceilings according to ASTM C 636/C 636M, seismic design requirements, and manufacturer's written instructions.

- B. Suspend ceiling hangers from building's structural members and as follows:
1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 2. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structure or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 3. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
 4. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 5. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 6. Do not attach hangers to steel deck tabs.
 7. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 8. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.
 9. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
- D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 2. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches from ends. Miter corners accurately and connect securely.
 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- F. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide precise fit.
1. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.

2. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
3. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
4. Install seismic clips in areas indicated; space according to panel manufacturer's written instructions unless otherwise indicated.
5. Install clean-room gasket system in areas indicated, sealing each panel and fixture as recommended by panel manufacturer's written instructions.
6. Protect lighting fixtures and air ducts according to requirements indicated for fire-resistance-rated assembly.

3.4 ERECTION TOLERANCES

- A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet (3 mm in 3.6 m), non-cumulative.
- B. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3 mm in 3.6 m), non-cumulative.

3.5 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.
- B. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095113

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Thermoset-rubber base.
 - 2. Vinyl molding accessories.
 - 3. Metal transition accessories.
- B. Related Sections: Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Division 1 Section "Construction and Demolition Waste Management."
 - 2. Division 9 Section "Resilient Tile Flooring."
 - 3. Division 9 Section "Tile Carpeting."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches (300 mm) long.
- C. Product Schedule: For resilient base and accessory products. Use same designations indicated on Drawings.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish not less than 10 linear feet (3 linear m) for every 500 linear feet (150 linear m) or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C).

1.6 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive resilient products during the following periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).
- C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 THERMOSET-RUBBER BASE – TYPE: **ALL RB TYPES PER FINISH SCHEDULE**

- A. Rubber Wall Base: Provide rubber base with matching end stops and performed or molded corner units, and as follows:
 - 1. Basis of Design: Tarkett; rubber base.
 - 2. Subject to compliance with requirements of this section, provide thermoset-rubber base from one of the following acceptable manufacturers:
 - a. Burke Mercer Flooring Products; a division of Burke Industries, Inc.
 - b. Flexco.
 - c. Tarkett.
 - d. Roppe Corporation, USA.
- B. Product Standard: ASTM F 1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).
 - 1. Style and Location:
 - a. Style A, Straight: Provide in areas with carpet.
 - b. Style B, Cove: Provide in areas with resilient floor coverings.

- C. Thickness: 0.125 inch (3.2 mm).
- D. Height: As indicated.
- E. Lengths: Coils in manufacturer's standard length.
- F. Finish: Matte.
- G. Outside Corners: Job formed or preformed.
- H. Inside Corners: Job formed or preformed.
- I. Colors: As indicated by manufacturer's designations.

2.2 ALUMINUM MOLDING ACCESSORIES – “TR” TYPES indicated to be aluminum, other than saddle thresholds.

- A. Basis of Design: Schluter Systems, or equal.
- B. Description: Aluminum beveled and same height transitions for carpet, resilient floor covering, carpet edge for glue-down applications, reducer strip for resilient floor covering, joiner for tile and carpet and transition strips.
- C. Profile and Dimensions: As indicated on Drawings.
- D. Locations: Provide aluminum molding accessories in areas indicated.
- E. Colors and Finish: As indicated by manufacturer's designations.

2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates for Resilient Stair Accessories: Prepare horizontal surfaces according to ASTM F 710.
1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
 4. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft. (304.8 sq. m), and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
 - b. Relative Humidity Test: Using in-situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install resilient products until materials are the same temperature as space where they are to be installed.
1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Preformed Corners: Install preformed corners before installing straight pieces.
- H. Job-Formed Corners:
 - 1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches (76 mm) in length.
 - a. Form without producing discoloration (whitening) at bends.
 - 2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches (76 mm) in length.
 - a. Miter or cope corners to minimize open joints.

3.4 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Perform the following operations immediately after completing resilient-product installation:
 - 1. Remove adhesive and other blemishes from surfaces.
 - 2. Sweep and vacuum horizontal surfaces thoroughly.
 - 3. Damp-mop horizontal surfaces to remove marks and soil.

- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513

SECTION 096519 –RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Vinyl floor tile (VFT).
 - 2. Alternate to VFT: Vinyl Composite Tile (VCT).
- B. Related Sections: Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Division 1 Section “Construction and Demolition Waste Management.”
 - 2. Division 3 Section “Hydraulic-Cement-Based Underlayment” for self-leveling underlayments to be installed under floor finishes.
 - 3. Division 9 Section “Rubber Base and Accessories.”

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of resilient floor tile.
 - 1. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
 - 2. Show details of special patterns.
- C. Samples: Full-size units of each color, texture, and pattern of floor tile required.
- D. Samples for Initial Selection: For each type of floor tile indicated.
- E. Samples for Verification: Full-size units of each color and pattern of floor tile required.
- F. Product Schedule: For floor tile. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Sample Warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.
 - 1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 85 deg F (29 deg C). Store floor tiles on flat surfaces.

1.9 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 65 deg F (18 deg C) or more than 85 deg F (29 deg C) in spaces to receive resilient products during the following periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. Maintain the ambient relative humidity between 40% and 60% during installation.
- C. Spread unopened cartons no more than 6 cartons high and a minimum of 4 inches (101 mm) apart.

- D. Keep flooring materials away from sources of heating and cooling. Avoid exposure to direct sunlight.
- E. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 85 deg F (29 deg C).
- F. Close spaces to traffic during floor tile installation.
- G. Close spaces to traffic for 48 hours after floor tile installation.
- H. Install floor tile after other finishing operations, including painting, have been completed.

1.10 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's standard warranty.
 - 1. Warranty Period for Vinyl Floor Tile (VFT): Twenty years from date of Substantial Completion.
 - 2. Warranty Period for Vinyl Composition Tile (VCT): Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

2.2 VINYL FLOOR TILE (**VFT SERIES**)

- A. Basis of Design: iQ Granit Series as manufactured by Tarkett. Solid Vinyl Tile, polyurethane-reinforced.
- A. Tile Standard: ASTM F 1700
- B. Slip Resistance per ASTM D2047: ≥ 0.5 SCOF
- C. Thickness: 0.80-inch (2mm).
- D. Size: Per Finish Schedule.
- E. Passes ASTM F925 for Chemical Resistance.
- F. Static Load Limit Per ASTM F 970: 250 PSI

- G. Colors and Patterns: As selected by Architect from Manufacturer's full range. Provide up to two colors per space as indicated on the Finish Legend.

2.3 VINYL COMPOSITION FLOOR TILE (VCT SERIES – ALTERNATE TO VFT)

- A. Basis of Design: Tarkett VCT II per Finish Legend.
- B. Tile Standard: ASTM F1066, Class 1, solid color or Class 2, through pattern as selected by Architect.
- C. Slip Resistance per ASTM D2047: ≥ 0.5 SCOF
- D. Thickness: 0.125 inch (3.2 mm).
- E. Size: 12 by 12 inches (305 by 305 mm).
- F. Passes ASTM F925 for Chemical Resistance.
- G. Static Load Limit Per ASTM F 970: 150 PSI
- H. Colors and Patterns: As selected by Architect from manufacturer's full range.

2.4 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
 - 4. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft. (304.8 sq. m), and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
 - b. Relative Humidity Test: Using in-situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
- C. Access Flooring Panels: Remove protective film of oil or other coating using method recommended by access flooring manufacturer.
- D. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- E. Do not install floor tiles until materials are the same temperature as space where they are to be installed.
 - 1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.
- F. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.3 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 - 1. Lay tiles in pattern indicated.

- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
 - 1. Lay tiles in pattern of colors and sizes indicated.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Adhere floor tiles to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
 - 1. Remove adhesive and other blemishes from surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect floor tile from marks, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Floor Polish (VCT only): Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish.
 - 1. Apply three coats.
- E. Cover floor tile until Substantial Completion.

END OF SECTION 096519

SECTION 096623 – RESINOUS MATRIX TERRAZZO FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Thin-set epoxy terrazzo.
 - 2. Precast, thin-set, epoxy terrazzo wall base units.
 - 3. Related accessories.
- B. Related Sections: Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Division 1 Section "Construction and Demolition Waste Management."
 - 2. Division 3 Section "Hydraulic-Cement-Based Underlayment," for self-leveling underlayments to be installed under floor finishes.
 - 3. Division 7 Section "Joint Sealants" for sealants installed with terrazzo.

1.3 COORDINATION

- A. Coordinate the types of traffic allowed on terrazzo between the following events:
 - 1. Completion of pouring and before coarse grinding.
 - 2. Completion of grouting and before polishing.
- B. Coordinate the preparation for terrazzo work with the installation of plumbing, electrical, communications, and data work in the floor area to receive terrazzo.
 - 1. Verify that fixtures, equipment, and outlets will be located properly and at the correct elevation.

1.4 PRE-INSTALLATION MEETINGS

- A. Pre-installation Conference: Prior to installation of concrete substrates, conduct conference at Project site.

1. Review methods and procedures related to terrazzo including, but not limited to, the following:
 - a. Inspect and discuss condition of substrate and other preparatory work performed by other trades.
 - b. Inspect and discuss installation procedures, joint details, jobsite conditions, substrate specification, vapor barrier details and coordination with other trades.
 - c. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment and facilities needed to make progress and avoid delays.
 - d. Review special terrazzo designs and patterns.
 - e. Review dust control procedures.
 - f. Review plans for concrete curing and site drying to enable timely achievement of suitable slab moisture conditions.
 - g. Review concrete substrate tolerance requirements for acceptable terrazzo installation.

1.5 SUBMITTALS

- A. Product Data: Manufacturer's product data for each type of terrazzo and accessory including the following information:
 1. Physical properties.
 2. Performance properties.
 3. Independent Lab Testing for Moisture Mitigation System and Bond Strength Testing
 4. For tests not listed in published data, supply missing data according to standard referenced.
- B. Shop Drawings: Include terrazzo installation requirements. Include plans, elevations, sections, component details, and attachments to other work. Show layout of the following:
 1. Divider strips.
 2. Control- and expansion-joint strips.
 3. Base and border strips.
 4. Precast terrazzo-jointing and edge configurations including anchorage details.
 5. Terrazzo patterns.
 6. Layout of special graphic patterns.
 7. Large scale details of terrazzo patterns and metal or other material inserts.
- C. Samples for Initial Selection: NTMA color plates showing the full range of colors and patterns available for each terrazzo type indicated.
- D. Samples for Verification: For each type, material, color, and pattern of terrazzo and accessory required showing the full range of color, texture, and pattern variations expected. Label each terrazzo sample to identify matrix color and aggregate types, sizes, and proportions. Prepare samples of same thickness and from same material to be used for the Work in size indicated below:
 1. Precast Terrazzo: 6-inch square Samples.

2. Accessories: 6-inch long Samples of each exposed strip item required.
- E. Qualification Data: For qualified Installer and Manufacturer.
- F. Material Certificates: For each type of terrazzo material or product, provide supplier or manufacturer's written certificate stating that materials comply with or exceed NTMA specified properties and performance requirements of this Section.
- G. Material Test Reports: For moisture and/or relative humidity of substrate, by a qualified testing agency.
- H. Precast Terrazzo Flooring Test Reports: Provide test reports for precast terrazzo flooring, for the following tests performed by manufacturer and witnessed by a qualified testing agency:
 1. Compressive Strength: ASTM D695.
 2. Water Absorption: ASTM C373/ASTM C140.
 3. Flexural Strength: ASTM D638.
 4. Tensile Strength: ASTM D638.
- I. Maintenance Data: For terrazzo to include in maintenance manuals.

1.6 PERFORMANCE REQUIREMENTS

- A. NTMA Standards: Comply with NTMA's "Terrazzo Specifications and Design Guide," and with written recommendations for terrazzo type indicated unless more stringent requirements are specified.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Engage a terrazzo manufacturer with minimum 5 years documented manufacturing experience producing epoxy binder, and flexible crack isolation membranes; including the following:
 1. Proof of NTMA membership.
 2. Furnish documentation for at least 5 epoxy terrazzo projects of the same scope and complexity; installed in the past 5 years using material being submitted for this project.
- B. Installer Qualifications: Submit proof of Contractor's membership in NTMA or IMI with a letter recognizing that they are a qualified installer in good standing and is acceptable to epoxy terrazzo manufacturer.
 1. Furnish documentation for at least 3 epoxy terrazzo projects of the same scope and complexity; installed in the past 5 years using material being submitted for this project.
 2. For each epoxy terrazzo project submitted, provide the following information:
 - 1) Project name.
 - 2) Square footage of terrazzo installed.
 - 3) Address of facility with contact name and phone number.

- 4) Contact name, address and phone number of prime contractor or construction manager.
 - 5) Field experience resumes of key project personnel including lead supervisor and field technicians to be used on this project.
- C. Source Limitations: Obtain primary Epoxy Terrazzo Flooring System materials including membranes, primers, resins, and hardening agents from a single manufacturer.
1. Source Limitations for Marble Chips and Aggregates: Obtain each color, grade, type, and variety of granular materials from one source with resources to provide materials of consistent quality in appearance and physical properties.
 2. Obtain solvents, divider strips, sealers and cleaners from source recommended by primary materials manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in supplier's original wrappings and containers, labeled with source's or manufacturer's name, material or product brand name, and lot number if any.
- B. Immediately return materials found to be defective in manufacturing and materials damaged in transit, handling or storage. Replace defective materials at no cost to Owner.
- C. Store materials per manufacturer's instructions in their original, undamaged packages and containers, inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.
- D. Precast Terrazzo Protective Wrapping: Wrap precast units individually in a nonstaining protective cover and mark each unit for proper identification of installation location.

1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Maintain the ambient room and substrate temperature above 55 degrees F for 48 hours before, during terrazzo installation, and for 48 hours after completion of terrazzo pouring.
 1. After terrazzo has been poured, maintain substrate temperature at 40 degrees F or above until substantial completion.
 2. Each day of installation, before beginning work, verify that the dew point is at least 5 degrees F less than the slab and air temperature.
- B. Field Measurements: Verify actual dimensions of construction contiguous with precast terrazzo by field measurements before fabrication.
- C. Control and collect dust produced by grinding operations. Protect adjacent construction from detrimental effects of grinding operations.
 1. Provide dustproof partitions and temporary enclosures to limit dust migration and to isolate areas from noise.

- D. Verify that adequate ventilation is provided.
- E. Maintain a minimum uniform level of 50-60 foot candles (538.2 Lux – 645.8 Lux) in areas where terrazzo system is being installed.
- F. Field Measurements, Precast Terrazzo: Verify actual dimensions of construction contiguous with precast terrazzo by field measurements before fabrication.
- G. Acceptable Substrate Conditions:
 - 1. Flatness Tolerance: Maximum variation from flatness of 1/4 inch in 10 feet.
 - 2. Concrete floor Finish: Steel trowel finish.
 - 3. Allow concrete to receive epoxy terrazzo to cure for at least 30 days before beginning installation process.
 - a. Allow no curing agents to be used in areas to receive terrazzo.
 - 4. Test concrete substrate to determine acceptable moisture levels prior to terrazzo installation.
 - 5. Saw cutting of control joints must be done between 12 and 24 hours after placement of the structural concrete and at a frequency compatible to ACI recommendations.
- H. Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during terrazzo installation.
- I. Close spaces to traffic during terrazzo application and for not less than 24 hours after application unless manufacturer recommends a longer period.
- J. Provide protection from other trades prior to final acceptance by Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Products: Subject to compliance with requirements, provide products by Master Terrazzo Technologies, Levittown, PA (www.masterterrazzo.com) indicated in Part 2 Articles below, or comparable products by one of the following:
 - 1. Crossfield Dex-O-Tex.
 - 2. General Polymers (a subsidiary of Sherwin Williams).

2.2 EPOXY TERRAZZO FLOORING SYSTEM

- A. Materials:
 - 1. Epoxy Resin: Manufacturer's standard recommended for use indicated and in color required for mix indicated.

- a. Physical Properties without Aggregates:
 - 1) Hardness: ASTM D2240 70-85 Shore D
 - 2) Minimum Tensile Strength: 4,800 psi per ASTM D638 for a 2-inch specimen made using a "C" die per ASTM D412.
 - 3) Minimum Compressive Strength: 12,000 psi per ASTM D695, Specimen B cylinder.
 - 4) Chemical Resistance: No deleterious effects by contaminants listed below after 7-day immersion at room temperature per ASTM D1308.
 - a) Distilled water
 - b) Mineral water
 - c) Isopropanol
 - d) Ethanol
 - e) 0.025 percent detergent solution
 - f) 1 percent soap solution
 - g) 10 percent sodium hydroxide
 - h) 10 percent hydrochloric acid
 - i) 5 percent acetic acid
 - b. Physical Properties with Aggregates: For resin blended with Georgia White marble, ground, grouted, and cured per requirements in NTMA's "Guide Specification for Epoxy Terrazzo," comply with the following:
 - 1) Flammability: Self-extinguishing, maximum extent of burning 0.25 inch per ASTM D635.
 - 2) Linear Coefficient of Thermal Expansion: 25.0×10^{-6} in/in per °F for temperature range of -12 degrees to 140 degrees F per ASTM D696.
 - 3) Bond Strength: When tested in accordance with Field Test Method for surface soundness and adhesion as described in ACI Committee No. 403 Bulletin Title No. 59-43 the Epoxy terrazzo shall comply with the following value: 100 percent concrete failure minimum, with 300 psi minimum tensile strength.
2. Marble Chips:
- a. Sizes: #2's, #1's and #0's, conforming to NTMA gradation standards.
 - b. Abrasion and Impact Resistance: ASTM C131-89; maximum 40 percent loss.
 - c. Chips shall contain no deleterious or foreign matter.
- B. Mix: Comply with NTMA's "Terrazzo Specifications and Design Guide" and manufacturer's written instructions for matrix and aggregate proportions and mixing.
- C. Colors and Patterns: Two colors, as selected by architect from manufacturer's full range. Pattern as indicated on Drawings.

2.3 PRECAST TERRAZZO UNITS

- A. Precast Wall Base Units: Precast epoxy terrazzo cove base units, 3/8 inch thick, unless otherwise indicated with 3/4 inch radius cove; cast in maximum lengths possible, but not more than 48 inches.
1. Configuration and height: Four inches high, or as indicated on Drawings.
 2. Colors and Patterns: One of the two terrazzo flooring colors selected by architect from manufacturer's full range.

- B. Toe Strips for Precast Wall Base: L-type or T-type strips to fit cove base units in depth required for topping thickness indicated.

1. Material: To match divider strips.
2. Top Width: To match divider strips

2.4 DIVIDER AND ACCESSORY STRIPS

- A. Thin –Set Divider Strips: L-type and T-type.

1. Material: White zinc alloy.
2. Top Width: 1/16 inch.

- B. Heavy-Top Divider Strips: Angle type in depth required for topping thickness indicated.

1. Bottom-Section Material: Matching top-section material.
2. Top-Section Material: White zinc alloy, unless otherwise indicated.
3. Top-Section Width: 1/8 inch, unless otherwise indicated.

- C. Control joint Strips: Separate, double L-type divider strips, positioned back to back with 3/8 inch separation filled with sealant.

- D. Accessory Strips: Match divider-strip width, material, and color unless otherwise indicated. Provide the following types of accessory strips:

1. Base bead and base dividers.
2. Edge beads for exposed edges of terrazzo.

2.5 MISCELLANEOUS ACCESSORIES

- A. Concrete Patch and Topping: 100 percent solids fill mortar system including blended aggregate.

1. Basis of Design Product: MorriFill Epoxy Slope and Fill Mortar.
2. Compressive Strength: ASTM C579, 8,000 psi minimum.
3. Hardness: ASTM D2240, 75-80 Shore D

- B. Moisture Remediation System: Two-component formulation designed to reduce moisture vapor transmission through concrete and provide bond with epoxy terrazzo flooring system.

1. Basis of Design: Morricite MVP Moisture Suppression System by Master Terrazzo Technologies.
2. Adhesion: ASTM D4541, 500 psi.
3. Moisture Vapor Transmission: ASTM E96, 0.131 perm.

- C. Primer: 100 percent solids, epoxy primer moisture insensitive. No solvent containing primers are allowed

1. Basis of Design Product: Morricite Primer.

2. Moisture Vapor Transmission: ASTM E96, 1 perm maximum.
- D. Crack Isolation Membrane
1. Basis of Design Product: MasterFlex Flexible Epoxy Membrane.
 2. Flexible Epoxy Membrane: Flexible epoxy membrane with 100 percent solids with the following properties:
 - a. Tensile Strength: ASTM D2370 at 68 degrees F: 1,500 psi.
 - b. Elongation: ASTM D2370 at 68 degrees F: 130 percent.
 - c. Adhesion: ASTM D4541, 350 psi
- E. Membrane Reinforcing: Fiberglass mesh reinforcement fabric compatible with crack isolation membrane.
1. Basis of Design Product: MasterFlex Fabric.
- F. Divider-Strip Adhesive: Epoxy-resin adhesive recommended by adhesive manufacturer for this use and acceptable to terrazzo manufacturer. Use adhesive that has a VOC content of 50g/L or less.
- G. Anchoring Devices:
1. Strips: Provide mechanical anchoring devices for strip materials as required for secure attachment to substrate.
 2. Precast Terrazzo: Provide mechanical anchoring devices as recommended by Terrazzo Contractor for proper anchorage and support of units for conditions of installation and support.
- H. Finishing Grout: Epoxy grout with 100 percent Solids.
1. Basis of Design Product: Morricite Terrazzo Grout.
- I. Control Joint Filler: Flexible, grindable, epoxy joint filler, 100 percent solids, with the following properties:
1. Basis of Design Product: MTT ColorFlex.
 2. Tensile Strength: ASTM D2370 at 68 degrees F: 1,600 psi.
 3. Elongation: ASTM D2370 at 68 degrees F: 100 percent/
 4. Tensile Modulus: ASTM D2370 at 68 degrees F: 27,800 psi.
 5. Color: As selected by the Architect.
- J. Joint Sealants and Expansion Control: Comply with requirements of Division 7 Sections "Joint Sealants" and "Expansion Control."
- K. Terrazzo Cleaner: As recommended by cleaner manufacturer for use on terrazzo type specified.
- L. Terrazzo Sealers: Manufacturer's approved slip- and stain-resistant sealer that is chemically neutral with a pH factor between 7 and 10, does not affect physical properties of terrazzo and complies with NTMA's "Terrazzo Specifications and Design Guide."

1. Provide a medium gloss water based sealer and finish system.
 - a. Basis of Design Product: MTT SealOn Waterborne Sealer.
 - b. Coefficient of Friction: Dry – 0.80 min.; Wet – 0.65 min.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
 1. Evaluate slab condition, including slab moisture content and extent of repairs required to comply with substrate requirements of NTMA's "Terrazzo Specifications and Design Guide" and the requirements of this Section.
 2. Verify that concrete substrate was poured no fewer than 30 days prior to date of examinations.
 3. Verify existing work has no defects affect proper execution of terrazzo work.
 4. Verify that concrete substrate meets flatness tolerances.
 5. Verify that concrete substrates are visibly dry and free of moisture.
- B. Verify measurements and dimensions; coordinate the installation of insert and work of other trades.
- C. Proceed with installation only after unsatisfactory conditions, including levelness tolerances, have been corrected.

3.2 PREINSTALLATION TESTING

- A. Concrete Moisture Testing, General
 1. Conduct relative humidity test at each test site.
 2. Conduct one pH test at each test site.
- B. Calcium Chloride Testing:
 1. Perform tests in accordance with ASTM F1869.
- C. Relative Humidity Testing:
 1. Perform tests in accordance with ASTM F2170.
 2. Conduct relative humidity testing at the following depths:
 - a. Slabs-On-Grade: Measure temperature and relative humidity at 40 percent of slab thickness measured from top surface.
 - b. Elevated Slabs: Measure temperature and relative humidity at 20 percent of slab thickness measured from top surface.
 3. Drill test hole at each test site to accommodate test sleeve.

4. Hole Diameter: In accordance with test equipment manufacturer's instructions.
 5. Drilling Fluids: Not permitted.
 6. Vacuum dust and debris from test hole.
 7. Insert sleeve, to the full depth of test hole. Cap or plug sleeve to prevent test hole contamination.
 8. Permit the test site to acclimate for minimum 72 hours before measuring relative humidity.
 9. Remove sleeve plug and insert probe to bottom of test hole. Allow test probe to reach temperature equilibration with concrete slab.
 10. Measure and record temperature and relative humidity at the test site.
- D. Proceed with terrazzo installation only after substrates have a maximum relative humidity measurement reading less than 80 percent.
1. If concrete substrate moisture exceeds 80 percent according to ASTM F2170, consult terrazzo manufacturer for additional drying or negative side moisture remediation methods.

3.3 PREPARATION

- A. Clean substrates to produce clean, dry, and neutral substrate for terrazzo application.
1. Remove substances, including oil, grease, and curing compounds, that might impair bond of terrazzo system.
 2. Roughen concrete substrates before installing terrazzo system according to NTMA's written recommendations. Surface preparation results should achieve a CSP3-CSP4 profile according to International Concrete Repair Institute Guideline No. 03732.
- B. Repair or level damaged concrete with concrete patch and topping. Do not use latex fills and self-leveling underlayments. Cracks and non-expansion joints greater than 1/16 inch wide after surface preparation shall be prepared until sound.
1. Repair cracks and non-expansion joints according to NTMA Technical Bulletin #111.
- C. Protect other work from dust generated by grinding operations. Control dust to prevent air pollution and comply with environmental protection regulations.
1. Erect and maintain temporary enclosures and other suitable methods to limit dust migration and to ensure adequate ambient temperatures and ventilation conditions during installation.
- D. Apply one coat of moisture remediation system over concrete surface prepared to receive epoxy-resin terrazzo flooring according to manufacturer's written instructions.

3.4 INSTALLATION OF EPOXY TERRAZZO

- A. Comply with NTMA's "Terrazzo Specifications and Design Guide," and with written recommendations for terrazzo type and accessory indicated unless more stringent requirements are specified within this section. Comply with written directions of product manufacturer.
 - 1. Ensure that matrix components and fluids from grinding operations do not stain terrazzo by reacting with divider and control joint strips
 - 2. Delay fine grinding until heavy trade work is complete and construction traffic through area is restricted.
- B. Extend epoxy terrazzo surface into toe spaces, door reveals, closets, display-case closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- C. Installation Tolerance: Limit variation in terrazzo surface from level to 1/4 inch in 10 feet noncumulative.
- D. Full Membrane Application
 - 1. Flexible Reinforcing Membrane:
 - a. Prepare and prefill substrate cracks with concrete patch and topping material or with primer and allow to cure.
 - b. Apply 25 mils of crack isolation membrane over prepared substrate to produce full substrate coverage in areas to receive terrazzo.
 - c. Apply second coat of crack isolation membrane, 15 mils thick and install reinforcing fabric.
 - d. Prepare membrane according to manufacturer's written instructions before applying primer.
 - 2. Primer: Install primer if required by manufacturer over crack isolation membrane.
- E. Divider and Accessory Strips: Install in locations indicated in adhesive setting bed without voids below strips.
 - 1. Anchoring Strips: Adhere the strips to the floor with primer or hot glue.
- F. Install isolation and expansion material where terrazzo abuts adjacent construction and directly above substrate expansion joints.
- G. Control Joint Strips:
 - 1. Install L-type divider strips back to back over [full membrane] [crack treatment] parallel to control and non-doweled construction joints leaving a space appropriate for anticipated movement - typically 1/4 to 3/8 inch according to NTMA Technical Bulletin #111, Detail #1.
 - a. Fill gap between control joints with joint sealant.
- H. Placing Terrazzo:

1. Mix terrazzo binder with chips and fillers in ratios as approved by manufacturer.
2. Trowel-apply terrazzo mixture over epoxy primer to provide smooth seamless surface at a minimum of 3/8 inch thick.
 - a. Allow terrazzo mixture to cure per manufacturer's recommendations prior to grinding operations.
- I. Rough Grinding: Grind with 24 grit or finer stones or with comparable diamond plates.
- J. Intermediate Grinding: Follow initial grind with 80 grit or finer stones.
- K. Grouting: Prior to final grinding, apply epoxy grout as follows:
 1. Cleanse floor with clean water and rinse thoroughly.
 2. Remove excess rinse water by wet vacuum and machine until completely dry.
 3. Apply epoxy grout to fill voids.
- L. Fine Grinding: Grind with 120 grit or finer stones until all grout is removed from surface.
 1. Repeat rough grinding, grout coat, and fine grinding if large voids exist after initial fine grinding.
 2. Produce surface with a minimum of 70 percent aggregate exposure
- M. Repair: Cut out and replace terrazzo areas that evidence lack of bond with substrate or underbed, including areas that emit a "hollow" sound if tapped. Cut out terrazzo areas in panels defined by strips and replace to match adjacent terrazzo according to NTMA's written recommendations, as approved by Architect.
- N. Construction Tolerances: Limit variation in terrazzo surface from level 1/4 inch in 10 feet.

3.5 PRECAST TERRAZZO INSTALLATION

- A. Install precast terrazzo units using method recommended by NTMA and manufacturer unless otherwise indicated.
- B. Installation Tolerance: Set units with alignment level and true to dimensions, varying 1/8 inch maximum in length, height, or width; noncumulative.
- C. Do not install units that are chipped, cracked, discolored, or improperly finished.
- D. Seal joints between units with cement grout matching precast terrazzo matrix or joint sealant.

3.6 CLEANING AND PROTECTION

- A. Protect surrounding substrates and surfaces, as well as in-place equipment from damage during surface preparation and system application.

- B. Maintain area where terrazzo work is being done be free of other trades during surface preparation, crack detailing, divider strip installation, terrazzo pouring, and for a period of 36 hours upon completion.
- C. Precast Terrazzo Cleaning:
 - 1. Remove grinding dust from installation and adjacent areas.
 - 2. Wash surfaces with cleaner immediately after grouting precast terrazzo units and final cleaning of terrazzo flooring.
 - 3. Wash surfaces with cleaner according to NTMA's written recommendations and manufacturer's written instructions; rinse surfaces with water and allow to dry thoroughly.
- D. Sealing:
 - 1. Seal surfaces according to NTMA's written recommendations.
 - 2. Apply sealer according to sealer manufacturer's written instructions.
- E. Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure that terrazzo is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 096723 - RESINOUS FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Broadcast quartz, urethane topcoat, seamless flooring system, including base, to be overlaid on existing resinous flooring. Intent is to patch area impacted by removal of plumbing fixture prior to overlay.
- B. Related Sections: Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Division 1 Section "Construction and Demolition Waste Management."
 - 2. Division 7 Section "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in resinous flooring surfaces.

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data, application instructions and general recommendations for the epoxy resin composition flooring specified herein.
 - 1. Manufacturer's Material Safety Data Sheet (MSDS) for each product specified.
- B. Samples for initial selection purposes in form of manufacturer's color charts showing full range of colors and finishes available. Submit 3-inches by 3-inches samples of color chips from color chart selection designated by the Architect. Furnish samples of full range of non-slip surface.
- C. Material certificates signed by manufacturer certifying that the epoxy resin composition flooring systems complies with specified requirements.
 - 1. Demonstrate epoxy resin composition flooring systems certification as "High Traction" by National Floor Safety Institute (NFSI).
- D. Maintenance Instructions: Submit manufacturer's written instructions for recommended maintenance practices.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer or applicator who has specialized in installing resinous flooring types similar to that required for this Project and who is acceptable to manufacturer of primary materials.
- B. Single-Source Responsibility: Obtain epoxy resin composition flooring materials, including primers, resins, hardening agents, and finish or sealing coats, from a single manufacturer.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in original packages and containers with seals unbroken and bearing manufacturer's labels containing brand name and directions for storage and mixing with other components.
- B. Store materials to comply with manufacturer's directions to prevent deterioration from moisture, heat, cold, direct sunlight, or other detrimental effects.
- C. Maintain copies of Material Safety Data Sheets (MSDS) for all resinous flooring components for review by the Construction Manager and construction personnel.

1.6 PROJECT CONDITIONS

- A. Environmental Conditions: Comply with epoxy resin composition flooring manufacturer's directions for maintenance of ambient and substrate temperature, moisture, humidity, ventilation, and other conditions required to execute and protect the Work.
- B. Installing resinous flooring after permanent lighting has been installed, or equivalent lighting levels are provided and maintained.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Resinous Flooring Systems: Obtain epoxy-based seamless flooring; and self-leveling broadcast quartz and urethane topcoat seamless flooring system from single source.

2.2 HYBRID EPOXY FLOORING – (ERF-1; ERB-1)

- A. System Description: A cementitious urethane based self-leveling seamless flooring system with decorative quartz broadcast, and topcoats; having a 3/16-inch (4.76 mm) nominal thickness.
 - 1. Basis of Design: Dur-A-Flex, Inc.; Hybri-Flex AQ, self-leveling, natural quartz broadcast, epoxy/aliphatic urethane topcoat seamless flooring system.

2. Provide the basis of design flooring system or a comparable system that meets or exceeds the listed minimum physical performance requirements; when tested according to the referenced standard test methods, from one of the following manufacturers:
 - a. Dex-o-Tex.
 - b. Sherwin-Williams Company.
 - c. Stonhard.
3. Base: Provide 4-inch (101.6 mm) high integral cove base at perimeter and intersecting walls. Existing base to be recoated.

B. Performance Requirements:

1. Impact Resistance per ASTM D-2794: >160.
2. Bond Strength to Concrete per ASTM D-4541: 400 psi (substrate fails).
3. Compressive Strength per ASTM D-695: 17,500 psi.
4. Solids by Volume: 100
5. Adhesion per ASTM D-4541: 400 psi.
6. Flexibility (1/4: Cylindrical mandrel) per ASTM D-1737: Pass.
7. Elongation per ASTM D-2370: 9%
8. Tensile Strength per ASTM D-2370: 7,000 psi.
9. Static Coefficient of Friction per ANSI B101.1: >0.6
10. Dynamic Coefficient of Friction – Wet per ANSI A326.3: >0.42
11. Abrasion Resistance CS-10 Wheel, 1000 g Load, 1000 cycles per ASTM D-4060: 27 mg loss. Flame Spread Index per ASTM E-84: Class B.
12. VOC Content: 0 g/L.

C. Assembly Components:

1. Body Coat: Basis of Design, Dur-A-Flex; Poly-Crete SL, pigmented.
2. Broadcast Coats: Basis of Design; Dur-A-Flex, Inc., broadcast of Q28 decorative quartz aggregate into the body coat; followed by second quartz broadcast consisting of clear Dur-A-Glaze #4 with broadcast of Q28 decorative quartz.
3. Top Coat: Basis of Design, Dur-A-Flex, Inc.; Clear accelera top coat. Provide two coats.

2.5 PATCHING MATERIALS

- A. Shallow Fill and Patching: Use resinous flooring manufacturer's recommended system for patches up to 1/4-inch (6.34 mm).
 1. Basis of Design: Dur-A-Flex, Inc.; Poly-Crete MD.
- B. Deep Fill and Sloping Material: Use resinous flooring manufacturer's recommended system for repairs exceeding 1/4-inch (6.34 mm).
 1. Basis of Design: Dur-A-Flex, Inc.; Poly-Crete WR.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas and conditions, with Applicator present, for compliance with requirements for maximum moisture content, installation tolerances and other conditions affecting flooring performance.
- B. Ensure the space has adequate lighting equal to the final lighting level during the preparation and installation of the system.
- C. Verify that substrates and conditions are satisfactory for flooring installation and comply with requirements specified.

3.2 PREPARATION

- A. Substrate: Perform preparation and cleaning procedures according to flooring manufacturer's instructions for particular substrate conditions involved, and as specified. Provide clean, dry, and neutral substrate for flooring application.
- B. Moisture Testing: Perform tests recommended by manufacturer and as follows:
 - 1. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 99 percent relative humidity level measurement.
 - 2. Notify Architect if relative humidity exceeds 99 percent.
 - 3. Notify Architect if vapor drive exceeds 99 percent relative humidity; or 20 pounds per 1,000 square feet.
 - 4. Do not proceed with resinous floor installation until relative humidity and vapor drive meet manufacturer's requirements.
- C. Surfaces: New and existing surfaces must be free of oil, curing compounds, loose particles, moss, algae growth, laitance, friable matter, dirt, bituminous products and other components that may impede resinous floor adhesion.
- D. Mechanical Surface Preparation: Shot blast all surfaces to receive flooring system with a mobile steel shot, dust recycling machine (Blastrac or equal).
 - 1. Completely removed all surface and embedded accumulations of paint, toppings hardened concrete layers, laitance, power trowel finishes and other similar surface characteristics leaving a bare concrete surface having a minimum profile of CSP 4-5 as described by the International Concrete Repair Institute.
 - 2. Mechanically abraded floor areas inaccessible to the mobile blast machines the same degree of cleanliness, soundness and profile using diamond grinders, needle guns, bush hammers, or other suitable equipment.
 - 3. Cut a 1/4-inch deep by 3/16-inch wide keyways at free edges, including doorways, wall perimeters, expansion joints, columns, doorways, drains and equipment pads.
 - 4. Repair cracks and non-moving joints greater than 1/4-inch wide per manufacturer's recommendations.

- E. Mechanically remove loose or delaminated concrete to sound concrete at worn or spalled areas and patch as recommended by manufacturer.

3.3 APPLICATION

- A. General: Apply each component of epoxy resin composition flooring system according to manufacturer's directions to produce a uniform monolithic flooring surface of thickness indicated.
- B. Ensure substrate is dry immediately prior to the application of any system component. Remove remaining dust or loose particles using a vacuum or clean, dry, oil-free compressed air.
- C. Perform the handling, mixing and addition of components in a safe manner to achieve the desired results in accordance with the Manufacturer's recommendations.
- D. Follow the contour of the substrate unless pitching or other leveling work has been specified.
- E. Provide a neat finish with well-defined boundaries and straight edges.

3.4 HYBRID EPOXY FLOORING APPLICATION

- A. General: Apply the system in the following steps:
 - 1. Substrate preparation.
 - 2. Topping/overlay application with quartz broadcast.
 - 3. Resin application with natural quartz broadcast.
 - 4. Topcoat application.
 - 5. Second topcoat application.
- B. Topping: Apply topping; comprised of manufacturer's resin, hardener and filler, in single lift with a 1/8-inch (3.18 mm) nominal thickness.
 - 1. Add and thoroughly disperse hardener in resin by manufacturer's recommended methods.
 - 2. Add aggregate to catalyzed mixture and mix to achieve a homogeneous blend.
 - 3. Apply topping over horizontal surfaces using 1/2-inch (12.7 mm) V-notched squeegee, trowel or other manufacturer approved system.
 - 4. Degas topping with a loop roller immediately after placement.
 - 5. Broadcast chips to excess, Macro chips at the rate of 0.1 lbs/sf.
 - 6. Vacuum, sweep and/or blow to remove loose aggregate after topping has been allowed to fully cure.
- C. Broadcast Coats: Apply broadcast coat; comprised of liquid components at manufacturer defined ratios, at a rate of 100 square feet per gallon (2.45 m²/L). Thoroughly blend liquid components using a high-speed mechanical mixer.
- D. Topcoat: Apply topcoat; comprised of liquid components at manufacturer defined ratios, at a rate of 100 square feet per gallon (2.45 m²/L) for a nominal finished thickness of 3/16-inch (4.76 mm). Thoroughly blend liquid components using a high-speed mechanical mixer.

1. Back roll and cross roll first topcoat to provide uniform texture and finish.
2. Roller apply second topcoat with grit at a coverage rate of 500 square feet per gallon (12.27 m²/L).

3.5 CURING, CLEANING AND PROTECTION

- A. Cure flooring material in compliance with manufacturer's directions, taking care to prevent their contamination during stages of application and prior to completion of the curing process.
- B. Remove masking. Perform detail cleaning at floor termination, to leave cleanable surface for subsequent work of other sections

END OF SECTION 096723

SECTION 096813 - TILE CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes modular carpet tile.
- B. Related Requirements:
 - 1. Division 1 Section "Construction and Demolition Waste Management."
 - 2. Division 3 Section "Hydraulic-Cement-Based Underlayment" for self-leveling underlayments to be installed under floor finishes.
 - 3. Division 9 Section "Rubber Base and Accessories."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
 - 2. Include manufacturer's written installation recommendations for each type of substrate.
- B. Shop Drawings: For carpet tile installation, plans showing the following:
 - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
 - 2. Carpet tile type, color, and dye lot.
 - 3. Type of subfloor.
 - 4. Type of installation.
 - 5. Pattern of installation.
 - 6. Pattern type, location, and direction.
 - 7. Pile direction.
 - 8. Type, color, and location of insets and borders.
 - 9. Type, color, and location of edge, transition, and other accessory strips.
 - 10. Transition details to other flooring materials.
- C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in Finish Legend in Drawings.

1. Carpet Tile: Full-size Sample.
 2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- (300-mm-) long Samples.
- D. Samples for Verification: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in Finish Legend in Drawings.
1. Carpet Tile: Full-size Sample.
 2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- (300-mm-) long Samples.
- E. Product Schedule: For carpet tile. Use same designations indicated on Drawings.
- F. Sustainable Product Certification: Provide ANSI/NSF 140 certification for carpet products.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.
- C. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:
 1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd. (8.3 sq. m).

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.
- B. Fire-Test-Response Characteristics: Provide products with the critical radiant flux classification and smoke density indicated below, as determined by testing identical products per

ASTM E 648 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1. Flammability: ASTM E-648 flooring radiant panel; Class 1.
2. Smoke Development: ASTM E-662 NBS smoke chamber, less than 450.
3. Passes Methenamine Pill Test (DOC-FF1-70).

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI's "CRI Carpet Installation Standard."

1.9 FIELD CONDITIONS

- A. Comply with CRI's "CRI Carpet Installation Standard" for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.
- C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.10 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
 1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
 2. Failures include, but are not limited to, the following:
 - a. More than 10 percent edge raveling, snags, and runs.
 - b. Dimensional instability.
 - c. Excess static discharge.
 - d. Loss of tuft-bind strength.
 - e. Loss of face fiber.
 - f. Delamination.
 3. Warranty Period: Manufacturer's limited lifetime warranty commencing at date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE – ALL “CPT” Types on Finish Legend.

- A. Basis of Design: As indicated; refer to Finish Legend.
- B. Colors & Patterns: As indicated; refer to Finish Legend.
- C. Size: As indicated; refer to Finish Legend.
- D. Backing System: As indicated; refer to Finish Legend.
- E. Primary Backing/Backcoating: Manufacturer's standard composite materials.
- F. Lifetime Antimicrobial.
- G. Applied Treatments:
 - 1. Soil-Resistance Treatment: Manufacturer's standard treatment.

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance.
- B. Examine carpet tile for type, color, pattern, and potential defects.
- C. Concrete Slabs: Verify that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.
 - 1. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft. (304.8 sq. m), and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

- a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
 - b. Relative Humidity Test: Using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
 - c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with CRI's "Carpet Installation Standards" and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch (3 mm) wide or wider, and protrusions more than 1/32 inch (0.8 mm) unless more stringent requirements are required by manufacturer's written instructions.
- C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

- A. General: Comply with CRI's "CRI Carpet Installation Standard," Section 18, "Modular Carpet" and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: As recommended in writing by carpet tile manufacturer.
- C. Maintain dye-lot integrity. Do not mix dye lots in same area.
- D. Maintain pile-direction patterns indicated on Drawings.
- E. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

- G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.
- H. Install pattern parallel to walls and borders.

3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
 - 1. Remove excess adhesive and other surface blemishes using cleaner recommended by carpet tile manufacturer.
 - 2. Remove yarns that protrude from carpet tile surface.
 - 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with CRI's "Carpet Installation Standard," Section 20, "Protecting Indoor Installations."
- C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 096813

SECTION 099123 - PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes surface preparation and field painting of exposed items and surfaces.
 - 1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.
- B. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.
 - 1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.
- C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
 - 1. Prefinished items include the following factory-finished components:
 - a. Manufactured casework.
 - b. Acoustical wall panels.
 - c. Metal toilet enclosures.
 - d. Metal lockers.
 - e. Unit kitchens.
 - f. Elevator entrance doors and frames.
 - g. Elevator equipment.
 - h. Finished mechanical and electrical equipment.
 - i. Light fixtures.
 - 2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:
 - a. Foundation spaces.
 - b. Furred areas.
 - c. Ceiling plenums.

- d. Utility tunnels.
 - e. Pipe spaces.
 - f. Duct shafts.
 - g. Elevator shafts.
- 3. Finished metal surfaces include the following:
 - a. Anodized aluminum.
 - b. Stainless steel.
 - c. Chromium plate.
 - d. Copper and copper alloys.
 - e. Bronze and brass.
- 4. Operating parts include moving parts of operating equipment and the following:
 - a. Valve and damper operators.
 - b. Linkages.
 - c. Sensing devices.
 - d. Motor and fan shafts.
- 5. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.
- D. Related Sections: Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Division 1 Section "Construction and Demolition Waste Management."
 - 2. Division 5 Section "Structural Steel" for shop priming structural steel. (Refer to Drawings).
 - 3. Division 5 Section "Metal Fabrications" for shop priming ferrous metal.
 - 4. Division 6 Section "Interior Finish Carpentry" for shop priming interior architectural woodwork.
 - 5. Division 8 Section "Hollow Metal Doors and Frames" for factory priming steel doors and frames.
 - 6. Division 9 Section "Gypsum Board" for surface preparation of gypsum board.

1.3 DEFINITIONS

- A. General: Standard coating terms defined in ASTM D 16 apply to this Section.
 - 1. Delete gloss ranges below not required for Project. Standard gloss ranges were developed by the National Paint and Coatings Association.
 - 2. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
 - 3. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
 - 4. Semigloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.

5. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.

1.4 SUBMITTALS

- A. Product Data: For each paint system indicated. Include block fillers and primers.
 1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
 2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.
- B. Samples for Initial Selection: For each type of finish-coat material indicated.
 1. After color selection, Architect will furnish color chips for surfaces to be coated.
- C. Samples for Verification: For each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.
 1. Provide stepped Samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.
 2. Provide a list of materials and applications for each coat of each Sample. Label each Sample for location and application.
- D. Qualification Data: For Applicator.

1.5 QUALITY ASSURANCE

- A. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- B. Source Limitations: Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:
 1. Add other requirements to suit Project.
 2. Product name or title of material.
 3. Product description (generic classification or binder type).
 4. Manufacturer's stock number and date of manufacture.
 5. Contents by volume, for pigment and vehicle constituents.
 6. Thinning instructions.

7. Application instructions.
8. Color name and number.
9. VOC content.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain storage containers in a clean condition, free of foreign materials and residue.

1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

1.7 PROJECT CONDITIONS

A. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F (10 and 32 deg C).

B. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F (7 and 35 deg C).

C. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

1.8 EXTRA MATERIALS

A. Furnish extra paint materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.

1. Quantity: Furnish Owner with an additional 5 percent, but not less than 1 gal. (3.8 L) or 1 case, as appropriate, of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: The design based on the products named in other Part 2 articles and in the schedule at the end of Part 3. Subject to compliance with requirements, provide either the named product or a comparable product by one of the following manufacturers:

1. Benjamin Moore & Co. (Benjamin Moore) – Basis of Design, specs
2. Sherwin-Williams Co. (Sherwin-Williams)
3. PPG Industries, Inc. (Pittsburgh Paints).

4. Pratt & Lambert, Inc. (Pratt & Lambert)

2.2 PAINT MATERIALS, GENERAL

- A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
 - 1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.
- C. Colors: As selected by Architect from manufacturer's full range.

2.3 CONCRETE UNIT MASONRY BLOCK FILLERS

- A. Concrete Unit Masonry Block Filler: Factory-formulated high-performance latex block fillers.
 - 1. Benjamin Moore; Ultra Spec High Build Block Filler No. 571: Applied at a dry film thickness of not less than 8.5 mils.

2.4 EXTERIOR PRIMERS

- A. Exterior Ferrous-Metal Primer: Factory-formulated rust-inhibitive metal primer for exterior application.
 - 1. Benjamin Moore; Ultra Spec HP Acrylic Metal Primer No. HP04: Applied at a dry film thickness of not less than 1.7 mils.
- B. Exterior Galvanized Metal Primer:
 - 1. Benjamin Moore; Ultra Spec HP Acrylic Metal Primer No. HP04: Applied at a dry film thickness of not less than 1.7 mils.

2.5 INTERIOR PRIMERS

- A. Interior Smooth Concrete and Masonry Primer: Factory-formulated alkali-resistant acrylic-latex interior primer for interior application.
 - 1. Benjamin Moore; Ultra Spec Masonry Acrylic Sealer No.608: Applied at a dry film thickness of not less than 0.095 mils (0.030 mm).

- B. Interior Gypsum Board Primer (Standard): Factory-formulated latex-based primer for interior application.
 - 1. Benjamin Moore; Ultra Spec 500 Interior Latex Primer No. N534: Applied at a dry film thickness of not less than 1.8 mils.
- C. Interior Wood Primer for Semigloss Finishes: Factory-formulated- acrylic-latex-based interior wood primer.
 - 1. Benjamin Moore Fresh Start High Hiding All Purpose Primer No.046: Applied at a dry film thickness of not less than 1.4mils.
- D. Interior Wood Primer for Gloss Finishes: Factory-formulated alkyd- or acrylic-latex-based interior wood primer.
 - 1. Benjamin Moore; Fresh Start High Hiding All Purpose Primer No.046: Applied at a dry film thickness of not less than 1.4mils.
- E. Interior Ferrous-Metal Primer: Factory-formulated quick-drying rust-inhibitive alkyd-based metal primer.
 - 1. Benjamin Moore; Ultra Spec HP Acrylic Metal Primer No. HP04: Applied at a dry film thickness of not less than 2 mils.
- F. Interior Zinc-Coated Metal Primer: Factory-formulated galvanized metal primer.
 - 1. Benjamin Moore; Ultra Spec HP Acrylic Metal Primer No. HP04: Applied at a dry film thickness of not less than 2.0 mils (0.051 mm).

2.6 EXTERIOR FINISH COATS

- A. Exterior Full-Gloss Alkyd Acrylic Enamel: Factory-formulated full-gloss alkyd enamel for application on exterior metals
 - 1. Benjamin Moore; Ultra Spec HP DTM Acrylic Gloss Enamel HP28: Applied at a dry film thickness of not less than 2.3 mils (0.051 mm).

2.7 INTERIOR FINISH COATS

- A. Retain finish-coat materials below for a flat acrylic finish over interior concrete, stucco, masonry, concrete masonry units, mineral-fiber-reinforced cement panels, gypsum board, plaster, acoustic plaster, and Primed ferrous and zinc-coated metal.
- B. Interior Flat Acrylic Paint: Factory-formulated flat acrylic-emulsion latex paint for interior application.
 - 1. Benjamin Moore; Ultra Spec 500 Interior Flat No. N536: Applied at a dry film thickness of not less than 1.8 mils.

- C. Interior Low-Luster/ Eggshell Acrylic Enamel: Factory-formulated eggshell acrylic-latex interior enamel.
 - 1. Benjamin Moore; Ultra Spec 500 Interior Eggshell No. 538: Applied at a dry film thickness of not less than 1.8 mils.
- D. Interior Semi-gloss Acrylic Enamel: Factory-formulated semi gloss acrylic-latex enamel for interior application.
 - 1. Benjamin Moore; Ultra Spec 500 Semi-gloss Finish No. N539: Applied at a dry film thickness of not less than 1.8 mils.
- E. Interior Full-Gloss Acrylic Enamel: Factory-formulated full-gloss acrylic-latex interior enamel.
 - 1. Benjamin Moore; Advance Waterborne Alkyd Interior High Gloss No. N794: Applied at a dry film thickness of not less than 1.5 mils
- F. Interior Semi-Gloss Acrylic Epoxy
 - 1. Benjamin Moore Corotech Pre Catalyzed Waterborne Epoxy V341: Applied at a dry film thickness of not less than 1.5.

2.8 INTERIOR WOOD STAINS AND VARNISHES

- A. Open-Grain Wood Filler: Factory-formulated paste wood filler applied at spreading rate recommended by manufacturer.
 - 1. Benwood Interior Wood Grain Filler No. 238.
- B. Interior Wood Stain: Factory-formulated alkyd-based penetrating wood stain for interior application applied at spreading rate recommended by manufacturer.
 - 1. Benjamin Moore: Lenmar Quick Stain Waterborne Wiping Stain 1WB.1100.
- C. Interior Waterborne Clear Satin Varnish: Factory-formulated clear satin acrylic-based polyurethane varnish applied at spreading rate recommended by manufacturer.
 - 1. Benjamin Moore; Benwood Stays Clear Acrylic Polyurethane No. N423, Satin.
- D. Interior Waterborne Clear Gloss Varnish: Factory-formulated clear gloss acrylic-based polyurethane varnish applied at spreading rate recommended by manufacturer.
 - 1. Benjamin Moore; Benwood Stays Clear Interior Wood Finishes Waterborne Polyurethane Finishes High Gloss No. N422.
- E. Paste Wax: As recommended by manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application. Comply with procedures specified in PDCA P4.
 - 1. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
 - 2. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.
- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
 - 1. Notify Architect about anticipated problems when using the materials specified over substrates primed by others.

3.2 PREPARATION

- A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
- B. Cleaning: Before applying paint or other surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning.
 - 1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
- C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
 - 1. Provide barrier coats over incompatible primers or remove and reprime.
 - 2. Cementitious Materials: Prepare concrete, concrete unit masonry, cement plaster, and mineral-fiber-reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
 - a. Use abrasive blast-cleaning methods if recommended by paint manufacturer.
 - b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces if moisture content exceeds that permitted in manufacturer's written instructions.

- c. Clean concrete floors to be painted with a 5 percent solution of muriatic acid or other etching cleaner. Flush the floor with clean water to remove acid, neutralize with ammonia, rinse, allow to dry, and vacuum before painting.
 - 3. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
 - a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
 - b. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and back sides of wood, including cabinets, counters, cases, and paneling.
 - c. If transparent finish is required, backprime with spar varnish.
 - d. Backprime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on back side.
 - e. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.
 - 4. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC's recommendations.
 - a. Blast steel surfaces clean as recommended by paint system manufacturer and according to SSPC-SP 6/NACE No. 3.
 - b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
 - c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as the shop coat.
 - 5. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.
- D. Material Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
- 1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
 - 2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
 - 3. Use only thinners approved by paint manufacturer and only within recommended limits.
- E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

- A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
1. Paint colors, surface treatments, and finishes are indicated in the paint schedules.
 2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
 3. Provide finish coats that are compatible with primers used.
 4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, grilles, convector covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
 5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
 7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
 8. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
 9. Finish interior of wall and base cabinets and similar field-finished casework to match exterior.
 10. Sand lightly between each succeeding enamel or varnish coat.
- B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
 2. Omit primer over metal surfaces that have been shop primed and touchup painted.
 3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
 4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.
- C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
1. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
 2. Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.

3. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.
- D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.
- E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and occupied spaces.
- F. Mechanical items to be painted include, but are not limited to, the following:
 1. Uninsulated metal piping.
 2. Uninsulated plastic piping.
 3. Pipe hangers and supports.
 4. Tanks that do not have factory-applied final finishes.
 5. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
 6. Duct, equipment, and pipe insulation having "all-service jacket" or other paintable jacket material.
 7. Mechanical equipment that is indicated to have a factory-primed finish for field painting.
- G. Electrical items to be painted include, but are not limited to, the following:
 1. Switchgear.
 2. Panelboards.
 3. Electrical equipment that is indicated to have a factory-primed finish for field painting.
- H. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.
- I. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.
- J. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
- K. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.
 1. Provide satin finish for final coats, unless otherwise indicated or specified.
- L. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.4 FIELD QUALITY CONTROL

- A. Owner reserves the right to invoke the following test procedure at any time and as often as Owner deems necessary during the period when paint is being applied:
1. Owner will engage a qualified independent testing agency to sample paint material being used. Samples of material delivered to Project will be taken, identified, sealed, and certified in the presence of Contractor.
 2. Testing agency will perform appropriate tests for the following characteristics as required by Owner:
 - a. Film thickness
 - b. Paint composition
 - c. Gloss
 3. Owner may direct Contractor to stop painting if test results show material being used does not comply with specified requirements. Contractor shall remove noncomplying paint from Project site, pay for testing, and repaint surfaces previously coated with the noncomplying paint. If necessary, Contractor may be required to remove noncomplying paint from previously painted surfaces if, on repainting with specified paint, the two coatings are incompatible.

3.5 CLEANING

- A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.
1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.

3.6 PROTECTION

- A. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.
- B. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.
1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.7 SCHEDULE OF PAINT MATERIALS

- A. All products are those of Benjamin Moore & Co., unless noted otherwise.
- B. Surface Preparation.

1. SP-1: Clean all surfaces to be coated, with Benjamin Moore M83 Oil and Grease Emulsifier, or suitable cleaning solution.
2. SP-2: Spot prime bare substrate.

3.8 SCHEDULE OF PAINT MATERIALS

<u>Number Key</u>	<u>Material</u>
-------------------	-----------------

Interior Primers

- | | |
|---|--|
| 1 | Moorcraft Super Spec Acrylic Masonry Sealer No. N066 |
| 2 | Ultra Spec 500 Interior Latex Primer No. N534 |

Interior Finish coats

- | | |
|---|---|
| 5 | Ultra Spec 500 Interior Flat No. N536 |
| 6 | Ultra Spec 500 Interior Eggshell No. 538 |
| 7 | Ultra Spec 500 Gloss Finish No. N540 |
| 8 | Advance Waterborne Alkyd Interior High Gloss No. N794 |

Stains & Clear Finishes

- | | |
|----|--|
| 9 | Benwood Interior Wood Grain Filler No. 238 |
| 10 | Lenmar Quick Stain Waterborne Wiping Stain 1WB.1100 |
| 11 | Benwood Stays Clear Acrylic Polyurethane No. N423, Satin. |
| 12 | Benwood Stays Clear Interior Wood Finishes Waterborne Polyurethane Finishes High Gloss No. N422. |

Metal Primers

- | | |
|----|--|
| 13 | Ultra Spec HP Acrylic Metal Primer No. HP04 (Ferrous Metal) |
| 14 | Ultra Spec HP Acrylic Metal Primer No. HP04 (Galvanized Metal) |

Exterior Finish Coats

- | | |
|----|---|
| 15 | Ultra Spec HP DTM Acrylic Gloss Enamel HP28 |
|----|---|

Specialty coatings

- | | |
|----|---|
| 16 | Corotech Pre Catalyzed Waterborne Epoxy V341 |
| 17 | Ultra Spec High Build Block Filler No. 571 |
| 18 | Sweep-up Spray Latex Flat No. M53 |
| 19 | Rosco Tough Prime |
| 20 | Rosco – Iddings Deep Colors and Clear Acrylic Glaze |

Note: Deep accent colors shall be top coated with Stays Clear acrylic Polyurethane.

3.9 SCHEDULING OF PAINTING

A. Exterior Surfaces

Coats			
1 st	2 nd	3 rd	4 th

1.	*Galvanized metal	14	15	15	
2.	*Ferrous Metal		13	15	15
3.	*Masonry Smooth	17	16	16	
4.	*Masonry Block	17	16	16	

*Includes new miscellaneous steel, ferrous metal, exposed angles and lintels, miscellaneous metal, vent pipes above roofs, support for equipment on roof, hollow metal doors and frames, other metal doors, fans, air handling units, miscellaneous equipment on roofs, pipes, ducts and conduits.

B.	Interior Surfaces		Coats			
			1 st	2 nd	3 rd	4 th
1A.	Ferrous metal		13	15	15	
2A.	Masonry: (epoxy)	17	16		16	
2B.	Masonry (paint)	17	5		5	
3A.	Gypsum Board/ (eggshell)	2	6		6	
3B.	Gypsum Board/ (semi-gloss)	2	7		7	
3C.	Gypsum Board/ (epoxy)		2	16	16	
4.	Stained wood/millwork/		9**	10	11*	11*
5.	Wood Painted		2	8	8	
6.	Gym/Stage/ ceilings Including steel decking, ducts, etc.	18				

* Sand lightly between coats.

** Only necessary for open grain wood

*** Completely fill voids for acoustic reflectance; apply (3) additional coats as required.

3.10 ACCENT COLORS

- A. One (1) wall, in each space where painting is called for, shall have one (1) accent wall. Accent Colors may require a deep base primer and a minimum of two finish coats.

END OF SECTION 099123

SECTION 101100 - VISUAL DISPLAY UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Visual display board assemblies, including but not limited to:
 - a. Marker boards.
 - b. Tack boards.
 - c. Tackable surface infill.
- B. Related Sections: Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Division 1 Section "Construction and Demolition Waste Management."
 - 2. Division 9 Section "Non-Structural Metal Framing."

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, finishes, and accessories for visual display units.
- B. Shop Drawings: For visual display units.
 - 1. Include plans, elevations, sections, details, and attachment to other work.
 - 2. Show locations of panel joints.
 - 3. Include sections of typical trim members.
- C. Samples: For each type of visual display unit indicated.

1. Visual Display Panel: Not less than 8-1/2 by 11 inches (215 by 280 mm), with facing, core, and backing indicated for final Work. Include one panel for each type, color, and texture required.
2. Trim: 6-inch- (150-mm-) long sections of each trim profile.
3. Accessories: Full-size Sample of each type of accessory.

D. Product Schedule: For visual display units. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for surface-burning characteristics of tackboards.
- C. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For visual display units to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver factory-fabricated visual display units completely assembled in one piece. If dimensions exceed maximum manufactured unit size, or if unit size is impracticable to ship in one piece, provide two or more pieces with joints in locations indicated on approved Shop Drawings.

1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install visual display units until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Verify actual dimensions of construction contiguous with visual display units by field measurements before fabrication.
 1. Allow for trimming and fitting where taking field measurements before fabrication might delay the Work.

1.10 WARRANTY

- A. Special Warranty for Porcelain-Enamel Face Sheets: Manufacturer agrees to repair or replace porcelain-enamel face sheets that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Surfaces lose original writing and erasing qualities.
 - b. Surfaces exhibit crazing, cracking, or flaking.
 - 2. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of visual display unit from single source from single manufacturer.
- A. Manufacturer: Subject to compliance with requirements, provide products of one of the following:
 - 1. Claridge Products and Equipment, Inc. (Basis-of-Design Manufacturer, typical).
 - 2. AARCO Products, Inc.
 - 3. AJW Architectural Products.
 - 4. Bangor Cork Company, Inc.
 - 5. Forbo.
 - 6. Homosote Company, Trenton, NJ.

2.2 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 450 or less.

2.3 MATERIALS

- A. High-Pressure Plastic Laminate: NEMA LD 3.
- B. Plastic-Impregnated-Cork Sheet: Seamless, homogeneous, self-sealing sheet consisting of granulated cork, linseed oil, resin binders, and dry pigments that are mixed and calendared onto fabric backing; with washable vinyl finish and integral color throughout with surface-burning characteristics indicated.

- C. Hardboard: ANSI A135.4, tempered.
- D. Particleboard: ANSI A208.1, Grade M-1.
- E. Medium-Density Fiberboard: ANSI A208.2, Grade 130.
- F. Fiberboard: ASTM C 208 cellulosic fiber insulating board.
- G. Extruded Aluminum: ASTM B 221 (ASTM B 221M), Alloy 6063.
- H. Adhesives for Field Application: Mildew-resistant, nonstaining adhesive for use with specific type of panels, sheets, or assemblies; and for substrate application; as recommended in writing by visual display unit manufacturer.

2.4 VISUAL DISPLAY BOARD ASSEMBLY

- A. Visual Display Board Assembly: Factory fabricated.
 - 1. Assembly: Markerboards and tackboards with integrated map rails where indicated.
 - 2. Corners: Square.
 - 3. Width: As indicated on Drawings.
 - 4. Height: As indicated on Drawings.
 - 5. Mounting Method: Z-clips.
- B. Markerboard Panel (**WB-1 per Finish Legend**): Porcelain-enamel-faced markerboard panel with integrated map rail., Claridge Series 1 or equal.
 - 1. Color: Per Finish Legend.
- C. Tackboard Panel (**CPL-1 per Finish Legend**): Natural-cork tackboard panel with integrated map rail., Claridge Series 1 or equal.
 - 1. Color and Pattern: As selected by Architect from manufacturer's full range.
- D. Aluminum Frames and Trim: Fabricated from not less than 0.062-inch- (1.57-mm-) thick, extruded aluminum; of size and shape indicated on Drawings.
 - 1. Aluminum Finish: Clear anodized..
- E. Joints: Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints as acceptable to Architect and as indicated on approved Shop Drawings.
- F. Chalktray: Manufacturer's standard; continuous.
 - 1. Box Type: Extruded aluminum with slanted front, grooved tray, and cast-aluminum end closures.
 - 2. Solid Type: Extruded aluminum with ribbed section and smoothly curved exposed ends.

- G. Display Rail: Manufacturer's standard, extruded-aluminum display rail with plastic-impregnated-cork insert, end stops, and continuous paper holder, designed to hold accessories.
1. Map Hooks and clips: Two map hooks for every 48 (1200) inches (mm) of display rail or fraction thereof.
 2. Flag Holder: One for each room where display units are installed.
 3. Tackboard Insert Color: Per Finish Legend.
 4. Aluminum Color: Per Finish Legend.
- H. Paper Holder Display Rail: Extruded aluminum; designed to hold paper by clamping action.

2.5 TACKABLE SURFACE INFILL (**CPL-2 per Finish Legend**)

- A. Natural-cork tack surface to match CPL-1 surface as manufactured by Claridge.
1. Assembly: Tack surface adhered to existing substrate after removal of existing tack surface.
 2. Edges: Cut to fit, but tight to existing wood casing surround.
 3. Size: As required to fit within existing cased archway above existing wood wainscot.
 4. Mounting Method: Adhered.

2.6 ACCESSORIES

- A. Metal Frame Clips: Manufacturer's standard clip for securing panels to framing.
- B. Adhesive: APA approved panel adhesive.
- C. Adhesive: APA AFG-01 specification adhesive.
- D. Wall Panel Fasteners:
1. Screws: Metal Framing: 22-25 gauge, drywall type steel screw.
 2. Z-Clips: As indicated, fully concealed, tight to wall.
- E. Metal Trim and Accessories: Fabricate frames and trim of not less than 0.062" thick aluminum alloy, size and shape as indicated, to suit type of installation. Provide straight, single length units wherever possible; keep joints to a minimum. Miter corners to a neat, hairline closure.

2.1 FABRICATION

- A. Assembly: Provide factory assembled units, except where field assembled units are required.

1. Make joints only where total length exceeds maximum manufactured length. Fabricate with a minimum number of joints, balanced around the center of the board, as acceptable to the architect.
2. Provide the manufacturer's standard vertical joint system between abutting sections.

2.7 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, surface conditions of wall, and other conditions affecting performance of the Work.
- B. Examine walls and partitions for proper preparation and backing for visual display units.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.
- B. Clean substrates of substances, such as dirt, mold, and mildew, that could impair the performance of and affect the smooth, finished surfaces of visual display boards.
- C. Prepare surfaces to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, defects, projections, depressions, and substances that will impair bond between visual display units and wall surfaces.

3.3 INSTALLATION

- A. General: Install visual display surfaces in locations and at mounting heights indicated on Drawings, or if not indicated, at heights indicated below. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.

- B. Factory-Fabricated Visual Display Board Assemblies: Attach concealed clips, hangers, and grounds to wall surfaces and to visual display board assemblies with fasteners at not more than 16 inches (400 mm) o.c. Secure tops and bottoms of boards to walls.

3.4 CLEANING AND PROTECTION

- A. Clean visual display units according to manufacturer's written instructions. Attach one removable cleaning instructions label to visual display unit in each room.
- B. Touch up factory-applied finishes to restore damaged or soiled areas.
- C. Cover and protect visual display units after installation and cleaning.

END OF SECTION 101100

SECTION 102800 – TOILET, BATH AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Toilet and bath accessories.
- B. Related Sections: Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Division 1 Section "Construction and Demolition Waste Management."
 - 2. Division 6 Section "Rough Carpentry" for in-wall blocking.

1.3 SUBMITTALS

- A. Product Data: Include construction details, material descriptions and thicknesses, dimensions, profiles, fastening and mounting methods, specified options, and finishes for each type of accessory specified.
- B. Setting Drawings: For cutouts required in other work; include templates, substrate preparation instructions, and directions for preparing cutouts and installing anchoring devices.
- C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required. Use designations indicated in the Toilet and Bath Accessory Schedule and room designations indicated on Drawings in product schedule.
- D. Maintenance Data: For accessories to include in maintenance manuals specified in Division 1. Provide lists of replacement parts and service recommendations.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Provide products of same manufacturer for each type of accessory unit and for units exposed to view in same areas, unless otherwise approved by Architect.
- B. Product Options: Accessory requirements, including those for materials, finishes, dimensions, capacities, and performance, are established by specific products indicated in the Toilet and Bath Accessory Schedule.
 - 1. Other manufacturers' products with equal characteristics may be considered. See Division 1 Section "Substitutions."

2. Do not modify aesthetic effects, as judged solely by Architect, except with Architect's approval. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.

- C. Structural Strengths: Allowable stresses shall not be exceeded for materials when a vertical or horizontal force of 250 lbs. is applied at any point on grab bars, shower seats, and associated fasteners, mounting devices, or supportive structures.

1.5 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by disabled persons, proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.6 WARRANTY

- A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Manufacturer's Mirror Warranty: Written warranty, executed by mirror manufacturer agreeing to replace mirrors that develop visible silver spoilage defects within minimum warranty period indicated.

1. Minimum Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide accessories by one of the following:
 1. Toilet and Bath Accessories:
 - a. American Specialties, Inc.
 - b. Bobrick Washroom Equipment, Inc.
 - c. Bradley Corporation.
 - d. McKinney/Parker Washroom Accessories Corp.
- B. Products: Subject to compliance with requirements, provide one of the products indicated for each designation in the Toilet and Bath Accessory Schedule at the end of Part 3.

2.2 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, with No. 4 finish (satin), in 0.0312-inch minimum nominal thickness, unless otherwise indicated.
- B. Brass: ASTM B 19, leaded and unleaded flat products; ASTM B 16 (ASTM B 16M), rods, shapes, forgings, and flat products with finished edges; ASTM B 30, castings.
- C. Sheet Steel: ASTM A 366/A 366M, cold rolled, commercial quality, 0.0359-inch minimum nominal thickness; surface preparation and metal pretreatment as required for applied finish.
- D. Galvanized Steel Sheet: ASTM A 653/A 653M, G60 (Z180).
- E. Chromium Plating: ASTM B 456, Service Condition Number SC 2 (moderate service), nickel plus chromium electrodeposited on base metal.
- F. Baked-Enamel Finish: Factory-applied, gloss-white, baked-acrylic-enamel coating.
- G. Mirror Glass: ASTM C 1036, Type I, Class 1, Quality q2, nominal 6.0 mm thick, with silvering, electroplated copper coating, and protective organic coating complying with FS DD-M-411.
- H. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- I. Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.

2.3 FABRICATION

- A. General: One, maximum 1-1/2-inch-diameter, unobtrusive stamped manufacturer logo, as approved by Architect, is permitted on exposed face of accessories. On interior surface not exposed to view or back surface of each accessory, provide printed, waterproof label or stamped nameplate indicating manufacturer's name and product model number.
- B. Surface-Mounted Toilet Accessories: Unless otherwise indicated, fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with continuous stainless-steel hinge. Provide concealed anchorage where possible.
- C. Framed Glass-Mirror Units: Fabricate frames for glass-mirror units to accommodate glass edge protection material. Provide mirror backing and support system that permits rigid, tamper-resistant glass installation and prevents moisture accumulation.
 - 1. Provide galvanized steel backing sheet, not less than 0.034 inch and full mirror size, with nonabsorptive filler material. Corrugated cardboard is not an acceptable filler material.
- D. Mirror-Unit Hangers: Provide mirror-unit mounting system that permits rigid, tamper- and theft-resistant installation, as follows:
 - 1. One-piece, galvanized steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
 - 2. Heavy-duty wall brackets of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Secure mirrors to walls in concealed, tamper-resistant manner with special hangers, toggle bolts, or screws. Set units level, plumb, and square at locations indicated, according to manufacturer's written instructions for substrate indicated.
- C. Install grab bars to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

3.3 TOILET AND BATH ACCESSORY SCHEDULE

- A. Basis-of-Design Product: The design for each accessory is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.
- B. Toilet Tissue Holder: High Capacity Bath Tissue Roll Dispenser. Surface mounted unit. Supplied by Owner, installed by Contractor.
- C. Paper Towel Dispenser: Hand Towel Roll Dispenser. Surface mounted unit. Supplied by Owner, installed by Contractor.
- D. Bulk Foam Soap Dispenser: Supplied by owner, installed by contractor.
- E. Sanitary Napkin Receptacle:
 - 1. Basis of Design: Bobrick Washroom Equipment; B-270 Sanitary Napkin Disposal Unit.
 - 2. Subject to compliance with the requirements of this section, acceptable sanitary napkin disposal unit manufacturers include:
 - a. AJW Architectural Products,
 - b. American Specialties, Inc.
 - c. Bobrick Washroom Equipment
 - d. Bradley Corporation.
 - 3. Mounting: Surface mounted.

4. Door or Cover: Self-closing, disposal-opening cover.
5. Receptacle: Removable.
6. Material and Finish: Stainless steel, No. 4 finish (satin).

F. Angle Frame Mirror:

1. Basis of Design: Bobrick Washroom Equipment; B-290 Glass Mirror with Stainless Steel Angle Frame.
2. Subject to compliance with the requirements of this section, acceptable mirror unit manufacturers include:
 - a. AJW Architectural Products,
 - b. American Specialties, Inc.
 - c. Bobrick Washroom Equipment
 - d. Bradley Corporation.
3. Frame: Stainless-steel angle, 0.05 inch (1.3 mm) thick.
 - a. Corners: Welded and ground smooth.
4. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
 - a. One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
 - c. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
5. Size: As indicated on Drawings.
6. 15-year warranty against silver spoilage; secured to wall hanger.

G. Grab Bar:

1. Basis of Design: Bobrick Washroom Equipment; B-5806 1-1/4-inch (32 mm) Diameter Stainless Steel Grab Bars with Snap Flange.
2. Subject to compliance with the requirements of this section, acceptable grab bar manufacturers include:
 - a. AJW Architectural Products,
 - b. American Specialties, Inc.
 - c. Bobrick Washroom Equipment
 - d. Bradley Corporation.
3. Mounting: Flanges with concealed fasteners.
4. Material: Stainless steel, 0.05 inch (1.3 mm) thick, smooth, No. 4 finish (satin).
5. Outside Diameter: 1-1/4 inches (32 mm).
6. Configuration and Length: As indicated on Drawings.

END OF SECTION 102800

SECTION 122413 - ROLLER WINDOW SHADES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Manually operated, single-roller shades.

B. Related Requirements:

1. Division 1 Section "Substitution Procedures" for deviations from basis-of-design products.
2. Division 1 Section "Construction and Demolition Waste Management."
3. Division 6 "Rough Carpentry" for wood blocking and grounds for mounting roller shades and accessories.
4. Division 7 "Joint Sealants" for sealing the perimeters of installation accessories for light-blocking shades with a sealant.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.

B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.

C. Samples for Initial Selection: For each type and color of shadeband material.

1. Include Samples of accessories involving color selection.

D. Product Schedule: For roller shades.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of shadeband material.

C. Product Test Reports: For each type of shadeband material, for tests performed by a qualified testing agency.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For roller shades to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roller shades in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.
- B. Coordination:
 - 1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.
- C. Sequencing:
 - 1. Take field measurements for each opening are taken with field conditions in place before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of work.
 - 2. Do not install shades until final surface finishes and painting are complete.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.8 WARRANTY

- A. Special Warranty: Provide manufacturer's special 25-year warranty for Project Name, transferable to Owner, project-based, specified, and commencing on the Date of Substantial Completion. Complete forms in Owner's name and register with warrantor.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Obtain roller shades from single source from single manufacturer.
- B. Basis of Design: To establish a standard of quality, design and function desired, Drawings and specifications have been based on the following:
 - 1. Basis of Design: Rollease Acmeda Contract – Stamford, CT.
 - a. Manufacturer Representative: For samples, product documentation, certifications, dealer, or installer inquiries please contact: Apex Lighting+Building Solutions at: shadedivision@apexltg.com or (877) 886-2843.
- C. Other Acceptable Manufacturers:
 - 1. Hunter Douglas, NY
 - 2. Lutron, PA

2.2 MANUALLY OPERATED, SINGLE-ROLLER SHADES

- A. General: Provide shade system that operates smoothly when shades are raised or lowered with components that are easy to remove or adjust without removal of mounted shade brackets.
- B. Performance Requirements:
 - 1. Design and size components to support shade system dead loads and to withstand live loads caused by positive and negative wind pressure acting normal to plane of window wall on exterior shade systems.
 - 2. Operating Cord Safety: Comply with requirements of ANSI/WCMA A100.1-2022 regarding operating cord safety on window coverings.
- C. Manually Operated Clutch and Chain Interior Roller Shade System:
 - 1. Description: Single roller, manually operated fabric window shade system with mounting brackets, roller tubes, hem bars, hardware, and other components necessary for complete installation.
 - a. Fabric Drop Orientation: Regular roll. Unless otherwise indicated on drawings.
 - b. Mounting Positions: Provide universal hardware and brackets with ability to mount and affix to top, side, or face. As indicated on drawings.
 - 2. Manual Clutch Operator: Manufacturer's standard material and design; UV-stabilized fiberglass reinforced nylon construction and tempered high carbon steel internal springs, self-lubricating.
 - a. Clutch and Chain Operation: Right side. Unless otherwise indicated on drawings.

- b. Drive Chain: Continuous loop stainless steel beaded ball chain, 120 lb (54 kg) minimum breaking strength. Provide upper and lower limit stops.
 - c. Shade Lift Assistance: Manufacturer's standard spring device contained in idler end of roller tube to reduce force required to lift shades; as required based on shade weight.
 - d. Chain tensioning device: Must comply with ANSI/WCMA A100.1-2022.
- 3. Mounting System and Hardware: Fascia with end caps.
 - a. Mounting Brackets: Zinc plated or powder-coated, cold-rolled steel universal brackets. Must have ability for linking brackets for multiple shade bands.
 - b. Type and Size: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.
 - c. Fascia: Extruded aluminum, required to conceal shade mounting, attachable to mounting end caps, without exposed fasteners
 - 1) Color: Clear Anodized Aluminum
- 4. Roller Tubes: As required for type of shade operation; designed for removal without removing mounting hardware.
 - a. Material: Extruded aluminum with engineered wall & ribs to lock the clutch and idle end plug into place, providing strength & durability.
 - b. Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.
 - c. Fabric Attachment: Switch fabric changer spline attachment; fabric hook attached to top edge of shade fabric engages flexible tube hook that drops down from tube.
 - d. Roller tubes capable of being removed and reinstalled without affecting roller shade limit adjustments.
- 5. Hembars: Designed to maintain bottom of shade straight and flat; selected from manufacturer's standard options.
 - a. Style: Closed pocket; aluminum elliptical slat inside pocket with heat-sealed ends.

2.3 SHADEBAND MATERIALS

- A. Shadeband Material Flame-Resistance Rating: Comply with NFPA 701. Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- B. Light-Filtering Fabric: Woven fabric, stain and fade resistant.
 - 1. Basis-of-Design: Ambient Renew by Rollease Acmeda.
- C. Shade cloth material shall hang flat without buckling or distortion. The edge when trimmed shall hang straight without raveling. The unguided shade band shall roll up true and straight, without shifting sideways more than 1/8 inch in either direction due to warp distortion or weave design.

1. Fabric Drop Orientation: Regular roll, unless otherwise indicated on drawings.
2. Color and openness selections chosen by architect from the manufacturers full range of standard selections.
3. Nonflammable, color-fast, impervious to heat and moisture, and able to retain its shape under normal operation.
4. Material: 100 percent polyester. Free of lead, phthalates, PVC, formaldehyde, and fragrances.

2.4 ROLLER SHADE FABRICATION

- A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1, including requirements for flexible, chain-loop devices; lead content of components; and warning labels.
- B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F (23 deg C):
 1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which shade is installed less 1/4 inch (6 mm) per side or 1/2-inch (13-mm) total, plus or minus 1/8 inch (3.1 mm). Length equal to head-to-sill or -floor dimension of opening in which shade is installed less 1/4 inch (6 mm), plus or minus 1/8 inch (3.1 mm).
- C. Shadeband Fabrication: Fabricate shadebands without battens or seams to extent possible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Field Measurements: Verify actual measurements of openings by field measurements before fabrication; show recorded measurements on shop drawings.
- B. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, other conditions affecting performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ROLLER SHADE INSTALLATION

- A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.
- B. Replace shades that exceed specified dimensional tolerances at no extra cost to Owner.
- C. Roller Shade Locations: Windows at exterior walls of Main Office 102 and Office 102C.

3.3 ADJUSTING

- A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 DEMONSTRATION

- A. Demonstrate operation and maintenance of window shade system to Owner's personnel.

3.5 CLEANING AND PROTECTION

- A. Clean roller shade surfaces, after installation, according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged roller shades that cannot be repaired or cleaned to “like new” condition, in a manner approved by Architect, before time of Substantial Completion.

END OF SECTION 122413

SECTION 123400 - MANUFACTURED PLASTIC-LAMINATE-CLAD CASEWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and provisions of the contract including General Conditions, and Division 1, apply to this section.

1.2 SUMMARY

A. Section Includes:

1. Manufactured plastic-laminate-clad casework: Furnish and install high-pressure laminate casework and accessories as shown and listed on drawings and specified herein. Include all countertops, sink cutouts, splashes, supports, shelving, and filler panels necessary for a complete casework installation for general casework.
2. Verify all critical building dimensions prior to fabrication of casework. The casework manufacturer shall re-configure the casework arrangements to dimensions requiring 2-1/2" or less of filler at each end of wall-to-wall elevations, and to ensure a complete and satisfactory installation.
3. Provide all labor for unloading, distribution, and installation of casework and related items as specified.

B. Related Requirements:

1. Division 1 Section "Construction Waste Management and Disposal."
2. Division 6 Section "Miscellaneous Rough Carpentry" for blocking within walls to adequately support casework.
3. Division 6 Section "Interior Finish Carpentry" for custom casework with hardware per this section; and panelized trim.
4. Division 9 Section "Resilient Flooring" for resilient base.
5. Division 23: Mechanical-furnishing, installation, and hook-up of sinks, fixtures, outlets, strainers, tailpieces, traps, vacuum breakers, stops, etc., shall be performed by the mechanical contractor to state and local codes.
6. Division 26: The electrical contractor to state and local codes shall perform electrical furnishing, installation, and final connections of wiring, conduit, and/or electrical items within casework.

1.4 SUBMITTALS

- A. Product data: submit casework manufacturer's catalog showing model numbers, casework construction details, materials and hardware used.
- B. Submit color high-pressure decorative laminate brochures and edge chains samples.

1. Provide a minimum of (150) laminate selections to choose from among solids, patterns and woodgrains in the standard matte or suede finish.
 2. Provide a minimum of (48) PVC 3mm and .020-inch color selections.
- C. Submit interior samples as indicated on Finish Legend.
- D. Submit shop drawings consisting of:
1. Color and Hardware options selection sheet.
 2. Small scale floor plan showing casework in relation to the building.
 3. Large scale elevations and plan views.
 4. Cross-sections; service runs; blocking locations; and sink centerlines.
- E. Shop drawings to be submitted within 30 days after the notice to proceed or as specified in the general conditions of the contract documents.

1.6 DELIVERY, STORAGE, AND PROTECTION

- A. All casework shall be wrapped for protection.
- B. Disposable packaging materials causing un-necessary debris shall not be acceptable.
- C. All products shall be direct shipped on premium air-ride furniture vans by a licensed hauler to ensure that the casework joinery is not weakened or damage.
- D. Ambient relative humidity must be maintained between 25 – 55% prior to delivery and throughout the life of installation. Temperature must be controlled above 55°F. Casework shall not be stored in non-climate-controlled conditions.

PART 2 - PRODUCT

2.1 ACCEPTABLE MANUFACTURERS

- A. General Casework: Subject to the requirements of this section, acceptable manufacturers of plastic laminate casework include the following:
1. Case Systems, Inc., 2700 James Savage Road, Midland, Michigan 48642; (989) 496-9510. Basis-of-Design.
 2. Stevens Industries, Inc., 704 West Main Street, Teutopolis, IL.
 3. TMI Design: 50 South Third Avenue West, Dickinson, ND 58601-5595; (800) 456-6716.
 4. Wood-Metal Industries, 100 East Sherman Street, Selinsgrove, PA.

2.2 MATERIALS

- A. Core:
1. Particleboard: All particleboard shall be Grade M-2 Industrial, according to the American

National Standard (ANSI) for Mat-Formed Wood Particleboard, ANSI-A208.1-1999 and shall meet or exceed all requirements set forth by said document.

- a. Density: 40-50 lbs/cu.ft.
 - b. Moisture Content : 10 percent maximum.
 - c. Modulus of Rupture : 1885 psi.
 - d. Thickness Swelling 5.5 percent maximum.
2. Hardboard: All hardboard shall be tempered with a “S2S” surface finish and must meet or exceed the hardboard product standard ANSI-A135.5.

B. Edge Banding

1. PVC: 3mm and .020” PVC shall be color through and be applied utilizing hot melt adhesive and radiused by automatic trimmers. Hand tool applying and trimming of edge shall not be allowed. Edging shall be available in a minimum 48 color coordinated options. See section 2.07 for additional information.

C. Laminate:

1. High-Pressure Laminate
 - a. “High Pressure Laminates” shall meet the definition and performance requirements of ANSI/NEMA 3 LD – 2000. Vertical grade laminate shall be VGS, GP-28 balanced with a minimum grade of CLS. Countertops shall be HGS, GP-50 as specified. Minimum 150 color options. See section 2.07 for additional information.
 - b. Provide at all exposed exterior cabinet surfaces including wall cabinet bottoms and also interiors of open cabinets or those with glazed doors.
2. Thermally Fused Melamine Laminate
 - a. Thermally Fused Laminate shall meet the performance requirements of ANSI/NEMA 3 LD – 2000 for GP-28. Cabinet manufacturer shall submit panel manufacturers’ current published specification stating ANSI core properties and NEMA finish properties. Color shall match interior, Almond, Grey, or White. Surface texture shall be similar to exterior finish.
 - b. Provide at all semi-exposed and concealed surfaces, all surfaces that are not exposed when doors and drawers are closed except where balancing of GP-28 laminate is required.
3. Cabinet Liner
 - a. .020-inch thick, high- pressure cabinet liner conforming to ANSI/NEMA 3 LD – 2000, CLS. Color shall match interior, Almond, Grey, or White. Surface texture shall be similar to exterior finish.
 - b. Provide on semi exposed surfaces where exterior surface is GP-28 laminate for proper balancing. Surfaces are such as semi exposed face of doors, drawer heads, finished end panels, etc.

D. Adhesives:

1. PVA: Adhesive shall be mechanically applied; no contact adhesive will be permitted.
2. EVA: Adhesive shall be mechanically applied; no contact adhesive will be permitted.

2.3 HARDWARE

A. Hinges: 5 Knuckle hinges / reveal overlay.

1. Hinges shall be model #HH020 .095" steel five-knuckle hospital-tip institutional grade quality with .187" diameter tight pin. Residential, kitchen type pivot, plain butt, or hinges with removable pins "shall not be acceptable". Each hinge shall be secured with a minimum of nine No. 8 screws. Hinge shall permit door to swing 270 degrees without binding. Doors less than 48" in height shall have two hinges. Doors over 48" in height shall have three hinges. A minimum of three color finishes shall be available.

B. Pulls: One pull shall be located at the centerline of the drawer, regardless of width, to ensure ease of operation and maximize drawer slide life. One selection from standard options per color scheme.

1. Basis of Design Doug Mockett & Company, Inc.; DP157-SSS Tab, ADA compliant, 4 by 1-1/2 inches (101.6 by 38.1 mm), or equal.

C. Drawer Slides:

1. Standard drawer: DS230 Self-closing, bottom mount epoxy coated with captive roller and positive in stop. Slide shall have 100lb. load rating, must be self-closing and must prevent drawer fronts from contacting the cabinet body.
2. File drawer: DS430 Full extension, bottom mount epoxy coated with captive roller and positive in-stop. Slide shall have 100lb. load rating, must be full extension, and prevent drawer fronts from contacting the cabinet body.

D. Mod-Eez: All cabinet body components shall be secured utilizing concealed interlocking mechanical fasteners as approved by the Architectural Woodwork Institute Quality Standards 8th Edition -2003 Sections 400A-T-12, 400B-T10 and 1600-T-11. The Mod-Eez is also an approved fastener by the Woodwork Institute "Manual of Millwork".

F. Shelf Clips: Plastic

1. Shelf clips shall be SC240 injected molded clear plastic, with a double pin engagement 32mm on center and shall have 3/4" and 1" anti-tip locking tabs as approved in AWI 400B-T-9 for premium grade.

G. Coat Hooks: Single prong and double prong zinc plated.

J. Locks: Model # LK010. Provide at all drawers and cabinet doors unless specifically noted otherwise.

1. Five disc tumbler cam locks with chrome plated steel face plate.
2. All locks keyed alike or keyed differently by room and master keyed. Shall permit a minimum of 166 keying options.

3. Lock core is removable with a control key, permitting owner to easily change lock arrangements without tools.
4. Inactive door of base and wall cabinets shall be secured by using an elbow catch or a chain bolt for tall cabinets.

L. Chain Pulls: Model # CP200.

1. Zinc plated, spring loaded door catch used to hold door securely shut.

M. Chain Stops, model # CS010

1. Zinc plated looped chain used to limit door swing, mounting plate at each end of chain shall use (4) #7 x 5/8" screws to secure to cabinet door and end panel.

N. Elbow Catch, model # EC010

1. Chrome plated, spring loaded door catch used to hold door securely shut.

O. Roller Catch, model # RC010 (not used with self-closing hinges).

1. Heavy-duty spring-loaded roller, with molded plastic bumper mounted at door top to keep door securely shut.

P. Magnetic Catch, model # MC010 (not used with self-closing hinges).

1. White plastic housing with two 32mm spaced, elongated holes for screw attachment to allow adjustability.

R. Countertop Supports:

1. Powder-coated, formed metal supports using .25" X 1.50" steel bar stock. Must provide attachment points to counter top and wall. See Color Selection Section 2.07 for color information.

U. Grommets:

1. Basis of Design: Doug Mockett & Company, Inc.; MGB1/A26M; 3-inch (76.2 mm) diameter.

2.4 CASEWORK FABRICATION

A. General Cabinet Construction:

1. All structural components shall be min. 3/4" thick with balanced surfaces.
2. All fastening devices and screws shall be treated to deter or resist corrosion.
3. Mounting stretchers are 3/4" thick structural components fastened to end panels by mechanical fasteners, and are concealed by the cabinet back.
4. When the rear of a cabinet is exposed, a separate finished 3/4" thick decorative laminate back panel may be applied.
5. A 5mm diameter row hole pattern 32mm (1-1/4") on center shall be bored in cabinet ends

for adjustable shelves. This row hole pattern shall also serve for hardware mounting and replacement and/or relocation of cabinet components.

6. All door and drawer fronts and finished ends shall be balanced construction with “high-pressure” laminate bonded to both sides of a M-3 engineered board core.
7. Fixed interior components such as fixed shelves, dividers, and cubicle compartments shall be full 3/4" thick M-3 engineered board core attached with concealed interlocking mechanical fasteners.
8. All joints are tight fitting and will not rupture or loosen due to the following:
 - a. Dimensional changes in the engineered board.
 - b. Racking of casework during shipment and installation.
 - c. Normal use.
 - d. Seismic shock as tested and approved by the Woodwork Institute for casework used in schools and hospitals.

B. Cabinet Box:

1. Each end panel to be secured with mechanical fasteners for a total tensile strength of 2,450 pounds. (excluding tall cabinets)
2. All tall cabinet end panels to be secured with mechanical fasteners for a total tensile strength of 3,850 pounds. All tall cabinets to also be provided with an intermediate fixed shelf to maintain internal dimensional stability under heavy loading conditions as well as an intermediate 3/4" thick stretcher located behind the back panel and be secured to the cabinet ends with mechanical fasteners. Where an intermediate shelf is present, the stretcher shall also be secured to the shelf with #8 x 2" plated flat head screws.
3. All base cabinets, except sink cabinets, shall have a solid 3/4" thick sub-top of M-3 engineered board core fastened to the ends with interlocking mechanical fasteners.
4. All wall cabinet bottoms shall be of 1" thick M-3 engineered board core mechanically fastened to end panels and secured to the bottom back stretcher. A lower 3/4" thick stretcher shall be located behind the back panel and attached to the end panels with mechanical fasteners. The stretcher is also secured to the cabinet bottom.
5. All sink cabinets shall incorporate a split removable back panel. A formed front brace and steel corner gussets shall be utilized to support and securely fasten top in all four corners. Front brace shall be powder coated black with attached trim, matching box edge trim color.
6. An upper 3/4" thick stretcher shall be located behind the back panel and attached to the end panels with mechanical fasteners. This stretcher is also fastened to the full sub-stop thus capturing the back panel.

C. Backs, all back panels:

1. 1/2-inch thick surfaced both sides for balanced construction.
2. Fully captured on both sides and bottom; face-mounted, stapled backs are not acceptable.

D. Base: Individual bases constructed of exterior grade plywood, factory applied to base and tall cabinets shall support and carry the load of the end panels, and the cabinet bottom, directly to the floor. The base shall be let in from the sides and back of the cabinet to allow cabinets to be installed tightly together and tight against a wall. Also to conceal the top edge of applied vinyl base molding. There shall be a front to back center support for all bases over 30-inches wide.

E. Drawers:

1. All drawer components shall be 1/2-inch thick M-3 engineered board core surfaced both sides for balanced construction.
2. Drawer box shall be constructed with a full 1/2-inch thick, non-racking, non-deflecting platform bottom that is carried directly by "L" shaped, bottom mount drawer glides. Sides are secured with 1-1/2-inches long screws driven through the platform and into the sides.
3. Sides, back, sub-front and bottom shall be 1/2-inch thick M-3 engineered board core surfaced both faces with (Frosty White: Wilsonart 1573, Natural Almond: Wilsonart D30, Fog: Formica 961) thermally fused melamine. The top edge shall be nominal 1mm (.020-inch) PVC matching the drawer color.
4. Corners shall be joined with fluted hardwood dowels and glue spaced at a minimum of 32mm on center.
5. Drawer fronts shall be removable and attached to drawer box sub-front with screws from inside of drawer.
6. Horizontal parting rails between drawers shall be 3/4-inch M-3 engineered board with balanced surfaces, secured to and further reinforcing cabinet ends. When drawers are keyed individually within a cabinet, or when drawers are fitted with lock hasps, the parting rail shall run full depth of cabinet to prevent pilfer.
7. Drawers with 1/4-inch bottoms requiring hot melt glue or intermediate supports will not be permitted. No exceptions will be permitted.
8. File drawer box shall have full height sides supporting a heavy-duty support rail for hanging file folders. Painted steel supports or metal file frames set into the drawer are not acceptable.

F. Doors:

1. Solid Doors: Solid 3/4-inch M-3 engineered board core with HPL front and liner back used for balanced construction.

G. Adjustable Shelves

1. Laminate Shelves
 - a. Adjustable shelves shall be M-3 engineered board core with balanced surfaces and have a nominal 1mm (.020-inch) thick PVC front edge.
 - b. Adjustable shelves 36-inches wide and over shall be 1-inch thick.
 - c. All adjustable shelves in open cabinets shall be 1-inch thick, except for special use cabinets such as mail, cubical or locker type units.
 - d. All other shelves shall be 3/4-inch thick.

2.6 COLOR SELECTION

A. Edge Banding:

1. PVC
 - a. Thick (3mm) coordinating and contrasting edge solutions are to be selected from minimum (48) color-thru standard colors with a low gloss smooth finish. No hand tool trimming allowed.
 - b. Thin (Nominal 1mm, actual .020-inch) coordinating and contrasting edge solutions

are to be selected from minimum (48) color-thru standard colors. No hand tool trimming allowed.

B. Laminate:

1. High Pressure Laminate for cabinets or counter tops are to be selected from minimum (150) manufacturers' standard line suede finishes from selected laminate manufacturers, including WilsonArt® in a "60" matte finish and Nevamar® in a "T" textured finish.
2. Thermally Fused Melamine Laminate to be selected from Natural Almond (WilsonArt D30), Fashion Gray (Wilsonart D381) and Frosty White (Wilsonart 1573) for the standard interior cabinet surface.

C. Miscellaneous Hardware

1. Table Frames: light beige, grey or black
2. Countertop Support: X0500 Support in grey, light beige, black and white
3. Hinges: HH020 5 Knuckle hinge to be selected from black, almond and platinum in an epoxy powder coat.
4. Grommets: GR660 Round grommet to be selected from black, almond, grey or white.

2.7 PRODUCT QUALITY TESTING

A. Cabinet Joinery

1. Base Cabinet: Test base cabinet in accordance with SEFA 8PL Recommended Practices Paragraph 4.0 Base Cabinets. Perform SEFA testing by certified independent testing facilities. Perform the following tests:
 - a. The SEFA test procedures are accessible on-line at www.sefalabs.com. The ANSI/NEMA 3 LD – 2000 test procedures are available on-line at www.global.ihs.com.

<u>Test</u>	<u>Paragraph</u>
Cabinet Load	4.2
Cabinet Concentrated Load	4.3
Cabinet Torsion	4.4
Cabinet Submersion	4.5

2. Doors: Test doors in accordance with SEFA 8PL Recommended Practices Paragraph 5.0 Doors. Perform the following tests:

<u>Test</u>	<u>Paragraph</u>
Door Hinge Test	5.1
Door Cycle Test	5.2

3. Drawers: Test drawers in accordance with SEFA 8PL Recommended Practices Paragraph 6.0 Drawers. Perform the following tests:

<u>Test</u>	<u>Paragraph</u>
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**JULIAN CURTISS SCHOOL
ADA RENOVATIONS PHASE I & II
GREENWICH, CT**

Drawer Static Test	6.1
Drawer Impact Test	6.2
Drawer Internal Rolling Test	6.3
Drawer Cycle Test	6.4

4. Cabinet Surface Finish: Test cabinet surface finishes in accordance with SEFA 8PL Recommended Practices Paragraph 8.0, Cabinet Surface Finish Tests. Perform the following tests:

<u>Test</u>	<u>Paragraph</u>
Chemical Spot Test	8.1
Boiling Water Resistance Test	8.2 (ANSI/NEMA LD 3 -2000 Paragraph 3.5)
Ball Impact Resistance Test	8.3 (ANSI/NEMA LD 3 -2000 Paragraph 3.8)
Dart Impact Resistance Test	8.4 (ANSI/NEMA LD 3 – 2000 Paragraph 3.9)

5. Edge Delaminating Test: Test edge delaminating in accordance with SEFA 8PL Recommended Practices Paragraph 8.5, Edge Delaminating Test.
6. Plastic Laminate Abrasion Test: Test plastic laminate abrasion in accordance with SEFA 8PL Recommended Practices Paragraph 8.7 Plastic Laminate Abrasion Test (ANSI/NEAM LD 3 – 2000 Paragraph 3.13).
7. Wall, Counter Mounted, and Tall Cabinets Load Test: Test wall mounted cabinet load in accordance with SEFA 8PL Recommended Practices Paragraph 9.0.

PART 3 - EXECUTION

3.1 SHIPPING

- A. All casework shall be blanket wrapped and delivered to the jobsite in air-ride furniture vans.

3.2 CASEWORK INSTALLATION

- A. Casework shall not be delivered or stored at the jobsite until building has become adequately dry and secure. The ambient relative humidity must be maintained between 25% and 55% prior to delivery and through the life of the installation.
- B. Installation shall be by CASEWORK MANUFACTURER'S authorized representative.
- C. Casework is to be installed plumb and true, and is to be securely anchored in place. Scribe casework fillers as necessary for a tight fit.
- D. Wall cabinets shall be securely fastened to horizontal blocking, not to plaster, lath, or wallboard. Appropriate trade shall provide reinforcement of stud walls during erection of walls. CASEWORK MANUFACTURER shall accurately locate blocking requirements on shop drawings.

- E. Install countertops on base cabinets using screws.

3.3 CLEANING AND PROTECTION

- A. Empty drawers of dirt and dust. Wipe out cabinets interiors to remove dirt and dust. Remove pencil or other marks, excess adhesive, etc. from cabinets and countertops. Remove all packaging, scraps, and debris resulting from casework installation activities.
- B. Make final adjustments to doors and drawers. Doors shall swing freely, catches shall hold securely, and all other doors shall be aligned both vertically and horizontally. Drawers shall open and close smoothly, without binding and without excessive slide play.
- C. Keys shall be appropriately labeled and turned over to the Owner.

3.4 SCHEDULE

- A. **LTC-1 (Laminate Tall-1)**, similar to *Case Systems T0100 Tall Cabinet - Storage with Doors*; Four adjustable shelves, one centered fixed shelf, two hinged doors.
- B. **LTC-2 (Laminate Tall-2)**, similar to *Case Systems T1040 Tall Cabinet – Cubicle Storage with Doors*; Eight adjustable shelves, Two centered fixed shelves, One fixed center partition, Two hinged doors.
- C. **LBC-1 (Laminate Base-1)**, similar to *Case Systems B3100 Base Cabinet – Door/Drawer Storage*; One adjustable shelf, two drawers, two hinged doors.
- D. **LBC-2 (Laminate Base-2)**, similar to *Case Systems B0000 Base Cabinet – Open Storage*; One adjustable shelf.
- E. **LBC-3 (Laminate Base-3)**, similar to *Case Systems B4020 Base Cabinet – Two Drawer Storage*; Two drawers.
- F. **LBC-4 (Laminate Base-4)**, similar to *Case Systems B0030 Base Cabinet – Open Storage*; Fixed shelves.
- G. **LWC-1 (Laminate Wall-1)**, similar to *Case Systems W0100 Wall Cabinet – Storage with Doors*; Adjustable shelves, two hinged doors. Provide with R9600 Apron.
- H. **LWC-2 (Laminate Wall-2)**, similar to *Case Systems W2900 Open Mail Cubicle – Fixed Shelves*; Four fixed vertical partitions, Fixed cubicle shelf thickness is nominal $\frac{3}{4}$ inch.
- I. **LWC-3 (Laminate Wall-3)**, similar to *Case Systems W0000 Wall Cabinet – Open Storage*; Adjustable shelves.

END OF SECTION 123400

SECTION 123661 - SOLID SURFACING MATERIALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Solid surface material countertops and wall caps.
2. Solid surface material apron fronts.
3. Solid surface material window stools and aprons

B. Related Requirements:

1. Division 1 Section "Construction Waste Management and Disposal".
2. Division 6 Section "Interior Finish Carpentry."
3. Division 7 Section "Joint Sealants."
4. Division 9 Section "Gypsum Board Shaft Wall Assemblies" for metal wall framing, and gypsum wall assemblies.
5. Division 9 Section "Gypsum Board."
6. Division 9 Section "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.

1.3 ACTION SUBMITTALS

- A. Product Data: For countertop, window stools and apron materials.
- B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.
 1. Show locations and details of joints.
 2. Show direction of directional pattern, if any.
- C. Samples for Verification: For the following products:
 1. Countertop material, 6 inches (150 mm) square.
- D. INFORMATIONAL SUBMITTALS
- D. Qualification Data: For fabricator.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For solid surface material countertops to include in maintenance manuals. Include Product Data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.
- B. Installer Qualifications: Fabricator of countertops.

1.6 FIELD CONDITIONS

- A. Field Measurements: Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete.

1.7 COORDINATION

- A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 - PRODUCTS

2.1 SOLID SURFACE COUNTERTOP MATERIALS

- A. Solid Surface Material: Homogeneous-filled plastic resin complying with ICPA SS-1.
 - 1. Subject to compliance with the requirements of this section, provide solid surface materials from one of the following manufacturers:
 - a. Avonite Surfaces.
 - b. DuPont Corian.
 - c. Durat.
 - d. Formica Corporation.
 - e. Sloan Valve Company.
 - e. Wilsonart.
 - 2. Type: Provide Standard type unless Special Purpose type is indicated.
 - 3. Colors and Patterns: As indicated by manufacturer's designations.
- B. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.
- C. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

2.2 COUNTERTOP FABRICATION

- A. Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards."
 - 1. Grade: Premium.
- B. Configuration:
 - 1. Front: Straight, slightly eased at top.
 - 2. Backsplash: Straight, slightly eased at corner.
 - 3. End Splash: Matching backsplash.
- C. Countertops: 1/2-inch- (12.7-mm-) thick, solid surface material with front edge built up with same material.
- D. Aprons: 1/2-inch- (12.7-mm-) thick, solid surface material.
- E. Fabricate tops with shop-applied edges unless otherwise indicated. Comply with solid surface material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
- F. Joints: Fabricate in sections for joining in field.
 - 1. Joint Locations: Not within 18 inches (450 mm) of a sink or cooktop and not where a countertop section less than 36 inches (900 mm) long would result, unless unavoidable.
 - 2. Splined Joints: Accurately cut kerfs in edges at joints for insertion of metal splines to maintain alignment of surfaces at joints. Make width of cuts slightly more than thickness of splines to provide snug fit. Provide at least three splines in each joint.

2.3 INSTALLATION MATERIALS

- A. Adhesive: Product recommended by solid surface material manufacturer.
- B. Sealant for Countertops: Comply with applicable requirements in Section 079200 "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates to receive solid surface material countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install countertops level to a tolerance of 1/8 inch in 8 feet (3 mm in 2.4 m), 1/4-inch (6 mm) maximum. Do not exceed 1/64-inch (0.4-mm) difference between planes of adjacent units.
- B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
- C. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.
- D. Secure countertops to subtops with adhesive according to solid surface material manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
- E. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
 - 1. Install metal splines in kerfs in countertop edges at joints. Fill kerfs with adhesive before inserting splines and remove excess immediately after adjoining units are drawn into position.
 - 2. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.
- F. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.
- G. Install aprons to backing and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Fasten by screwing through backing. Predrill holes for screws as recommended by manufacturer.
- H. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.
 - 1. Seal edges of cutouts in particleboard subtops by saturating with varnish.
- I. Apply sealant to gaps at walls; comply with Division 7 Section "Joint Sealants."

END OF SECTION 123661

SECTION 142100 - ELECTRIC TRACTION ELEVATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes machine-room-less electric traction elevators.
 - 1. New passenger elevator.
- B. Products Installed but not Furnished under This Section:
 - 1. Hoist Beam
 - 2. Pit Ladder
 - 3. Inserts mounted in CMU walls for rail attachments.
- C. Related Sections: Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Division 1 Section "Construction and Demolition Waste Management."
 - 2. Division 1 Section "Temporary Facilities and Controls" for temporary use of elevators for construction purposes.
 - a. Removable barricades at all hoistway openings, in compliance with OSHA 29 CFR 1926.502 in addition to any local code requirements.
 - b. Lifeline attachments capable of withstanding 5000 lb load in accordance with OSHA 29 CFR 1926.502. Provide a minimum of 2 at the top, front of each hoistway.
 - c. Temporary lighting, including temporary lighting in hoistway for machine space with switch located in hoistway on the strike jamb side of top landing door.
 - 3. Division 4 Section "Unit Masonry" for setting sleeves, inserts, and anchoring devices in masonry and for grouting elevator entrance frames installed in masonry walls.
 - 4. Division 5 Section "Structural Steel" for the following:
 - a. Attachment plates, angle brackets, and other preparation of structural steel for fastening guide-rail brackets.
 - 5. Division 5 Section "Metal Fabrications" for the following:
 - a. Attachment plates and angle brackets for supporting guide-rail brackets.

- b. Guide Rail Supports: Structurally adequate to extend from pit floor to top of hoistway, with spans in accordance with requirements of authority having jurisdiction and final layouts.
 - c. For the installation of hoist beams.
 - d. Structural-steel shapes for subsills.
 - e. For the installation of pit ladders.
 - f. Cants made from steel sheet in hoistways.
- 6. Division 9 Section "Resilient Flooring" for finish flooring in elevator cars.
- 7. Division 9 Section "Painting" for field painting of hoistway entrance doors and frames.
 - a. One fused three phase permanent power in building electrical distribution room
 - b. One non fused three phase permanent power in hoist way at top landing.
- 8. Division 23, "Heating, Ventilating and Air Conditioning" for hoistway ventilation shall be in accordance with local and national building code requirements.
- 9. Division 26, "Electrical" for:
 - a. Pit lighting: Fixture with switch and guards. Provide illumination level equal to or greater than that required by ASME A17.1/CSA B44 2000, or applicable version.
 - b. Control space lighting with switch. Coordinate switch with lighting for machine space as allowable by code.
 - c. Main line disconnects for each elevator.

1.3 DEFINITIONS

- A. Definitions in ASME A17.1/CSA B44 Safety Code for Elevators and Escalators apply to work of this Section.
- B. ICC/ANSI A117.1 Accessible and Usable Buildings and Facilities
- C. ADAAG - Accessibility Guidelines for Buildings and Facilities
- D. ANSI/NFPA 70, National Electrical Code.
- E. ANSI/NFPA 80, Standard for Fire Doors and Fire Windows.

1.4 ACTION SUBMITTALS

- A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information. Include Product Data for car enclosures, hoistway entrances, and operation, control, and signal systems.
 - 1. Cab design, dimension and layout.
 - 2. Layout, finishes and accessories and available options.
 - 3. Controls, signals and operating system.
 - 4. Color selection charts for cab and entrances.
- B. Shop Drawings:

1. Include plans, elevations, sections, and large-scale details indicating service at each landing, coordination with building structure, relationships with other construction, and locations of equipment.
 - a. Clearances and travel of car.
 - b. Clear inside hoistway and pit dimensions.
 - c. Location and layout of equipment and signals.
 - d. Car, guide rails, buffers and other components in hoistway.
 - e. Maximum rail bracket spacing.
 - f. Maximum loads imposed on building structure.
 - g. Hoist beam requirements.
 - h. Location and sizes of access doors.
 - i. Location and details of hoistway door and frames.
 - j. Electrical characteristics and connection requirements.
 2. Include large-scale layout of car-control station.
 3. Indicate maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.
- C. Samples for Initial Selection: For finishes involving color selection.
1. Color selection charts for cab and entrances.
 2. Layout finishes and accessories and available options.
- D. Samples for Verification: For exposed car, hoistway door and frame, and signal equipment finishes; 3-inch (75-mm-) square Samples of sheet materials; and 4-inch (100-mm) lengths of running trim members.
- E. Operation and maintenance data: Provide manufacturer's standard maintenance and operation manual.
- F. Diagnostic Tools: Prior to seeking final acceptance for the completed project as specified by the Contract Documents, the Elevator Contractor shall deliver to the Owner any specialized tool(s) that may be required to perform diagnostic evaluations, adjustments, and/or parametric software changes and/or test and inspections on any piece of control or monitoring equipment installed. This shall include any specialized tool(s) required for monitoring, inspection and/or maintenance where the means of suspension other than conventional wire ropes are furnished and installed by the Elevator Contractor. Any and all such tool(s) shall become property of the Owner.
1. Any diagnostic tool provided to the Owner by the Elevator Contractor shall be configured to perform all levels of diagnostics, systems adjustment and parametric software changes which are available to the Elevator Contractor.
 2. In those cases where diagnostic tools provided to the Owner require periodic recalibration/or re-initiation, the Elevator Contractor shall perform such tasks at no additional cost to the Owner for a period equal to the term of the maintenance agreement from the date of final acceptance of the competed project
 3. During those intervals in which the Owner might find it necessary to surrender a diagnostic tool for re-calibration, re-initiation, or repair, the Elevator Contractor shall provide a temporary replacement for the tool at no additional cost to the Owner.

4. The Elevator Contractor shall deliver to the Owner, printed instructions for the proper use of any tool that may be necessary to perform diagnostic evaluations, system adjustment, and/or parametric software changes on any unit of microprocessor-based elevator control equipment and means of suspension other than standard elevator steel cables furnished and install by the Elevator Contractor. Accompanying the printed instructions shall be any and all access codes, password, or other proprietary information that is necessary to interface with the microprocessor-control equipment.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway, pit, and machine room layout and dimensions, as indicated on Drawings, and electrical service, as shown and specified, are adequate for elevator system being provided.
- C. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For elevators to include in emergency, operation, and maintenance manuals.
- B. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.
- C. Continuing Maintenance Proposal: Submit a continuing maintenance proposal from Installer to Owner, in the form of a standard two-year maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.
 1. Replacement parts shall be produced by the original equipment manufacturer.
 2. Maintenance service be performed during regular working hours of regular working days and shall include emergency 24-hour call back service.
 3. Maintenance service excludes adjustments, repairs or replacement of parts due to negligence, misuse, abuse or accidents.
- D. Continuing Maintenance Proposal: Submit a continuing maintenance proposal from Installer to Owner with terms, conditions, and obligations as set forth in, and in same form as, a "Draft of Elevator Maintenance Agreement," starting on date initial maintenance service is concluded.

1.7 QUALITY ASSURANCE

- A. Manufacturer: Minimum of fifteen years' experience in the fabrication, installation and service of elevators of the type and performance of the specified. The manufacturer shall have a documented quality assurance program.

- B. Installer Qualifications: Elevator manufacturer or an authorized representative who is trained and approved by manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials, components, and equipment in manufacturer's protective packaging. Store materials, components, and equipment off of ground, under cover, and in a dry location.
 - 1. Comply with manufacturer's recommendations for delivery, storage and handling.
- B. Verify suitability of project site field conditions for delivery, receipt and storage of elevator material prior to agreed shipping date.
- C. Store elevator materials in protected environment in accordance with manufacturer's recommendations.
 - 1. Secure a minimum storage area of 10 feet by 20 feet is required adjacent to the hoistway.

1.9 COORDINATION

- A. Coordinate installation of inserts, sleeves, block outs, elevator equipment with integral anchors, and other items that are embedded in concrete or masonry for elevator equipment. Furnish templates, inserts, sleeves, elevator equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.
- B. Coordinate locations and dimensions of work specified in other Sections that relates to electric traction elevators including pit ladders; sumps and floor drains in pits; entrance subsills; electrical service; and electrical outlets, lights, and switches in hoistways, pits, and machine rooms.

1.10 WARRANTY

- A. Manufacturer's Special Warranty: Manufacturer agrees to repair, restore, or replace elevator work that fails in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
 - 2. Warranty Period: 2 year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Provide AC gearless machine room-less elevator systems subject to compliance with the design and performance requirements of this specification.
 - 1. KONE, Inc.; MonoSpace traction elevators (Basis of Design).
- B. Subject to compliance with requirements, acceptable alternative manufacturers are limited to the following:
 - 1. Otis Elevator Company.
 - 3. Schindler Elevators and Escalators.
- C. Source Limitations: Obtain elevators from single manufacturer.
 - 1. Major elevator components, including driving machines, controllers, signal fixtures, door operators, car frames, cars, and entrances, shall be manufactured by single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with ASME A17.1/CSA B44.
- B. Accessibility Requirements: Comply with requirements for accessible elevators in the United States Access Board's ADA-ABA Accessibility Guidelines and with ICC A117.1.
- C. Seismic Performance: Elevator system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 and shall comply with elevator seismic requirements in ASME A17.1/CSA B44.
 - 1. Project Seismic Design Category: B.
 - 2. Elevator Component Importance Factor: 1.0.
 - 3. Design earthquake spectral response acceleration short period (Sds) for Project is as indicated by the Drawings.
 - 4. Provide earthquake equipment required by ASME A17.1/CSA B44.
 - 5. Provide seismic switch required by ASCE/SEI 7.
- D. Car Performance
 - 1. Car Speed $\pm$ 5% of contract speed under any loading condition or direction of travel.
 - 2. Car Capacity: Safely lower, stop and hold (per code) up to 125% of rated load.
- E. System Performance
 - 1. Vertical Vibration (maximum): 25 mg.
 - 2. Horizontal Vibration (maximum): 25 mg,
 - 3. Jerk Rate (maximum): 3.3 ft/sec³.
 - 4. Acceleration (maximum) 1.3 ft/sec².

5. In Car Noise: = 55 dB(A).
6. Leveling Accuracy: ± 0.2 inches.
7. Starts per hour (maximum): 120.

2.3 ELEVATORS

- A. Elevator System, General: Manufacturer's standard elevator systems. Unless otherwise indicated, manufacturer's standard components shall be used, as included in standard elevator systems and as required for complete system.
- B. Elevator Description:
 1. Machine Type: Gearless traction elevator, KONE MonoSpace (Basis of Design).
 2. Rated Load: 3500 lb.
 3. Rated Speed: 150 fpm (0.762 m/s).
 4. Stretcher Compliant.
 5. Equipment Control: KCM831
 6. Drive: Non Regenerative
 7. Landings: 3
 8. Openings: 3 front, side opening per Drawings.
 9. Travel: 22 feet 10 inches (field verify).
 10. Clear Inside Dimensions 6' - 8"w x 4' - 3"d
 11. Cab Height: 8 feet (less 6-inch maximum depth of suspended ceiling)
 12. Entrance Width and Type: 3'- 6" Single Speed
 13. Entrance Height: 7' - 0"
 14. Main Power Supply: 480 Volts + 5%, three-phase
 15. Operation: Simplex
 16. Machine Location: Inside the hoistway mounted on car guide rail.
 17. Control Space Location: top floor jamb
 18. Maintenance Service Period: 12 months

2.4 EQUIPMENT: CONTROL COMPONENTS AND CONTROL SPACE

- A. Controller: Provide microcomputer-based control system to perform all of the functions
 1. All high voltage (110V or above) contact points inside the controller cabinet shall be protected from accidental contact in a situation where the controller doors are open.
 2. Controller shall be separated into two distinct halves; Motor Drive side and Control side. High voltage motor power conductors shall be routed and physically segregated from the rest of the controller.
 3. Provide a serial cardrack and main CPU board containing a non-erasable EPROM and operating system firmware.
 4. Variable field parameters and adjustments shall be contained in a non-volatile memory module.
- B. Drive: Provide Variable Voltage Variable Frequency AC drive system to develop high starting torque with low starting current.

- C. Controller Location: Locate controller{s} in the front wall integrated with the top landing entrance frame, machine side of the elevator. A separate control space should not be required.

2.5 EQUIPMENT: HOISTWAY COMPONENTS

- A. Machine: AC gearless machine, with permanent magnet synchronous motor, direct current electro-mechanical disc brakes and integral traction drive sheave, mounted to the car guide rail at the top of the hoistway.
- B. Governor: Friction type over-speed governor rated for the duty of the elevator specified.
- C. Buffers, Car and Counterweight: Polyurethane buffer.
- D. Hoistway Operating Devices:
 - 1. Emergency stop switch in the pit.
 - 2. Terminal stopping switches.
 - 3. Emergency stop switch on the machine.
- E. Positioning System: System consisting of magnets and proximity switches.
- F. Guide Rails and Attachments: Steel rails with brackets and fasteners.
- G. Security features shall not affect emergency firefighters' service.
 - 1. Card-Reader Operation: System uses card readers at hallway entrance call stations to authorize calls. Security system determines which landings and at what times calls require authorization by card readers. Make final connections of conductors provided by the Security Access Contractor from each card reader to the elevator controller located at the upper most landing. Provide programming of the elevator controller.
 - a. Security access system equipment is specified in Division 28 Section "Access Control." Refer to Drawings.

2.6 EQUIPMENT: HOISTWAY ENTRANCES

- A. Hoistway Entrances:
 - 1. Sills: extruded.
 - 2. Doors: Hollow metal construction with vertical internal channel reinforcements.
 - 3. Fire Rating: Entrance and doors shall be UL fire-rated for 1-1/2 hour.
 - 4. Entrance Finish: Brushed Stainless Steel.
 - 5. Entrance Markings Jamb Plates: Provide standard entrance jamb tactile markings on both jambs, at all floors. Plate Mounting: Refer to manufacturer drawings.

2.7 EQUIPMENT: CAR COMPONENTS

- A. Car Frame: Provide car frame with adequate bracing to support the platform and car enclosure.

- B. Platform: Platform shall be all steel construction.
- C. Car Guides: Provide guide-shoes mounted to top and bottom of both car and counterweight frame. Each guide-shoe assembly shall be arranged to maintain constant contact on the rail surfaces. Provide retainers in areas with Seismic design requirements.
- D. Steel Cab Finish: Stainless Series.
 - 1. Car Wall Panels: Non-removable vertical panels selected from standard manufacturer's catalog of choices.
 - 2. Subfloor: Exterior, C-C Plugged grade plywood, not less than 7/8-inch (22.2-mm) nominal thickness.
 - 3. Car Front Finish: Brushed stainless steel.
 - 4. Car Door Finish: Brushed stainless steel.
 - 5. Ceiling: Round LED Down Light Drop Ceiling - LF-88: Satin Finished Stainless Steel three panel suspended ceiling with three holes per panel for Round LED lights.
 - 6. Handrail: Provide rails on side and back wall of car enclosure.
 - 7. Flooring: By others. (Not to exceed 2sqft and 1/2" finished depth).
 - 8. Threshold: Aluminum.
- E. Emergency Car Signals:
 - 1. Emergency Siren: Siren mounted on top of cab that is activated when the alarm button in the car operating panel is engaged. Siren shall have rated sound pressure level of 80 dB(A) at a distance of three feet from device. Siren shall respond with a delay of not more than one second after activation of alarm button.
 - 2. Emergency Car Lighting: Provide emergency power unit employing a 12-volt sealed rechargeable battery and totally static circuits shall illuminate the elevator car and provide current to the alarm bell in the event of building power failure.
 - 3. Emergency Exit Contact: An electrical contact shall be provided on the car-top exit.
 - 4. Ventilation: Fan.

2.8 EQUIPMENT: SIGNAL DEVICES AND FIXTURES

- A. Car Operating Panel: Provide vandal resistant car operating panel with all push buttons, key switches, and message indicators for elevator operation. Fixture finish: Textured Stainless Steel.
 - 1. Flush mounted car operating panel shall contain a bank of round, mechanical, illuminated buttons marked to correspond to landings served, emergency call button, door open button, door close button, and key switches for lights, inspection, and exhaust fan. Buttons have blue illumination (halo). All buttons to have raised text and Braille marking on left hand side. The car operating display panel shall be blue DOT-matrix. All texts, when illuminated, shall be blue. The car operating panel shall have a brushed stainless steel finish.
 - 2. Additional features of car operating panel shall include:
 - a. Car Position Indicator within operating panel amber.

- b. Elevator Data Plate marked with elevator capacity and car number on car top.
 - c. Help buttons with raised markings.
 - d. In car stop switch per local code.
 - e. Firefighter's hat.
 - f. Firefighter's Phase II Key-switch.
 - g. Call Cancel Button.
 - h. Pre-programmed integrated ADA phone (complete description of krms features included as standard).
 - i. Help Button/Communicator. Activation of help button will initiate two-way communication between car and a location inside the building, switching over to alternate location if call is unanswered, where personnel are available to take the appropriate action. Visual indicators are provided for call initiation and call acknowledgement.
 - j. Firefighter's Phase II emergency in-car operating instructions.
 - k. Landing Passing Signal: A chime bell shall sound in the car to signal that the car is either stopping at or passing a floor served by the elevator.
 - B. Hall Fixtures: Wall mounted [vandal resistant] hall fixtures shall be provided with necessary push buttons and key switches for elevator operation. Wall mounted hall fixtures shall have a brushed stainless steel finish.
 - 1. Vandal Resistant Hall fixtures shall feature round, mechanical, illuminated buttons in flush fixture housings. Hall fixtures shall correspond to options available from that landing.
 - C. Hall Lanterns and Chime: A vandal resistant directional lantern visible from the corridor shall be provided at each hall entrance. When the car stops and the doors are opening, the lantern shall indicate the direction in which the car is to travel and a chime will sound. The chime will sound once for up and twice for down.
- 2.9 EQUIPMENT: ELEVATOR OPERATION AND CONTROLLER
- A. Elevator Operation.
 - 1. Simplex Collective Operation: Using a microprocessor-based controller, operation shall be automatic by means of the car and hall buttons. If all calls in the system have been answered, the car shall park at the last landing served.
 - B. Standard Operating Features to include:
 - 1. Full Collective Operation.
 - 2. Fan and Light Control.
 - 3. Load Weighing Bypass.
 - 4. Ascending Car Uncontrolled Movement Protection.
 - 5. Top of Car Inspection Station.
 - C. Additional Operating Features to include:
 - 1. Independent Service.

2. Provision for Card Reader in Car: Secure car access controlled via card reader during regular school hours. Access shall automatically revert to unsecured access before and after regular school hours and weekends. Provide programmable system to set school schedule. Firefighter's emergency operation shall be fully operational at all times. Card reader system shall not restrict access at any time.
3. Emergency Battery Power Supply: When the main line power is lost for longer than 5 seconds the emergency battery power supply provides power automatically to the elevator controller. The elevator will rise or lower to the first available landing, open the doors, and shut down. The elevator will return to service upon the return of normal main line power. An auxiliary contact on the main line disconnect and shunt trip breaker (if used) will be provided by others.

D. Elevator Control System for Inspections and Emergency.

1. Provide devices within controller to run the elevator in inspection operation.
2. Provide devices on car top to run the elevator in inspection operation.
3. Provide within controller an emergency stop switch to disconnect power from the brake and prevents motor from running.
4. Provide the means from the controller to mechanically lift and control the elevator brake to safely bring car to nearest available landing when power is interrupted.
5. Provide the means from the controller to reset the governor over speed switch and also trip the governor.
6. Provide the means from the controller to reset the emergency brake when set because of an unintended car movement or ascending car over speed.
7. Provide the means for the control to reset elevator earthquake operation.
8. Emergency elevator control system operation shall override card reader access system to allow firefighter's emergency operation at all times.

2.10 EQUIPMENT: DOOR OPERATOR AND CONTROL

- A. Door Operator: A closed loop permanent magnet VVVF high-performance door operator shall be provided to open and close the car and hoistway doors simultaneously. Door movement shall be cushioned at both limits of travel. Electro-mechanical interlock shall be provided at each hoistway entrance to prevent operation of the elevator unless all doors are closed and locked. An electric contact shall be provided on the car at each car entrance to prevent the operation of the elevator unless the car door is closed.
- B. The door operator shall be arranged so that, in case of interruption or failure of electric power, the doors can be readily opened by hand from within the car, in accordance with applicable code. Emergency devices and keys for opening doors from the landing shall be provided as required by local code.
- C. Doors shall open automatically when the car has arrived at or is leveling at the respective landings. Doors shall close after a predetermined time interval or immediately upon pressing of a car button. A door open button shall be provided in the car. Momentary pressing of this button shall reopen the doors and reset the time interval.
- D. Door hangers and tracks shall be provided for each car and hoistway door. Tracks shall be contoured to match the hanger sheaves. The hangers shall be designed for power operation with

provisions for vertical and lateral adjustment. Hanger sheaves shall have polyurethane tires and pre-lubricated sealed-for-life bearings.

- E. Electronic Door Safety Device. The elevator car shall be equipped with an electronic protective device extending the full height of the car. When activated, this sensor shall prevent the doors from closing or cause them to stop and reopen if they are in the process of closing. The doors shall remain open as long as the flow of traffic continues and shall close shortly after the last person passes through the door opening.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Field measure and examine substrates, supports, and other conditions under which elevator work is to be performed.
- B. Field measure and examine substrates, supports, and other conditions under which elevator work is to be performed.
- C. Prior to start of Work, verify hoistway is in accordance with shop drawings. Dimensional tolerance of hoistway from shop drawings: -0 inches +2 inches. Do not begin work of this section until dimensions are within tolerances.
- D. Prior to start of Work, verify projections greater than 2 inches (4 inches if ASME A17.1/CSA B44 2000 applies) must be beveled not less than 75 degrees from horizontal.
- E. Prior to start of Work, verify landings have been prepared for entrance sill installation. Traditional sill angle or concrete sill support shall not be required.
- F. Prior to start of Work, verify elevator pit has been constructed in accordance with requirements, is dry and reinforced to sustain vertical forces, as indicated in approved submittal. Verify that sumps or sump pumps located within pit will not interfere with installed elevator equipment.
- G. Prior to start of Work, verify control space has been constructed in accordance with requirements, with access coordinated with elevator shop drawings, including Sleeves and penetrations.
- H. Verify installation of GFCI protected 20-amp in pit and adjacent to each signal control cabinet in control space.

3.2 PREPARATION

- A. Coordinate installation of anchors, bearing plates, brackets and other related accessories

3.3 INSTALLATION

- A. Install equipment, guides, controls, car and accessories in accordance with manufacturer installation methods and recommended practices.
- B. Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.
- C. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts to minimize vibration transmission to structure and structure-borne noise due to elevator system.
- D. Lubricate operating parts of systems, including ropes, as recommended by manufacturers.
- E. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with car. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.
- F. Leveling Tolerance: 1/8 inch (3 mm), up or down, regardless of load and travel direction.
- G. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.
- H. Locate hall signal equipment for elevators as follows unless otherwise indicated:
 - 1. For groups of elevators, locate hall push-button stations between two elevators at center of group or at location most convenient for approaching passengers.
 - 2. Place hall lanterns either above or beside each hoistway entrance.
 - 3. Mount hall lanterns at a minimum of 72 inches (1829 mm) above finished floor.
- I. Lubricate operating system components in accordance with manufacturer recommendations.
- J. Perform final adjustments, and necessary service prior to substantial completion.

3.4 CONSTRUCTION

- A. Interface with Other Work:
 - 1 Guide rail brackets attached to steel shall be installed prior to application of fireproofing.
 - 2 Coordinate construction of entrance walls with installation of door frames and sills. Maintain front wall opening until elevator equipment has been installed.
 - a. Ensure adequate support for entrance attachment points at all landings.
 - b. Coordinate wall openings for hall push buttons, signal fixtures and sleeves. Each elevator requires sleeves within the hoistway wall.

- c. Coordinate emergency power transfer switch and power change pending signals as required for termination at the primary elevator signal control cabinet in each group.
- d. Coordinate interface of elevators and fire alarm system.
- e. Coordinate interface of dedicated telephone line.
- f. Coordinate the installation of the non-fused three phase permanent power disconnect in hoist way at top landing.

3.5 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of elevator installation and before permitting elevator use (either temporary or permanent), perform acceptance tests as required and recommended by ASME A17.1/CSA B44 and by governing regulations and agencies.
- B. Operating Test: Load elevator to rated capacity and operate continuously for 30 minutes over full travel distance, stopping at each level and proceeding immediately to the next. Record temperature rise of elevator machine during 30-minute test period. Record failure to perform as required.
- C. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times that tests are to be performed on elevators.

3.6 PROTECTION

- A. Temporary Use: Comply with the following requirements for elevator used for construction purposes:
 - 1. Provide car with temporary enclosure, either within finished car or in place of finished car, to protect finishes from damage.
 - 2. Provide strippable protective film on entrance and car doors and frames.
 - 3. Provide padded wood bumpers on entrance door frames covering jambs and frame faces.
 - 4. Provide other protective coverings, barriers, devices, signs, and procedures as needed to protect elevator and elevator equipment.
 - 5. Do not load elevators beyond their rated weight capacity.
 - 6. Engage elevator Installer to provide full maintenance service. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleanup, and adjustment as necessary for proper elevator operation at rated speed and capacity. Provide parts and supplies same as those used in the manufacture and installation of original equipment.
 - 7. Engage elevator Installer to restore damaged work, if any, so no evidence remains of correction. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.

3.7 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

1. Perform maintenance during normal working hours.
2. Perform emergency callback service during normal working hours with response time of two hours or less.

3.8 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to operate, adjust, and maintain elevator(s).
- B. Prior to substantial completion, instruct Owner's Representative on the proper function and required daily maintenance of elevators. Instruct personnel on emergency procedures.
- C. Check operation of elevator with Owner's personnel present before date of Substantial Completion and again not more than one month before end of warranty period. Determine that operation systems and devices are functioning properly.
- D. Schedule a demonstration for the Fire Marshal and other local authorities having jurisdiction (AHJ) to verify the emergency service override feature of the security access system. Acceptance of the completed installation is conditional upon the local authority's acceptance of the emergency service system operation.

END OF SECTION 142100

SECTION 312500 - EROSION AND SEDIMENTATION CONTROLS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 1 General Requirements and Specific Requirements, apply to this Section.
- B. "Connecticut Guidelines for Soil Erosion and Sediment Control", Connecticut Council on Soil and Water Conservation, May 2002, inclusive of all supplements and/or its latest revision or edition.

1.02 SECTION INCLUDES

- A. Hay bales, filter fabric fence, sediment barriers and sedimentation structures
- B. Temporary mulch
- C. Temporary sediment basins as required by field conditions

1.03 QUALITY ASSURANCE

- A. All erosion and sediment control measures will be constructed in accordance with the standards and specifications of the "Connecticut Guidelines for Soil Erosion and Sediment Control".

1.04 PROJECT CONDITIONS

- A. Land disturbance will be kept to a minimum; re-stabilization will be scheduled as soon as possible. Temporary seeding or permanent hydro-seeding should take place immediately upon completion of grading. Permanent seeding will be scheduled during March 15 - June 15; August 15 - October 15.
- B. Erosion and sediment control measures will be installed prior to construction whenever possible and will be maintained in effective condition throughout the construction period.
- C. Hay bale filters will be installed at the base of all proposed slopes and on the downhill side of any area receiving new planting and as instructed by the Engineer.
- D. Additional control measures will be installed during the construction period as required by field conditions or as requested by the Engineer.
- E. Sediment removed from control structures will be disposed of on site in a manner approved by the Engineer.

- F. Mulch all new slopes 3% or greater. Use straw or hay (70-90 lbs. 1,000 sq. ft.), free of weeds or coarse matter. Chemical binder such as Petroset Terratack Hydro Mulch and Aerospray will be used as recommended by manufacturer to anchor mulch. Mulch must be inspected periodically, in particular, after rainstorms to check for rill erosion. Where erosion is severe, repair the eroded area and place additional mulch as required to control the erosion. Grasses shall not be considered established until a ground cover is achieved, which is mature enough to control soil erosion and to survive severe weather conditions.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Hay bales:
1. Hay bales shall be made of hay with 40 lbs. minimum weight, and 120 lbs. maximum weight. The hay bales shall be sufficiently bound with either wire or nylon twine to resist breaking apart during their use, shipment or placement.
 2. Stakes shall be wood, minimum two inches (2") by two inches (2") by three feet (3') long.
- B. Filter fabric:
1. Synthetic filter fabric shall be a pervious sheet of propylene, nylon, polyester or ethylene filaments and shall be certified by the manufacturer or supplier as conforming to the following requirements:
- | | |
|--|----------------------|
| Minimum Filtering Efficiency: | 75% |
| Minimum Tensile Strength at 20% Elongation | |
| for Extra Strength: | 50 lbs./lin. in. |
| for Regular Strength: | 30 lbs./lin. in. |
| Minimum Flow Rate: | 0.3 gal./min./sq.ft. |
- C. Temporary mulch: clean oat straw, wheat straw, timothy hay, a mixture of clover and timothy hay or other approved native or forage grasses; well-seasoned before bailing, free from mature seed-bearing stalks or roots of prohibited or noxious weeds.
- D. Crushed stone: crushed or broken stone conforming to the requirements of Section M.02.01-1 "Broken or Crushed Stone" of CTDOT Form 817. Gradation shall conform to No. 8 (1/4" stone) per Section M.01.01.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Conduct construction operations in compliance with all terms of regulation agency requirements, including requirements noted on the Contract Drawings.
- B. Retain all sediments within the contract limits, and within designated disposal areas.

- C. Install erosion control measures prior to beginning site disturbance. Maintain erosion control measures throughout construction period, install additional measures if necessary to retain all sediment on site. Install any additional erosion control measures which may be required by local regulatory officials.

3.02 SEDIMENT BARRIERS

- A. Sediment barriers shall be limited to hay bales and silt fencing for sheet flow applications installed in accordance with Item 1.01.B.

B. Hay Bales:

1. Bales shall be placed in a single row, with ends of adjacent bales tightly abutting one another. Bales shall be oriented lengthwise on the contour for sheet flow applications, perpendicular to the contour for channel flow applications, and in a square or rectangular shape around depressed catch basin inlets.
2. Bales shall be installed so that bindings are oriented around the sides rather than along the tops and bottoms of the bales to prevent deterioration of the bindings.
3. The barrier shall be entrenched and backfilled. A trench shall be excavated the width of the bale and the length of the proposed barrier to a minimum depth of four inches (4"). After the bales are staked and chinked, the excavated soil shall be backfilled against the barrier. Backfill soil shall conform to the ground level on the downhill side and shall be built up to four inches (4") against the uphill side of the barrier.
4. For channel flow applications, the barrier shall be extended to such a length that the bottoms of the end bales are higher in elevation than the top of the lowest middle bale to assure that sediment laden runoff will flow either through or over the barrier but not around it.
5. The areas immediately around catch basins may be excavated slightly to increase ponding of runoff water around catch basins.
6. Each bale shall be securely anchored by at least two stakes driven through the bale. The first stake in each bale shall be driven toward the previously laid bale to force the bales together. Stakes shall be driven deep enough into the ground to securely anchor the bales.
7. The gaps between bales shall be chinked with straw to prevent water from escaping between bales.
8. In sloping areas where surface flow follows the bale line, perpendicular bale checks shall be installed at appropriate intervals (100 feet maximum).

C. Filter Fabric

1. Filter fabric shall be wrapped around all existing and proposed trench drain and catch basin and inlet grates to prevent sediment from entering the storm drainage system. The fabric shall be wrapped tightly around the outside of the grate structure and the grate placed securely back inside the receiving frame.
2. Where soil stockpiles are to be placed directly over trench drains or inlets, the fabric shall be wrapped a minimum of two (2) times around the grate structure.

3.03 TEMPORARY MULCH

- A. Place mulch uniformly in a continuous blanket at a rate of 2½ tons per acre, or two 50 pound bales per 1,000 square feet of area. A mechanical blower may be used for mulch application. Do not spread/apply mulch by mechanical means or by hand on windy or gusty days.
- B. Crimp straw into soil by mechanical means.
- C. On all slopes 4:1 or steeper, anchor mulch with liquid tackifier applied uniformly at a rate of 60 gallons per acre.
- D. Protect buildings, paving, planting and all non-seeded areas from liquid tackifier over-spray.

3.04 INSPECTION AND MAINTENANCE

- A. General
 - 1. Inspection shall be frequent, and shall be made after each storm event. Repair or replacement shall be made promptly as needed.
- B. Hay Bales
 - 1. Cleanout of accumulated sediment behind the bales is necessary if ½ of the original height of the bales becomes filled with sediment.
 - 2. Hay bales shall be replaced after their expected useful life of 60 days.
 - 3. Bale barriers shall be removed when they have served their usefulness, but not before the upslope areas have been permanently stabilized and the completion of construction activities.
- C. Filter Fabric Fence
 - 1. Fabric placed around grates shall be replaced whenever the fabric becomes torn, stretched or otherwise damaged so that it can no longer perform its function.
- D. Sedimentation Basins
 - 1. Temporary sedimentation basins shall be cleaned-out once one-half of the basin volume becomes filled with sediment.

END OF SECTION 312500

SECTION 321123 - PROCESSED AGGREGATE BASE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The General Provisions of the Contract, including General and Supplementary Conditions, and Division One General Requirements apply to the work specified in this section.
- B. Form 817 shall mean the State of Connecticut, Department of Transportation Standard Specifications for Roads, Bridges and Incidental Construction, Form 817 or its latest edition and any supplemental specifications.

1.02 SUMMARY

- A. Work Included: Provide and install a processed stone aggregate base in two courses on a prepared subgrade as shown on the Drawings or as ordered by the Engineer, and as specified herein.
- B. Related Requirements:
 - 1. Division 1 Section "Construction and Demolition Waste Management."
 - 2. Division 32 Section "Bituminous Paving and Markings."
 - 3. Division 32 Section "Portland Cement Concrete Pavement."

1.03 QUALITY ASSURANCE

- A. Material Standards: As defined in Form 817 inclusive of all supplements.
- B. Testing: Compaction tests may be required by the Owner and will be paid for by the Owner. No specific testing schedule has been established at this time. If tests indicate that density requirements have not been achieved, the Contractor shall continue compacting. All re-testing in unsatisfactory areas shall be paid for by the Contractor.
- C. Density and Compaction Testing: The Contractor is responsible to schedule compaction tests as required by the Owner and to allow adequate time for the proper execution of said tests.

1.04 SUBMITTALS

- A. Submit certified test reports and materials certificates, for products specified in this Section, indicating compliance of all proposed materials with specified requirements.

1.05 PROTECTION

- A. Dust Control: Use all means necessary to control dust on and near the construction areas caused by the Contractor's performance of the work in conformance with Form 817.

PART 2 - PRODUCTS

2.01 PROCESSED AGGREGATE BASE

- A. Conform to Article M.05.01, Form 817.

PART 3 - EXECUTION

3.01 SUBGRADE PREPARATION

- A. Prior to placing the bottom course of processed stone aggregate base, the prepared subgrade shall be maintained true to line and grade, at all times for a minimum distance of 200 feet in advance of the work. No placement of the processed aggregate is to commence until acceptance by the Engineer of the subgrade on which it is to be placed.
- B. The formation and protection of subgrade shall conform to the requirements of Form 817.

3.02 MATERIAL PLACEMENT/COMPACTION

- A. Install processed aggregate base material at the locations as shown on the Drawings and in accordance with Article 3.04.03 of Form 817. Dimensions specified are after compaction.
- B. Compact base material with vibratory roller to minimum 95% modified AASHTO laboratory density (ASTM D-1557, Method C).

END OF SECTION

SECTION 321216 - BITUMINOUS CONCRETE PAVEMENT AND MARKINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 1 General Requirements and Specific Requirements, apply to this Section.
- B. "Form 818" shall mean the State of Connecticut, Department of Transportation Standard Specifications for Roads, Bridges and Incidental Construction, Form 818 or its latest edition and any supplemental specifications.

1.02 SUMMARY

- A. This Section includes the materials, labor, installation and incidental costs for the installation of subbase material, base materials, bituminous concrete pavement and markings.
- B. Coordinate the work of this Section with Section 321313 - Portland Cement Concrete Pavement.

1.03 SUBMITTALS

- A. Material Certificates: Provide material certificates signed by the material producer and the Contractor, certifying that materials and products comply with specified requirements.

1.04 QUALITY ASSURANCE

- A. Material and Methods of Construction: Shall comply with the following standards:
 - 1. American Society for Testing and Materials (ASTM).
 - 2. American Association of State Highway and Transportation Officials (AASHTO).
 - 3. Asphalt Institute (AI).
 - 4. State of Connecticut DOT Standard Specifications, Form 818, inclusive of all supplements.
- B. Testing: Compaction tests may be required by the Owner and shall be paid for by the Contractor. No specific testing schedule has been established at this time. If tests indicate that density requirements have not been achieved, the Contractor shall continue compacting. All retesting in these areas shall be paid for by the Contractor.

- C. Density and Compaction Testing: The Contractor is responsible to schedule compaction tests if required by the Owner and to allow adequate time for the proper execution of said tests.
- D. Allowable Tolerances: Final surface of base materials within 3/8" from a required grade. Final pavement thicknesses shall conform to specified requirements as shown in the Drawings. Test for smoothness using a ten (10) foot long straightedge. Surface shall not vary more than 1/4" from straightedge when placed in any direction. In no case will water be allowed to stand or puddle on any finished pavement.
- E. Permits/Approvals: The Contractor shall obtain approval of construction and secure all permits for all work.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Transporting shipments of bituminous concrete material shall be made in tight vehicles previously cleaned of all foreign material, and delivered to the site, so that it will not become contaminated in any way.

1.06 PROJECT CONDITIONS

- A. Weather Limitations
 - 1. Base material shall not be placed on frozen or saturated subbase material.
 - 2. Bituminous concrete paving material shall not be placed on frozen or saturated base material.
 - 3. Cold weather: Bituminous concrete paving materials shall be mixed and placed in accordance with minimum placement temperature as specified in Article 4.06.03, Item 8 - Placing of Mixture, Form 818.
 - 4. Precipitation or Moisture: Placement of bituminous concrete paving materials shall not be scheduled when weather conditions of fog or rain prevail nor when the pavement surface shows signs of any moisture.
 - 5. Precipitation Probability: Placement of bituminous concrete paving materials shall not be scheduled when the Precipitation Probability, obtained by the Contractor from the U.S. Weather Bureau Within three (3) hours prior to the start of such operations, equals or exceeds fifty (50) percent. The Contractor shall notify the Engineer of the exact time at which the above information was obtained.
- B. Grade Control: Establish and maintain the required lines and grades for each course during paving operations.
- C. Provide temporary barricades and warning lights as required for protection of project work and public safety.
- D. Protect adjacent work from damage, soiling and staining during paving operations.

- E. Inspection Costs: All costs associated with material certifications, plant inspection and laboratory tests shall be borne by the Contractor and shall be deemed included in the price bid for asphalt pavement.

PART 2 - PRODUCTS

2.01 BITUMINOUS CONCRETE PAVEMENT

- A. Conform to the requirements of Article M.04.01, Form 818.

2.02 TACK COAT

- A. Conform to the requirements of Article M.04.01, Item 1(d), Sub-item (4), Form 818. Tack Coat shall be Grade CSS-1H cationic emulsified asphalt, diluted with water at a 1:1 ratio.

2.03 PROCESSED STONE AGGREGATE

- A. Conform to the requirements of Article M.05.01, Form 818.

2.04 PAINT

- A. Paint shall be hot-applied, fast drying type in accordance with Form 818, Section M.07.21. Minimum of two coats of paint shall be applied.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify that all existing utility openings, valves, and other project installations are at their proper finished grade elevations, within areas to be paved. Provide temporary closures and protection over openings until completion of rolling operations. Remove closures at completion of the work. Set covers to grade, flush with the surface of the adjoining pavement.

3.02 SUBGRADE PREPARATION

- A. Prior to placing the bottom course of processed stone aggregate base, the prepared subgrade shall be maintained true to line and grade, at all times for a minimum distance of 200 feet in advance of the work. No placement of the processed aggregate is to commence until acceptance by the Engineer of the subgrade on which it is to be placed.
- B. The formation and protection of subgrade shall conform to the requirements of Article 2.09.01 and 2.09.03, Form 818.

3.03 BASE COURSE MATERIAL PLACEMENT/COMPACTION

- A. Install processed aggregate base material at the locations as shown on the Drawings and in accordance with Article 3.04.03, Conn DOT Form 818. Dimensions specified are after compaction.
- B. Compact base material with vibratory roller to minimum 95% modified AASHTO laboratory density (ASTM D-1557, Method C).
- C. Insure thorough and proper compaction around all yard drains, catch basins, structures, utility valves, and other improvements that project above base material.

3.04 BITUMINOUS CONCRETE PAVEMENT

A. General

- 1. Install the bituminous concrete pavement to the lines, grades, and details shown on the Drawings. Neatly and cleanly meet and match abutting pavements. Remove all soft or yielding material below grade and replace with suitable material.
- 2. Thicknesses after compaction shall conform to the details on the Drawings. The pavement shall consist of the number of courses and thickness as detailed. Remove and replace areas showing deficiencies in required thickness with new material as directed by the Engineer.
- 3. Protect existing abutting pavement during paving operations. Replace any abutting pavement damaged during paving operations. Joint between bituminous pavement and existing portland cement concrete pavement shall be tightly compacted and pavement edge shall be of equal density to other areas of pavement.
- 4. Provide a cross-pitch of 1/4" per foot for proper drainage. Ensure that there are no "low" spots that may trap water and create a slipping hazard.

B. Forms

- 1. Provide wood edge forms of an approved type and a minimum length of ten (10) feet for tangents and curves, unless otherwise shown on the plans. Wood forms shall be of a depth equal to the depth of the pavement and shall be securely staked and braced to the required line and grade. Note: Hand tamp edges and bevel if wood forms are not used.
- 2. Install wood forms along all edges of pavement to produce a clean vertical edge. Secure strips to allow for proper compaction of bituminous concrete. Do not remove edge screed strips until pavement is thoroughly compacted. Raveled edges will not be accepted. Wood forms are to be removed after the bituminous pavement has completely set.

3. All forms shall be straight, free from bends and warps at all times, and shall be cleaned thoroughly and oiled before pavement is placed against them, this cleaning and oiling being repeated daily as the forms are moved ahead.
4. The forms shall rest firmly upon the thoroughly compacted sub-grade throughout their entire length, shall be joined neatly and tightly and staked securely to line and grade, three (3) bracing pins or stakes, each ten (10) foot length of side form, so that they will resist the pressure of the pavement and the impact of the roller without springing.

C. Placing

1. Bituminous concrete pavement shall be constructed and compacted in conformance with CT DOT Form 818 requirements.
2. Coat the edge of all abutting pavement with tack coat before installing bituminous concrete pavements. Insure that the abutting pavement has a sound, clean, straight edge. Feathering of edges and transitions between new and existing pavements is not acceptable. Protect surfaces of abutting pavement from tack coat overspray.
3. Each mixture shall be furnished and laid by means of a mechanical spreader of approved design to a depth which after final compaction shall be equal to the specified depth. In areas where the use of a mechanical spreader is impractical, as determined by the Engineer, other means of spreading and compacting may be permitted. The use of hand rakes will not be permitted. The Contractor shall use lutes where necessary.
4. After placing and compacting binder course, tack coat shall be applied prior to placement of the wearing (top) course.
5. Each mixture shall be laid only where the surface to be covered is free from loose or foreign material, dry, and only when weather conditions, in the opinion of the Engineer, are suitable.
6. The Contractor shall provide suitable means for keeping all small tools clean and free from bituminous accumulations.
7. Pavement may be laid by hand. Pavement shall be compacted by making multiple passes with a roller weighing not less than 2,000 pounds. After compaction, the thickness shall be that as specified on the drawings.

D. Compacting

1. Upon completion of the spreading of each mixture, the material shall be consolidated thoroughly and uniformly with self-propelled tandem rollers. The top course shall be free from roller marks.
2. Rollers used for compacting the top course shall be well balanced, self-propelled, tandem rollers, weighing between seven (7) and eight (8) tons. The roller shall have a compression under the rear wheel of between 200 and 300 pounds per linear inch of roll at a rate not exceeding 800 square yards per hour per roller. Final compaction shall meet all Conn DOT Form 818 requirements.
3. Locations inaccessible to the roller, the compression shall be effected with iron tampers weighing not less than twenty-five (25) pounds and having a bearing

area not exceeding forty-eight (48) square inches, or other impact type equipment.

4. Perform breakdown, second and finish rolling until the bituminous concrete mixture has been compacted to the required surface density and smoothness. Continue rolling until all roller marks are eliminated. Provide a smooth compacted surface true to thickness and elevations required.
5. After final rolling, do not permit vehicular traffic on the pavement until it has cooled and hardened, and in no case sooner than 8 hours.

E. Joints for New Construction and Between Existing Pavement:

1. Carefully make joints between old and new pavements, and between successive day's work, to ensure a continuous bond between adjoining work. Construct joints to have the same texture, density, and smoothness as other sections of the asphalt concrete course.
2. Construction shall be as nearly continuous as is possible. The roller shall pass over the end of the laid mixture only when a practical necessity.
3. When the operation of laying is interrupted, the end of the laid material shall be left unrolled until such time as work is resumed, in order that there be no joints throughout the project.
4. If it is necessary to roll the end of the laid mixture during construction, thus consolidating it, the joint so made shall be cut back before recommencing the operation of laying, in order to present a fresh, clean surface for contact with the newly placed material.
5. The edges of such joints shall be painted with liquid asphalt (RC-70 or MC-70) and the use of hot smoothing irons in finishing such joints, shall not be permitted.

F. Finished Surface

1. The surface of the top course of the pavement after compression shall be smooth and true to crown and grade, free from depressions, waves, bunches, overlapping seams and unevenness in surface. All new surfaces shall meet existing surfaces smoothly and evenly.
2. After the compaction of the top course, the Contractor shall check the entire paved area for depressions, using a ten (10) foot wood or metal straightedge. Any depressions greater than three-sixteenths (3/16) of an inch shall be corrected by removing the top course of the affected areas, and replacing with new material to form a true and even surface.

G. Defects: Where defects in composition, compression or finish appear in the completed work, such finished areas shall be removed to the full depth of the course and the defective material replaced with the required thickness of pavement at the expense of the contractor.

1. Patching: Remove and replace mixtures that become mixed with foreign materials and all defective areas. Cut out such areas and fill with fresh hot asphalt concrete. Compact by rolling to the required surface density and smoothness. Remove deficient areas for the full depth of the course. Cut sides

perpendicular and parallel to the directions of traffic with edges vertical. Apply a tack coat before placing asphalt concrete mixture.

3.05 PAINTED PAVEMENT MARKINGS

- A. Existing painted pavement markings shall be removed by sandblasting or milling. Painting over existing markings will not be allowed.
- B. Pavement areas to be painted shall be dry and sufficiently cleaned of sand, dust and road debris so as to provide an acceptable bond between the paint and the pavement.
- C. Fast drying paint shall be applied at a temperature of 120 F to 150 F at the spray gun.
- D. All paint shall be performed in a neat and workmanlike manner, using approved mechanical equipment. Lines shall be sharp and clear with no feathered edging or fogging and precautions shall be taken to prevent tracking by tires of the striping equipment. Paint shall be applied as shown on the plans with no unsightly deviations.
- E. After application, the paint shall be protected from crossing vehicles for a time at least equivalent to the drying time of the paint.
- F. Minimum of two coats of paint shall be applied.

3.06 PROTECTION/CLEAN-UP

- A. Protect all work until acceptance of the project. Replace or repair pavement if damaged prior to acceptance.
- B. Clean up all debris from installation procedures, including but not limited to bituminous concrete and base material overflow into/onto areas indicated to be lawn or other surfaces. Remove from site all excess materials, debris and equipment. Contractor shall dispose of debris material legally.
- C. Repair damage resulting from paving operation to other areas of the work.

END OF SECTION

SECTION 321313 - PORTLAND CEMENT CONCRETE PAVEMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 1 General Requirements and Specific Requirements, apply to this Section.
- B. "Form 818" shall mean the State of Connecticut, Department of Transportation Standard Specifications for Roads, Bridges and Incidental Construction, Form 818 or its latest edition and any supplemental specifications.

1.02 SUMMARY

- A. This Section includes the materials, labor, installation and incidental costs for the installation of subbase material, base materials, and portland cement concrete as follows:
 - 1. Reinforced concrete pavement
 - 2. Concrete curb ramps
 - 3. Concrete walls
 - 4. Concrete sidewalk
- B. Coordinate the work of this Section with Section 321216 - Bituminous Concrete Pavement and Markings.

1.03 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, expansive hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume.

1.04 SUBMITTALS

- A. Product Data: For each type of manufactured material and product indicated.
- B. Design Mixes: For each concrete pavement mix.
- C. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials. Contractor shall pay for all testing of concrete materials.
- D. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:
 - 1. Cementitious materials and aggregates

2. Steel reinforcement and reinforcement accessories
3. Admixtures
4. Curing compounds
5. Applied finish materials (i.e., traffic paint)
6. Joint fillers

1.05 QUALITY ASSURANCE

- A. Materials and methods of construction shall comply with the following standards:
1. American Society for Testing and Materials (ASTM)
 2. American Concrete Institute (ACI)
 3. State of Connecticut DOT Standard Specifications (Form 818)
- B. Installer Qualifications: An experienced installer who has completed pavement work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- C. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
1. Manufacturer must be certified according to the National Ready Mix Concrete Association's Plant Certification Program.
- D. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 shall be paid by the contractor to conduct the testing indicated, as documented according to ASTM E 548.
- E. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant and each aggregate from one source. Do not change source of brands of cement, aggregate materials, or batching plant during course of work.
- F. ACI Publications: Comply with all ACI requirements unless modified by the requirements of the Contract Documents.
- G. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixes.

1.06 PROJECT CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.01 FORMS

- A. Forms shall conform to Article 8.11.03-3 and 9.21.03-3 of Form 818, latest revision.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.02 STEEL REINFORCEMENT

- A. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
- B. Reinforcement Bars: ASTM A 615, Grade 60, deformed bars.
- C. Plain Steel Wire: ASTM A 82, as drawn.
- D. Joint Dowel Bars: ASTM A 615, Grade 60, plain steel bars.
- E. Tie Bars: ASTM A 615, Grade 60, deformed.
- F. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement bars, welded wire fabric, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:
 - 1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

2.03 CONCRETE MATERIALS

- A. General: Use the same brand and type of cementitious material from the same manufacturer throughout the Project.
- B. Concrete: Conform to the requirements of Form 818, Article M.03.01, Class "C" and ASTM C-94. Batch mixing at project site not acceptable.
- C. Compressive strength: 3,000 psi at 28 days.
- D. Entrained air: 5 to 7%.
- E. Reactive aggregates and calcium chloride are not allowed.
- F. Water: Potable.

2.04 ADMIXTURES

- A. General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cement and to be compatible with other admixtures.
- B. Air-Entraining Admixture: ASTM C 260.
- C. Water-Reducing Admixture: ASTM C 494, Type A.
- D. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.

2.05 CURING MATERIALS

- A. Conform to Article 4.01.03, Item F7 "Curing", Form 818.

2.06 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- B. Premolded Joint Filler Strips: ASTM D-994, premolded, resilient non-extruding joint filler conforming to the requirements of AASHTO M213.
- C. Thickness and depth of expansion- and isolation-joint filler as indicated on the drawings.
- D. Pavement-Marking Paint: Latex, water-base emulsion; ready mixed; complying with FS TT-P-1952.
 - 1. Color: Blue for handicapped requirements, yellow for fire lanes, white elsewhere.

2.07 CONCRETE MIXING

- A. Ready-Mixed Concrete: Comply with requirements and with ASTM C 94 and ASTM C 1116.
 - 1. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.01 SURFACE PREPARATION

- A. Proof-roll prepared subbase surface to check for unstable areas and verify need for additional compaction. Do not begin concrete work until such conditions have been corrected and are ready to receive concrete.

- B. Remove loose material from compacted subbase surface and excavations immediately before placing concrete.

3.02 FORMS

- A. Set, brace, and secure forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so that forms can remain in place at least 72 hours after concrete placement.
- B. Check completed formwork and screeds for grade and alignment to following tolerances:
 - 1. Top of Forms: Not more than 1/8 inch in 10 feet.
 - 2. Vertical Face on Longitudinal Axis: Not more than 1/4 inch in 10 feet.
- C. Clean forms after each use and coat with form release agent as required to ensure separation from concrete without damage.
- D. Form recess to receive brick facing masonry in exposed ramp wall as detailed in the Drawings.

3.03 PLACING REINFORCEMENT

- A. General: Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars" for placing and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.04 JOINTS

- A. General: Construct contraction, construction, and isolation joints true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to the centerline, unless indicated otherwise.
 - 1. When joining existing paving, place transverse joints to align with previously placed joints, unless indicated otherwise.
- B. Contraction Joints: Provide weakened-plane contraction joints, sectioning concrete into areas as shown on Drawings. Construct contraction joints for a depth equal to at least 1/4 of the concrete thickness, as follows:

1. Tooled Joints: Form contraction joints in fresh concrete by grooving and finishing each edge of joint with a radiused jointer tool.
 2. Inserts: Form contraction joints by inserting premolded plastic, hardboard, or fiberboard strips into fresh concrete until top surface of strip is flush with paving surface. Radius each joint edge with a jointer tool. Carefully remove strips or caps of two-piece assemblies after concrete has hardened. Clean groove of loose debris.
- C. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than ½ hour, unless paving terminates at isolation joints.
1. Provide preformed galvanized steel or plastic keyway-section forms or bulkhead forms with keys, unless indicated otherwise. Embed keys at least 1-1/2 inches into concrete.
 2. Continue reinforcement across construction joints unless indicated otherwise. Do not continue reinforcement through sides of strip paving unless indicated.
 3. Provide tie bars at sides of paving strips where indicated.
 4. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.
- D. Isolation Joints: Form isolation joints of preformed joint filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
1. Locate expansion joints at intervals of 20 feet, unless indicated otherwise.
 2. Extend joint fillers full width and depth of joint, not less than ½ inch or more than 1 inch below finished surface where joint sealant is indicated. Place top of joint filler flush with finished concrete surface when no joint sealant is required.
 3. Furnish joint fillers in one-piece lengths for full width being placed wherever possible. Where more than one length is required, lace or clip joint filler sections together.
 4. Protect top edge of joint filler during concrete placement with a metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- E. Installation of joint fillers and sealants shall conform applicable sections of Form 814A.
- F. Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one half of dowel length to prevent concrete bonding to one side of joint.

3.05 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.

- B. Remove snow, ice, or frost from subbase surface and reinforcing before placing concrete. Do not place concrete on surfaces that are frozen.
- C. Moisten subbase to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.
- D. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
 - 1. When concrete placing is interrupted for more than ½ hour, place a construction joint.
- E. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- F. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete complying with ACI 309R.
 - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocating reinforcing, dowels, and joint devices.
- G. Screed paved surfaces with a straightedge and strike off. Use bull floats or darbies to form a smooth surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces prior to beginning finishing operations.
- H. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay welded wire fabric or fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.
 - 1. Remove and replace portions of bottom layer of concrete that have been placed more than 15 minutes without being covered by top layer or use bonding agent if acceptable to Engineer.
- I. Cold-Weather Placement: Comply with provisions of ACI 306R and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - 1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.

2. Do not use frozen materials or materials containing ice or snow.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.
- J. Hot-Weather Placement: Place concrete complying with ACI 305R and as specified when hot weather conditions exist.
1. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 deg F. Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
 3. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.06 CONCRETE FINISHING

- A. Float Finish: Begin floating when bleed water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Finish surfaces to true planes within a tolerance of 1/4 inch in 10 feet as determined by a 10-foot-long straightedge placed anywhere on the surface in any direction. Cut down high spots and fill low spots. Refloat surface immediately to a uniform granular texture.
1. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across concrete sidewalk surface perpendicular to line of traffic to provide a uniform fine line texture finish.
- B. Final Tooling: Radius: 3/8 inch. Tool edges of paving, curbs, and joints formed in fresh concrete with a jointing tool to the following radius. Repeat tooling of edges and joints after applying surface finishes. Eliminate tool marks on concrete surfaces.

3.07 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with the recommendations of ACI 306R for cold weather protection and ACI 305R for hot weather protection during curing.
- B. Evaporation Control: In hot, dry, and windy weather, protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before floating.

- C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- D. Curing Methods: Cure concrete by curing compound, as follows:
 - 1. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.08 FIELD QUALITY CONTROL TESTING

- A. Employ a qualified independent testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement as follows:
- B. The Contractor will employ a qualified testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include the following:
 - 1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
 - a. Slump: ASTM C 143; one test at point of placement for each compressive-strength test but no less than one test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.
 - b. Air Content: ASTM C 231, pressure method; one test for each compressive-strength test but no less than one test for each day's pour of each type of air-entrained concrete.
 - c. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each set of compressive-strength specimens.
 - d. Compression Test Specimens: ASTM C 31; one set of four standard cylinders for each compressive-strength test, unless directed otherwise. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.
 - e. Compressive-Strength Tests: ASTM C 39; one set for each day's pour of each concrete class exceeding 5 cu. yd. but less than 25 cu. yd., plus one set for each additional 50 cu. yd. Test one specimen at 7 days, test two specimens at 28 days, and retain one specimen in reserve for later testing if required.
 - 2. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.

3. When total quantity of a given class of concrete is less than 50 cu. yd., the Engineer may waive strength testing if adequate evidence of satisfactory strength is provided.
 4. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi.
- C. Test results will be reported in writing to the Engineer, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing agency, concrete type and class, location of concrete batch in paving, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day and 28-day tests.

3.09 REPAIRS AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective, or does not meet the requirements of this Section.
- B. Drill test cores where directed by the Engineer when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with Portland cement concrete bonded to paving with epoxy adhesive.
- C. Protect concrete from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep concrete paving not more than 2 days prior to date scheduled for Substantial Completion inspections.

3.10 PROTECTION/CLEAN-UP

- A. Protect work completed until acceptance of project. Replace or repair concrete if damaged prior to acceptance.
- B. As work proceeds, maintain premises free of unnecessary accumulation of tools, equipment, surplus materials and debris related to this work.

END OF SECTION

SECTION 321400 – STONE UNIT PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Bluestone pavers.
2. Bluestone stair treads and risers.
3. Setting bed materials required for a complete installation.

B. Related Requirements:

1. Refer to structural drawings for Concrete substrates.
2. Division 5 Section “Exterior Metal Railings” for posts and mounting sleeves to be set into paving surface.

1.2 ACTION SUBMITTALS

A. Product Data:

1. For materials other than water and aggregates.

B. Sieve Analyses: For aggregate setting-bed materials, according to ASTM C136.

C. Samples for Initial Selection: For each type of unit paver indicated and the following:

1. Joint materials involving color selection.

D. Samples for Verification: For each type of unit paver indicated, provide three samples, minimum 6 inches square, showing color and texture range of stone. Include Samples of the following:

1. Joint materials.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Adhesion and Compatibility Test Reports: From latex-additive manufacturer for mortar and grout containing latex additives.

1.4 QUALITY ASSURANCE

- A. Mockups: Build mockup to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store pavers on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Store liquids in tightly closed containers protected from freezing.

1.6 FIELD CONDITIONS

- A. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.
- B. Weather Limitations for Bituminous Setting Bed:
 - 1. Install bituminous setting bed only when ambient temperature is above 40 deg F (4 deg C) and when base is dry.
 - 2. Apply asphalt adhesive only when ambient temperature is above 50 deg F (10 deg C) and when temperature has not been below 35 deg F (2 deg C) for 12 hours immediately before application. Do not apply when setting bed is wet or contains excess moisture.
- C. Weather Limitations for Mortar and Grout:
 - 1. Cold-Weather Requirements: Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

Hot weather has more effect on paver installations than on masonry because horizontal surfaces absorb more solar energy than vertical surfaces. Insert specific limits to suit local conditions.

- 2. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6. Provide artificial shade and windbreaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg F (38 deg C) and higher.

- a. When ambient temperature exceeds 100 deg F (38 deg C), or when wind velocity exceeds 8 mph (13 km/h) and ambient temperature exceeds 90 deg F (32 deg C), set pavers within 1 minute of spreading setting-bed mortar.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of unit paver, joint material, and setting material from single source with resources to provide materials and products of consistent quality in appearance and physical properties.

2.2 STONE PAVERS

- A. Bluestone Pavers: PA Flamed Blue Select as distributed by CT Stone, or approved equal. For use at landing and stair risers.
 1. Color range: Shades of blues and grays.
 2. Finish: Flamed, slip resistant.
 3. Thickness: 1 1/2-inches.
 4. Face Size: Random rectilinear flagging ranging from 12-inch by 12-inch to 24-inch by 36-inch.
- B. Bluestone Treads and landing perimeter: Bluestone Flamed Blue Select Treads as distributed by CT Stone, or approved equal. For use at landing and stair risers.
 1. Color range: Shades of blues and grays.
 2. Finish: Flamed, slip resistant.
 3. Thickness: 1 1/2-inches.
 4. Face Size: Lengths similar to those shown on drawings, typically 36-48 inches in length.

2.3 ACCESSORIES

- A. Compressible Foam Filler: Preformed strips complying with ASTM D1056, Grade 2A1.

2.4 MORTAR SETTING-BED MATERIALS

- A. Portland Cement: ASTM C150/C150M, Type I or Type II.
- B. Sand: ASTM C144.
- C. Latex Additive: Manufacturer's standard acrylic resin or styrene-butadiene-rubber water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement and aggregate mortar bed, and not containing a retarder.

- D. Thin-Set Mortar for Bond Coat: Latex-portland cement mortar complying with ANSI A118.4.
 - 1. Provide product that is approved by manufacturer for application thickness of [5/8 inch (16 mm)].
- E. Water: Potable.

2.5 GROUT MATERIALS

- A. High-Performance Cement Grout: ANSI A118.7, sanded.
- B. Grout Colors: As selected by Architect from manufacturer's full range.
- C. Water: Potable.

2.6 MORTAR AND GROUT MIXES

- A. General: Comply with referenced standards and with manufacturers' written instructions for mix proportions, mixing equipment, mixer speeds, mixing containers, mixing times, and other procedures needed to produce setting-bed and joint materials of uniform quality and with optimal performance characteristics. Discard mortars and grout if they have reached their initial set before being used.
- B. Mortar-Bed Bond Coat: Mix neat cement and latex additive to a creamy consistency.
- C. Portland Cement-Lime Setting-Bed Mortar: Type M complying with ASTM C270, Proportion Specification.
- D. Thinset Mortar Bond Coat: Proportion and mix according to manufacturer's written instructions.
 - 1. Pigmented Grout: Select and proportion pigments with other ingredients to produce color required. Do not exceed pigment-to-cement ratio of 1 to 10, by weight.
- E. Packaged Grout: Proportion and mix according to grout manufacturer's written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces indicated to receive unit paving, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove substances from concrete substrates that could impair mortar bond, including curing and sealing compounds, form oil, and laitance.
- B. Sweep concrete substrates to remove dirt, dust, debris, and loose particles.

3.3 INSTALLATION, GENERAL

- A. Do not use unit pavers with chips, cracks, voids, discolorations, or other defects that might be visible or cause staining in finished work.
- B. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures.
- C. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.
- D. Joint Pattern: Random rectilinear pattern with regular borders and treads. Refer to drawings.
- E. Tolerances:
 - 1. Do not exceed 1/16-inch (1.6-mm) unit-to-unit offset from flush (lippage) nor 1/8 inch in 24 inches (3 mm in 600 mm) and] 1/4 inch in 10 feet (6 mm in 3 m) from level, or indicated slope, for finished surface of paving.
- F. Provide steps made of pavers as indicated. Install paver steps before installing adjacent pavers.
 - 1. Where pavers set in mortar bed are indicated for steps constructed adjacent to pavers set in aggregate setting bed, install steps and allow mortar to cure before placing aggregate setting bed and remainder of pavers. Cut off mortar bed at a steep angle so it will not interfere with aggregate setting bed.

3.4 MORTAR SETTING-BED APPLICATIONS

- A. Saturate concrete subbase with clean water several hours before placing setting bed. Remove surface water about one hour before placing setting bed.
- B. Apply mortar-bed bond coat over surface of concrete subbase about 15 minutes before placing mortar bed. Do not exceed 1/16-inch (1.6-mm) thickness for bond coat. Limit area of bond coat to avoid its drying out before placing setting bed.
- C. Apply mortar bed over bond coat; spread and screed mortar bed to uniform thickness at subgrade elevations required for accurate setting of pavers to finished grades indicated.
- D. Mix and place only that amount of mortar bed that can be covered with pavers before initial set. Before placing pavers, cut back, bevel edge, and remove and discard setting-bed material that has reached initial set.

- E. Place pavers before initial set of cement occurs. Immediately before placing pavers on mortar bed, apply uniform 1/16-inch- (1.5-mm-) thick bond coat to mortar bed or to back of each paver with a flat trowel.
- F. Tamp or beat pavers with a wooden block or rubber mallet to obtain full contact with setting bed and to bring finished surfaces within indicated tolerances. Set each paver in a single operation before initial set of mortar; do not return to areas already set or disturb pavers for purposes of realigning finished surfaces or adjusting joints.
- G. Spaced Joint Widths: Provide 1/2-inch (13-mm) nominal joint width with variations not exceeding plus or minus 1/8 inch (3 mm).
- H. Grouted Joints: Grout paver joints complying with ANSI A108.10.
- I. Grout joints as soon as possible after initial set of setting bed.
 - 1. Force grout into joints, taking care not to smear grout on adjoining surfaces.
 - 2. Clean pavers as grouting progresses by dry brushing or rubbing with dry burlap to remove smears before tooling joints.
 - 3. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
 - 4. If tooling squeezes grout from joints, remove excess grout and smears by dry brushing or rubbing with dry burlap and tool joints again to produce a uniform appearance.
- J. Cure grout by maintaining in a damp condition for seven days unless otherwise recommended by grout or liquid-latex manufacturer.

3.5 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.
- B. Pointing: During tooling of joints, enlarge voids or holes and completely fill with grout. Point joints at sealant joints to provide a neat, uniform appearance, properly prepared for sealant application.
- C. Cleaning: Remove excess grout from exposed paver surfaces; wash and scrub clean.

END OF SECTION 321400

SECTION 321613.26 – PRECAST CONCRETE CURB

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All of the contract documents, including General Agreement and Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION: This Section includes:

- A. Shop drawings, detailing, fabrication, delivery and installation of precast concrete curb units.

1.03 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide precast concrete curb units capable of withstanding the design loads for on-grade condition.

1.04 SUBMITTALS

- B. Product Data: For each type of product indicated.
- C. Design Mixtures: For each precast concrete mixture. Include compressive strength and water-absorption tests.
- D. Shop Drawings: Detail fabrication and installation of precast concrete units. Indicate locations, plans, elevations, dimensions, shapes, and cross sections of each unit. Indicate reveals, and extent and location of each surface finish.
- E. Material test reports: For aggregates.
- F. Material Certificates: Signed by manufacturers:
- G. Field quality-control test reports.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm that assumes responsibility for engineering precast concrete units to comply with performance requirements. This responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
- B. Submit PCI plant certification.
- C. Design Standards: Comply with ACI 318 (ACI 318M) and design recommendations of PCI MNL 120, "PCI Design Handbook - Precast and Prestressed Concrete," applicable to types of precast concrete units indicated.

- D. Quality-Control Standard: For manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required, comply with PCI Precast Concrete Standards.
- E. Calculated Fire-Test-Response Characteristics: Where indicated, provide precast concrete units whose fire resistance has been calculated according to ACI 216.1/TMS 0216.1, "Standard Method for Determining Fire Resistance of Concrete and Masonry Construction Assemblies," and PCI MNL 124, "Design for Fire Resistance of Precast Prestressed Concrete," and is acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.01 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.
- C. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from galvanized steel wire into flat sheets.
- D. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.
- E. For aggressive climates, revise subparagraph below by adding an anchorage device encapsulation system consisting of caps and sleeves.

2.02 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I or Type III, gray, unless otherwise indicated.
 - 1. For surfaces exposed to view in finished structure, mix gray with white cement, of same type, brand, and mill source.
- B. Supplementary Cementitious Materials: No supplementary cementitious materials (i.e. fly ash, silica fume, and ground slag) shall be allowed.
- C. Normal-Weight Aggregates: Except as modified by PCI MNL 117, ASTM C 33, with coarse aggregates complying with Class 5S. Stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project.
 - 1. Face-Mixture-Coarse Aggregates: Selected, hard, and durable; free of material that reacts with cement or causes staining; to match selected finish sample.
 - 2. Face-Mixture-Fine Aggregates: Selected, natural or manufactured sand of same material as coarse aggregate, unless otherwise approved by Architect.
- D. Coloring Admixture: ASTM C 979, synthetic or natural mineral-oxide pigments or colored water-reducing admixtures, temperature stable, and nonfading.

- E. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
- F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture.

2.03 GROUT MATERIALS

- A. Sand-Cement Grout: Portland cement, ASTM C 150, Type I, and clean, natural sand, ASTM C 144 or ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

2.04 CONCRETE MIXTURES

- A. Prepare design mixtures for each type of precast concrete required.
- B. Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at precast concrete fabricator's option.
- C. Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by ACI 318 (ACI 318M) or PCI MNL 117 when tested according to ASTM C 1218/C 1218M.
- D. Normal-Weight Concrete Mixtures: Proportion mixtures by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:
 - 1. Compressive Strength (28 Days): 4000 psi minimum.
- E. Water absorption indicates susceptibility to weather staining. PCI states that limits in first paragraph below are suitable for average exposures.
- F. Water Absorption: 6 percent by weight or 14 percent by volume, tested according to PCI MNL 117.
- G. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 117.
- H. When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's written instructions.

2.05 FABRICATION

- A. Reinforcement: Comply with recommendations in PCI MNL 117 for fabricating, placing, and supporting reinforcement.
- B. Reinforce precast concrete units to resist handling, transportation, and erection stresses.

- C. Comply with requirements in PCI MNL 117 and requirements in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.
- D. Place face mixture to a minimum thickness after consolidation of the greater of 1 inch or 1.5 times the maximum aggregate size, but not less than the minimum reinforcing cover specified.
- E. Place concrete in a continuous operation to prevent seams or planes of weakness from forming in precast concrete units.
- F. Place backup concrete mixture to ensure bond with face-mixture concrete.
- G. Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing, or entrapped air on surfaces. Use equipment and procedures complying with PCI MNL 117.
- H. Place self-consolidating concrete without vibration according to PCI TR-6, "Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants."
- I. Comply with PCI MNL 117 for hot- and cold-weather concrete placement.
- J. Identify pickup points of precast concrete units, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each precast concrete unit on a surface that will not show in finished structure.
- K. Cure concrete, according to requirements in PCI MNL 117, by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture. Cure units until compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.
- L. Discard and replace precast concrete units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 117 and Architect's approval.

2.06 FABRICATION TOLERANCES

- A. Fabricate precast concrete units straight and true to size and shape with exposed edges and corners precise and true so each finished panel complies with PCI MNL 117 product tolerances as well as position tolerances for cast-in items.

2.07 FINISHES

- A. Surface shall be free of joint marks, grain, and other obvious defects. Corners shall be uniform, straight, and sharp as indicated in the drawings. Finish exposed-face surfaces of precast concrete units to conform to PCI's Precast Concrete Standards.

2.08 SOURCE QUALITY CONTROL

- A. Quality-Control Testing: Test and inspect precast concrete according to PCI MNL 117 requirements. If using self-consolidating concrete, also test and inspect according to PCI TR-6, "Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants."
- B. Owner will employ an independent testing agency to evaluate precast concrete fabricator's quality-control and testing methods.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Erect precast concrete level, plumb, and square within specified allowable tolerances. Provide temporary supports and bracing as required to maintain position, stability, and alignment as units are being permanently installed.
- B. Grouting Connections: Grout connections where required or indicated. Retain grout in place until hard enough to support itself. Pack spaces with stiff grout material, tamping until voids are completely filled. Place grout to finish smooth, level, and plumb with adjacent concrete surfaces. Keep grouted joints damp for not less than 24 hours after initial set. Promptly remove grout material from exposed surfaces before it affects finishes or hardens.
- C. Erect precast concrete units level, plumb, square, true, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 117, Appendix I.

3.02 REPAIRS

- A. Blemishes occurring after delivery are normally repaired before final joint sealing and cleaning as weather permits.
- B. Repair damaged precast concrete units if permitted by Architect. The Architect reserves the right to reject repaired units that do not comply with requirements.
- C. Precast concrete manufacturer should develop appropriate repair mixtures and techniques during production sample approval process.
- D. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 20 feet.
- E. Wire brush, clean, and paint damaged prime-painted components with same type of shop primer.
- F. Remove and replace damaged precast concrete units when repairs do not comply with requirements.

3.03 CLEANING

- A. Clean surfaces of precast concrete units exposed to view.
- B. Clean mortar, plaster, fireproofing, weld slag, and other deleterious material from concrete surfaces and adjacent materials immediately.
- C. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.
 - 1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's recommendations. Clean soiled precast concrete surfaces with detergent and water, using stiff fiber brushes and sponges, and rinse with clean water. Protect other work from staining or damage due to cleaning operations.
 - 2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION 321613.26

SECTION 321726 - DETECTABLE WARNING SURFACE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Special Conditions, apply to this Section.
- B. "Form 817" shall mean the State of Connecticut, Department of Transportation Standard Specifications for Roads, Bridges and Incidental Construction, Form 817 or its latest edition and any supplemental specifications.

1.02 DESCRIPTION

- A. This work shall consist of furnishing and installing a detectable warning surface on sidewalk pedestrian ramps or other locations as indicated on the plans or elsewhere in the contract documents. Sidewalk pedestrian ramps shall be constructed in accordance with the requirements as indicated on the Drawings. The surface of the ramp shall have a coarse broom finish running perpendicular to the slope, exclusive of the detectable warning fields. The ramp within two feet (2') of the curb shall be finished with a detectable warning surface meeting the dimensional details and other requirements as noted in Form 816 and standard drawings.

1.03 RELATED WORK

- A. Related work is described in the following sections of the specifications:

- 1. Section 321313 - Portland Cement Concrete Pavement and Curb

1.04 SUBMITTAL

- A. Submit manufacturer's product data.

PART 2 - PRODUCTS

2.01 DETECTABLE WARNING SYSTEMS

- A. All detectable warning systems shall meet the following color and friction requirements:
 - 1. The color of the detectable warning surface shall be dark gray, Munsell Book Notation BG-PB 3/5, for use adjacent to light colored sidewalk surfaces or white, Munsell Book Notation N 9/, for use adjacent to dark colored sidewalk surfaces, such as pigmented concrete sidewalk used in landmark districts, unless otherwise specified. The detectable warning surface shall contrast visually with adjoining surfaces by at least a 70% as defined in the Americans with Disabilities Act Accessibility Guidelines (ADAAG) Specifications.

2. The friction characteristics of completed detectable warning surfaces shall be approximately the same as the adjoining sidewalk or sidewalk pedestrian ramp surfaces as determined by the Engineer.

B. The Contractor may elect to use any of the following detectable warning systems:

1. **STAMPED DETECTABLE WARNING SYSTEMS.** Stamped detectable warning systems must be capable of uniformly providing the CT DOT's standard detectable warning pattern on sidewalk pedestrian ramps and other surfaces constructed of the CT DOT's standard class of concrete for sidewalks. The color, as specified above, shall be uniformly incorporated throughout the concrete mix prior to stamping the detectable warnings.
2. **SURFACE APPLIED DETECTABLE WARNING SYSTEMS** (This system shall not be used as an option for installation in new pedestrian ramps; however, at the direction of the Engineer it may be used as an option to retro-fit existing pedestrian ramps that comply with Form 816. For surface applied detectable warning systems, the Contractor shall submit Manufacturer's certified test results indicating compliance with the following requirements to the Engineer, at least 30 calendar days prior to proposed installation:

STANDARD	PROPERTY	RESULTS
ASTM-C-501	Wear Resistance	Wear Index: 25
MIL-D-3124	Impact Resistance	2 lbs. (9 N) steel ball dropped twice from 8 feet (2.4 meters) produced no adhesion failure or cracking
ASTM E-96	Water Vap. Transm	0.33 oz./sq. ft./24 hours (100 grams/sq. meter/24 hours)
ASTM C-109	Compressive Strength	6000 psi (41 Mpa) average
ASTM D-C190	Tensile Strength	440 psi (3 Mpa)
MIL D-3134	Bonding Strength	320 psi (2.2 Mpa) shear 500 psi (3.4 Mpa) pull
ASTM C-293	Flexural Strength	1,900 psi (13.0 Mpa) minimum
ASTM E-162	Fire Resistance	Flame spread index 0 Smoke deposited 0.015 grains (1 mg)

- a. Manufacturers of surface applied detectable warning systems shall certify that their materials comply with the volatile organic compound (VOC) requirements of the Form 816.

- b. The detectable warning system shall be capable of providing the Department's standard detectable warning surface on sidewalk pedestrian ramps and other surfaces constructed of the Department's standard class of concrete for sidewalks.
 - c. The color specified elsewhere in the Contract Documents should be homogeneous throughout the thickness of the surface material.
 - 3. PRECAST PORTLAND CEMENT CONCRETE DETECTABLE WARNING SYSTEMS.
Precast Portland cement concrete detectable warning systems shall consist of either slabs or pavers manufactured in accordance with the applicable materials specifications for Form 816. The minimum dimensions of pavers shall be 4" x 8" x 2-1/4". The minimum dimensions of slabs shall be 2' x 4' x 4", or as otherwise required to facilitate one slab per ramp.
 - a. The precast Portland cement detectable warning system shall be capable of providing the Department's standard detectable warning surface on sidewalk pedestrian ramps and other applicable locations.
 - b. The color, as specified above, shall be incorporated into the concrete during the precasting process.
- 2.02 SETTING MATERIALS: The Contractor shall be required to furnish, at no additional cost to the City, the following materials for setting precast Portland cement concrete pavers:
- A. Bituminous Setting Bed: Asphalt cement to be used in the bituminous setting bed shall conform to ASTM Designation D-946 with a penetration at 77 degrees Fahrenheit, 100 G., 5 Sec. of minimum 85 millimeters and maximum of 100 millimeters.
 - 1. The fine aggregate to be used in the bituminous setting bed shall be clean, hard sand with durable particles and free from adherent coatings, lumps of clay, alkali salts, and organic matter. It shall be uniformly graded from "coarse" to "fine" and all passing the No. 4 sieve and meet the gradation requirements when tested in accordance with the standard method of test for sieve or screen analysis of fine and coarse aggregates ASTM Designation C-136.
 - 2. The dried fine aggregate shall be combined with hot asphalt cement, and the mix shall be heated to approximately 300 degrees Fahrenheit at an asphalt plant. The approximate proportion of materials shall be seven and one-half (7-1/2%) percent cement asphalt, eighty-seven and one-quarter (87-1/4%) percent sand, and five and one-quarter (5-1/4%) percent mineral filler. Each ton shall be apportioned by weight in the approximate ratio of 150 lbs. asphalt to 1,745 lbs. sand and 105 lbs. mineral filler. The Contractor shall determine the exact proportions to produce the best possible mixture for construction of the bituminous setting bed to meet construction requirements.
 - B. Tack Coat to be used on the concrete base prior to application of the bituminous setting bed shall be Liquid Asphalt (RC-70) complying with the requirements of Form 816, unless otherwise approved by the Engineer.
 - C. Neoprene-Modified Asphalt Adhesive shall consist of two (2) percent neoprene (Grade WM 1) oxidized asphalt with a 155 degree softening point (80 penetration).

- D. Sand joint filler shall be clean, hard sand with durable particles free from adherent coatings, lumps of clay, alkali salts, and organic matter.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION

- A. All detectable warning systems shall meet the following construction detailing requirements:
1. The total combined sidewalk pavement thickness for each type of detectable warning system shall be a minimum of 7" on 6" of foundation material.
 2. Prior to the start of work, the Contractor shall show evidence of successful completion of similar installations and provide a job site sample for the approval of the Engineer. The sample size shall be five (5') feet x two (2') feet, minimum, and constructed at a location selected by the Engineer.
 3. As many test panels shall be constructed as necessary to achieve a sample panel that meets the satisfaction of the Engineer. All work shall conform to the appearance of the approved sample to the satisfaction of the Engineer. The sample shall not be incorporated into the work and will be removed when ordered by the Engineer.
 4. The Contractor shall follow all applicable suppliers and manufacturer's requirements for environmental conditions, surface preparation, installation procedures, curing procedures, and materials compatibility.
 5. The Contractor is responsible for removing any material spatters from areas not included in the scope of work.
 6. The Contractor shall repair any damage that should arise from the installation or the clean-up effort.

3.02 WARNING SYSTEM INSTALLATION

- A. Detectable warning systems selected by the Contractor shall meet the following construction details:
1. STAMPED DETECTABLE WARNING SYSTEMS. Stamped detectable warning systems shall be installed during construction of sidewalk pedestrian ramps and other surfaces as specified elsewhere in the Contract Documents.
 2. SURFACE APPLIED DETECTABLE WARNING SYSTEMS. (To be used only for retrofitting existing pedestrian ramps that comply with Form 816 and Standard Drawings. The Contractor shall submit three copies of literature describing the following to the Engineer for the Engineer's approval at least 30 days prior to the proposed installation:
 - The Detectable Warning Surface Material
 - All associated materials

- Preparation requirements
 - Equipment required
 - Name(s) of suppliers
 - Name(s) of subcontractor(s)
- a. In addition, a minimum 12" x 12" sample of the Detectable Warning Surface Material shall be submitted to the Engineer for the Engineer's approval.
 - b. The Manufacturer shall demonstrate in writing and by providing references that the surface applied detectable warning surface material and the proposed system for bonding the detectable warnings to the substrate, if applicable, have been satisfactorily used for roadway, sidewalk pedestrian ramp, path or exterior floor applications in high pedestrian use locations, under weather conditions similar to those experienced in the City of Bridgeport, for a minimum period of three years.
 - c. Installers of surface applied detectable warning systems shall be approved by the detectable warning surface material manufacturer. In no case shall the Contractor permit the use of any method, or application of any materials, by untrained personnel or non-approved installers of surface applied detectable warning systems. If a surface applied detectable warning system is used, the surface material manufacturer's certification of compliance with this requirement shall be provided to the Engineer.
3. PRECAST PORTLAND CEMENT CONCRETE DETECTABLE WARNING SYSTEMS.
Precast Portland cement concrete detectable warning systems, consisting of either concrete pavers or concrete slabs, shall be installed in accordance with the applicable construction details specified in Form 816 and Standard Drawings, latest edition, with the following modifications and additions:
- a. Where the Contractor has selected to use Concrete Pavers, they shall be set on a concrete base placed on 6" foundation material in accordance with the requirements of Form 816. Curing of the concrete base shall be done in accordance with the provisions of Form 816. Particular care shall be taken by the Contractor to insure that the concrete base for pavers be placed to its proper elevation and grade. Should the Contractor fail to meet the concrete base elevation and grade required to maintain the bituminous setting bed thickness specified, he shall be required to remove and replace the concrete base or portion thereof, as required, to maintain the below specified bed thickness, at no additional cost to the City. Minimum concrete replacement thickness shall be two (2) inches.
- After installation of the concrete base, tack coat shall be applied and then the bituminous setting bed shall be installed. The concrete base shall have been sufficiently cured prior to installation of the bituminous setting bed as approved by the Engineer. To install the bituminous setting bed, 3/4 inch deep control bars shall be placed directly over the base. If grades must be adjusted, set wood chocks under depth control bars to proper grade. Set two bars parallel to each other to serve as guides for striking board (2" x 6" boards, length as appropriate). The depth control bars must be set carefully to bring the pavers, when laid, to proper grade. Place some bituminous bed between the parallel depth control bars. Pull this bed with the striking board over these bars several times. After each passage, low porous spots must be showered with

fresh bituminous material to produce a smooth, firm and even setting bed. As soon as this initial panel is completed, advance the first bar to the next position in readiness for striking the next panel if applicable. Carefully fill up any depressions that remain after removing the depth control bars and wood chocks.

Bituminous setting bed shall be spread in a continuous workmanlike manner. Installation of setting bed in spotted, different and isolated areas will not be accepted. Bed depth less than 1/2" or greater than 1" will not be acceptable and the Contractor shall be required to remove the concrete bed, as required, to maintain the specified bed thickness. Minimum concrete replacement thickness to repair concrete base shall be 2".

Setting bed shall be rolled with an approved hand roller after the bed has cooled to eliminate a spongelike surface.

A coating of two (2) percent neoprene modified asphalt adhesive shall be applied by mopping or squeegeeing or troweling over the top surface of the bituminous setting bed so as to provide a bond under the pavers. If it is troweled, the trowel shall be serrated with serrations not to exceed one-sixteenth (1/16) of an inch. Minimum adhesive thickness shall be 1/16 inch.

The Contractor shall then install concrete pavers on the asphalt adhesive while it is still tacky, using hand tight joints and in a stacked pattern as approved by the Engineer. Joints shall be hand tight and read from 0" to 1/16" maximum. Pavers shall be set flush with a top surface elevation tolerance of 1/16" between adjacent pavers but not more than $\pm 1/32$ " at perimeters between pavers and adjacent curb or sidewalk surfaces. After the pavers are laid to the satisfaction of the Engineer, sand shall to be swept into the hand tight joints until the joints are filled.

Pavers shall be adequately protected from discoloration, due to adjacent concrete sidewalk installation operations, by an approved method.

- b. Alternatively, where the Contractor has selected to use Concrete Slabs, they shall be installed at the same time that the adjacent 7" concrete sidewalk is placed.

The base concrete to be set under the concrete slab shall be at least 3" thick on 6" of foundation material. Base concrete shall be placed prior to setting the concrete slabs and the adjacent 7" concrete sidewalk. Particular care shall be taken by the Contractor to insure that the concrete base is at the exact depth and grade required for slabs to be set at their proper grade and elevation. Setting of slabs shall be done while the concrete base is still fresh, or by other methods approved by the Engineer, to ensure full contact of the concrete slab with the concrete base.

Immediately thereafter, the adjacent 7" thick concrete sidewalk shall be placed and finished for the concrete slab to be set flush with a top surface elevation tolerance of not more than $\pm 3/32$ " at perimeters between the slab and adjacent curb or sidewalk surfaces. Should the Contractor fail to meet the proposed concrete slab elevation and grade, he shall be required to remove and replace the concrete slab, as required, at no additional cost to the City.

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Slabs shall be adequately protected from discoloration, due to adjacent concrete sidewalk installation operations, by an approved method.

END OF SECTION 321726

SECTION 329113 - TOPSOIL

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The general provisions of the Contract, including the General Conditions, Supplementary Conditions and General Requirements, apply to the work specified in this Section.

1.02 SUMMARY

- A. Testing, screening, amending, placing and finish grading all stockpiled and borrow topsoil as shown on the Drawings and specified herein.
 - 1. Provide all labor, materials, borrow topsoil, soil amendments and conditioners, compost, necessary equipment, and services to furnish and install topsoil for planting operations, for backing-up pavements and curbs installed under this Contract, and for repair of lawns and other areas damaged by construction necessary to properly complete all lawn and planting operations.
 - 2. Provide 6" minimum depth of topsoil in all lawn seeding areas.
- B. Related Sections: Examine Contract Documents for requirements that affect work of this Section.

1.03 QUALITY ASSURANCE

- A. Topsoil
 - 1. Testing: Representative samples of borrow topsoil and stockpiled topsoil shall be completely analyzed/ tested to determine:
 - a. Nutrient analysis using the Modified Morgan extractant for soil available P, K, Ca, and Mg.
 - b. Soil pH.
 - c. Organic matter content- determined by loss of weight on ignition.
 - d. Soil texture classification.
 - e. Particle size analysis - sand, silt, and clay - analysis shall be determined using the hydrometer or pipette methods of particle size analysis with size fractions based upon size limits established by USDA.
 - 2. Before delivery of any borrow topsoil, furnish the Landscape Architect with a 1 gallon sample of tested topsoil material.
 - 3. Topsoil testing costs shall be borne by the Contractor.
 - 4. Testing laboratory shall be:

Soil Nutrient Analysis Laboratory
University of Connecticut
Department of Plant Science
6 Sherman Place, Box U-102
Storrs, CT 06269-5102

Tel: 860-486-4274

Soil testing performed by a substitute laboratory will not be accepted without prior approval by the Landscape Architect.

1.04 SUBMITTALS

- A. Submit topsoil test results for approval.
- B. Submit topsoil sample. Submit a 1 gallon sample of tested topsoil material. The topsoil submittal shall be a representative sample of topsoil from the stockpile and shall be a homogeneous mix of uniform material taken from no less than 10 samplings of equal quality from areas similar in color, location and type.
- B. Submit materials certificates and product data for the following items, clearly marked, to indicate proposed materials. Printed data shall state application rates and amount of product to be added, if applicable.
 - 1. Soil amendments and conditioners
 - 2. Compost
- C. Submit batch delivery tickets for the following items, indicating the trade name, the supplier/distributor's name and the amount of product delivered to the contracting firm/project site.
 - 1. Soil amendments and conditioners
 - 2. Compost
 - 3. Processed sand
- D. Submit materials certificate and certified test report for processed sand and gravel.

1.05 PRODUCT HANDLING:

- A. Coordinate delivery of borrow topsoil such that it is placed as delivered and no stockpiling is required.

1.06 PROJECT CONDITIONS:

- A. Verify that subsurface drains are complete and fully functional prior to beginning work of this Section. Protect subsurface drains from failure.
- B. Coordinate topsoil placement with irrigation equipment installation (if applicable).

PART 2 PRODUCTS

2.01 TOPSOIL

- A. Shall be clean, fertile, friable, and well draining; not to contain materials harmful to plant life. All topsoil to be free of any subsoil earth clods, sods, stones over 1/2 inch in any dimension, sticks, roots, weeds, litter and other deleterious material. Topsoil shall be uniform in quality and texture and contain specified organic matter and mineral elements necessary for sustaining healthy plant growth. Stones and rock fragments shall not exceed two-percent by volume.

- B. Topsoil shall have a pH of 6.0 to 8.0.
- C. Organic Matter Content: 4 - 8%
- D. Nutrient levels shall be achieved by the Contractor's addition of amendments to the topsoil to meet the optimum nutrient levels specified in the testing laboratory report.
- E. All imported off-site topsoil shall be from a single source for all borrow topsoil required.
- F. Soil texture shall meet the USDA Soils Textural Classification percentage of sand, silt and clay for "loam" or "sandy loam" classifications, with not more than 75-percent sand and not less than 5-percent clay.
- G. Free of any toxic chemical, waste or any material or condition that would prevent the establishment of a suitable lawn.

2.03 AMENDMENTS/CONDITIONERS:

- A. Shall be as recommended by the Topsoil Test Report. Amend all topsoil to meet the optimum nutrient levels specified in the Topsoil Test Report.

2.04 COMPOST

- A. Compost shall be either Pioneer Valley Compost or Agresoil Premium Organic Compost as distributed by: Agresource, phone 800-313-3320 or approved equal.
- B. Compost shall be a stable, humus-like material produced from the aerobic decomposition of organic wastes. Compost residues may be derived from organic wastes such as food and agricultural residues, animal manures, yard wastes, source separated municipal solid waste and biosolids (treated sewage sludge) that meet all State Environmental Agency requirements.
- C. The product shall be well composted, free of viable weed seeds and contain material of a generally humus nature capable of sustaining growth of vegetation, with no materials toxic to plant growth. Compost shall contain no visible free water.
- D. 100-percent of the compost material shall pass a ½-inch screen.
- E. Compost shall have the following properties:

<u>Parameters</u>	<u>Range</u>
pH	5.5 - 8.0
Moisture Content	35% - 55%
Soluble Salts	4.0 mmhos cm ⁻¹
C:N ratio	10:1 - 25:1
Particle Size	less than 1/2"
Organic Matter Content	at least 40% on an oven dray basis
Bulk Density	<1000 lbs./cubic yard
Foreign Matter	shall not exceed 1% (dry weight)

- F. Compost generator shall also provide testing of minimum available nitrogen and other macro and micro-nutrients to determine fertilizer requirements.
- G. Heavy Metals regulated by EPA measured in parts per million shall not exceed the following limits:

<u>Regulated Metals</u>	<u>Regulated Limits*</u>
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Arsenic	41
Cadmium	39
Chromium	1200
Copper	1500
Lead	300
Mercury	17
Nickel	420
Selenium	36
Zinc	2800

*EPA 503 Regulations

Maximum Allowable Exceptional Quality P.P.M.

2.05 SAND: Processed to meet the following particle size criteria:

Description	Sieve Mesh	Diameter of sieve (mm)	Allowable range % retained
Gravel	10	2.00	0- 5%
Very coarse sand	18	1.00	0-20% combined with Gravel
Coarse	35	0.50	at least 60% in this range
Medium	60	0.25	at least 60% in this range
Fine	100	0.15	10% maximum
Very Fine	270	0.05	3% maximum
Silt		0.002	5% maximum
Clay		<0.002	3% maximum

In addition, there shall be 100% passing the No. 5 screen (4mm), and no more than 10% combined very fine sand, silt, and clay.

PART 3 EXECUTION

3.01 TOPSOIL PREPARATION

- A. Provide amendments and conditioners to bring topsoil into compliance with Project requirements to complete the work of this Section. Uniformly blend to produce a homogeneous mixture so that when placed, no layering within the soil profile will occur.
- B. Bulk-mix using an approved mechanical mixer, or fold-mix windrows with a loader.
- C. Mixture shall be kept dry at all times prior to final placement. Topsoil shall not be delivered in a frozen or muddy condition.

3.02 SHAPING AND GRADING OF SUBSOIL AT LAWN AREAS

- A. At completion of rough grading, shape and grade subgrade areas to lines and levels needed to achieve the finished grades indicated on the drawings.
- B. Shape subgrade areas to allow placement of uniform depth of topsoil. Adjustments may be

necessary due to field conditions. Provide all shaping adjustments at no additional cost to the owner.

- C. Harrow or otherwise loosen the subgrade soil to a depth of 4 inches. Protect loosened subgrades from compaction. Utilize small tracked equipment with low load bearing capacity.
- D. Remove all sticks, stones, or foreign material one-half (1/2) inch or greater in any dimension from surface. Remove debris and stone off-site.

3.03 SPREADING TOPSOIL AND TOPSOIL/COMPOST MIXES

- A. Do not apply topsoil materials to the scarified subgrade or gravel layer without approval by the Engineer. No vehicular traffic or rubber-tired equipment shall be allowed on finished subgrade. Topsoil materials shall not be spread until topsoil has been amended as required. Topsoil materials shall not be worked in a frozen or muddy condition. Do not handle soils when wet.
- B. Uniformly distribute and spread topsoil materials over all graded lawn areas to conform smoothly to the lines, grades, and elevations shown or otherwise required. Maintain consistent depths of material throughout the project area. Provide for a minimum thickness of 6-inches of topsoil.
- C. Manually supply topsoil around all trees to remain. Avoid damage to root systems. The depth of topsoil placed around existing trees shall be determined in consultation with the Engineer.
- D. Spread topsoil mixtures in two (2) equal lifts in all locations scheduled to receive 8" or more total topsoil thickness. Bottom lift shall be incorporated into the loosened subgrade or gravel layer as applicable, by disking, harrowing, or other approved means.
- E. Place topsoil in layers that will provide the scheduled thickness after natural settlement and light rolling.
- F. Spread topsoil from edges inward toward the middle of areas receiving topsoil. Do not allow equipment directly on the loosened subgrade.
- G. Do not over compact the topsoil. Do not allow rubber-tired equipment on topsoil areas. Use the lightest weight equipment practicable. Sequence operations to minimize the number of equipment passes required.
- H. Track topsoil slopes -parallel to the fall line.
- I. Place topsoil materials only when it can be immediately followed by seeding operations.
- J. Resupply and place topsoil to eroded, settled or damaged areas until all seeded areas are stabilized. Care shall be taken not to damage grass or pavement areas in the replacement to topsoil.
- K. Compact subgrade soils where fill is required to 80-85% maximum dry density.

3.04 PROTECTION

- A. Remove weeds prior to lawn development operations. No weeds shall be allowed to go to seed.

- B. Keep heavy equipment, trucks, etc. off topsoil areas at all times. Only light tractors will be allowed if necessary.
- C. If over compaction to topsoil occurs, scarify to the full depth of the topsoil and regrade topsoil.

3.05 EXCESS MATERIALS

- A. Excess material, including tailings from screening operations shall be legally disposed of offsite.

3.06 FIELD QUALITY CONTROL

- A. Following spreading of topsoil, and prior to the start of seeding operations, set grades as shown on the plans.

END OF SECTION 329113

SECTION 329200 - LAWN

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The general provisions of the Contract, including General and Supplementary Conditions, and General Requirements apply to the work specified in this Section.

1.02 SECTION INCLUDES

- A. Contractor to provide all labor, materials, necessary equipment, and services to provide and establish all seeded lawns for backing-up pavements and curbs installed under this Contract, and for repair of lawns and other areas damaged by construction as shown on the Drawings and as specified herein, including:
 - 1. Fine grading and preparing the seed bed.
 - 2. Repair of seeded lawn areas damaged by the work of other sections of this Contract.
 - 3. Providing and incorporating soil amendments as indicated for good seeded lawn growth.
 - 4. Seed all areas identified on the Drawings as lawn.
 - 5. Providing and installing erosion control systems (erosion control blanket or salt hay mulch) as necessary.
 - 6. Mowing, watering, and maintaining the seeded lawn until established and accepted by the Owner.
 - 7. Protection, security and repair of damage to all seeded lawn areas until acceptance of all lawn areas.

Note: Contractor shall note that all chemical treating of all lawn areas to insure that lawn is free of weeds and crabgrass shall comply with State of Connecticut laws and regulations for application of these products on school grounds.

1.03 RELATED SECTIONS

- A. Section 329113 - Topsoil
- B. Section 329300 - Landscape Planting

1.04 QUALITY ASSURANCE

- A. Qualifications of Installers: Provide at least one person who shall be present at all times during execution of this portion of the Work, who shall be thoroughly familiar with the type of materials being installed and who shall direct all work performed under this Section.
- B. Preventatives and Controls: Prior to the application of the preventatives and controls specified, confirm that each of the materials is permitted in the State of Connecticut. Pesticides shall be applied by Connecticut-Certified Commercial Applicators.

Note: Contractor shall note that all chemical treating of all lawn areas to insure that lawn is free of weeds and crabgrass shall comply with State of Connecticut laws and regulations for

application of these products on school grounds.

- C. Installer's Qualifications: Engaged firm must be able to provide evidence to indicated five years documented experience in the installation of work specified herein.
- D. Comply with the requirements of the State Department of Environmental Protection. Hazardous Materials: Section 22A-54 of the Connecticut General Statutes.
- E. Comply with the requirements of the State Department of Agriculture: Commercial Fertilizer Law and Agriculture and Vegetable Seed Law.

1.05 REFERENCES

- A. American Society for Testing Materials (ASTM) publication: ASTM C602-95a (2001) "Agricultural Liming Materials".
- B. Federal Specifications (FS): FSO-F-241 C (1). Fertilizers: Mixed Commercial.
- C. Connecticut Commercial Fertilizer Law: Chapter 427A (P.A. 73-278) of Connecticut General Statutes, Revisions and Subsequent Amendments.
- D. Connecticut Agriculture and Seed Law: Chapter 424 of Connecticut General Statutes, Revised to 1979 as amended.

1.06 PROJECT CONDITIONS

- A. All pesticide treatments shall conform to State of Connecticut laws and regulations for application of these products on school grounds.
- B. Notify the Owner's representative and Engineer a minimum of two (2) days prior to scheduled pesticide applications.

1.07 PRODUCT HANDLING

- A. Delivery and Storage:
 - 1. Seed, fertilizer, lime, and other amendments shall be delivered in standard size unopened containers, showing weight, analysis, and name of manufacturer.
 - 2. Delivery and storage of chemical preventatives and controls shall be coordinated with and approved by responsible school officials and representatives prior to delivery. Materials must be delivered in standard size unopened containers, showing weight, analysis, and name of manufacturer. Plan for protection of materials shall be coordinated with and approved by responsible school officials and representatives prior to delivery.
 - 3. Protect materials from deterioration during delivery and while stored at the site.

1.08 GUARANTEE

- A. Duration of guarantee shall be until the completion of the specified maintenance period and until Owner's final acceptance of lawn areas.

1.09 SCHEDULE

- A. Construct seeded lawns between April 1 and June 1 and between August 15 and October 1 unless otherwise permitted by the Owner's Representative.

1.10 EXISTING WORK

- A. Verify that topsoil surface is true to grade, smooth, free of irregularities, properly installed to the scheduled thickness and in good condition to receive the work of this Section.

1.11 SUBMITTALS:

- A. Provide copies of a material certificate signed by the seed vendor and the Contractor, (stating botanical and common names, percentages by weight, and percentages of purity, germination and weed seed for each 'grass' seed species) certifying that the seed mixture complies with the specified requirements. All materials are to be approved by the Owner's representative and the Engineer prior to their use. These certifications shall comply with these specifications and where applicable with the Standards of the Association of Official Agricultural Chemists and Association of Official Seed Analysts.
- B. Submit materials certificates and product data for the following items, clearly marked, to indicate proposed materials. Printed data shall state application rates and amounts of product to be added, if applicable. All materials are to be approved by the Owner's representative and the Engineer prior to their use. These certifications shall comply with these specifications and where applicable with the Standards of the Association of Official Agricultural Chemists.
 - 1. Fertilizers
 - 2. Lime
 - 3. Chemical preventatives and controls: Selection and submittal of materials certificates and product data for chemical preventatives and controls shall conform to local and State of Connecticut laws and regulations for application of these products on school grounds.
- C. Submit batch delivery tickets for the following items, indicating the trade name, the supplier/distributor's name and the amount of product delivered to the contracting firm/project site. All material certificates and invoices on quantities of all materials delivered to the project site shall be submitted to the Owner's representative and the Engineer prior to their use for examination and approval of such materials.
 - 1. Fertilizers
 - 2. Seed mixes
- D. Test Results: Submit tests of determining bulk density (density) of the topsoil once in place using an appropriate method outlined in C.A. Black (ed.) Methods of Soil Analysis, Part I, American Society of Agronomy. 1965.

1.12 TOPSOIL TESTING

- A. Insure that topsoil has been tested in accordance with Section 329113.
- B. Provide testing of bulk density (density) of the topsoil once in place using an appropriate method outlined as indicated above in Article 1.11 Submittals, Item D. Contractor shall be responsible for contracting and payment of testing.

1.13 INSPECTION AND ACCEPTANCE OF LAWN AREAS

- A. Submit written notice requesting inspection at least 10 days prior to the anticipated date.
- B. Maintenance responsibilities end with final acceptance which shall be a minimum 90 consecutive calendar days from the date of seeding. Seeded areas will not be accepted in 'pieces'

unless otherwise shown on the Drawings or specifically agreed to by the Owner. No seeded areas will be accepted prior to the substantial completion of this Contract and prior to the completion of a minimum of 5 mowings.

- C. A satisfactory stand of acceptable grass is defined as:
 - 1. Consisting of a uniform dense stand of established permanent grass species. Engineer will be the judge. Any part of the seed lawn that does not show a uniform dense lawn grass shall be reseeded. Lawns must be free of weeds, crabgrass, and other undesirable plants, and with no diseases present.
- D. Final acceptance will not be made until all damaged areas, including areas outside the property limits, have been restored to their original conditions by topsoiling, seeding, and other necessary operations.
- E. Upon stabilization of seeded lawn areas, erosion control devices and protection fencing shall be removed and disposed of off-site.

1.14 PROTECTION AND SECURITY

- A. Provide protection and security as necessary to prevent damage to lawn areas by any cause, including malicious vandalism and unauthorized usage, prior to acceptance of lawn by Owner.

PART 2 PRODUCTS

2.01 LIME:

- A. Ground dolomitic limestone, 98% passing through a number 20 mesh screen and at least 75% passing through a 100 mesh screen. Limestone shall have a calcium carbonate equivalency of 85% or higher. Application rate to be determined by the topsoil testing.

2.02 FERTILIZER:

- A. Topsoil Fertilizer: complete at the ratios recommended in the topsoil test reports.
- B. Starter Fertilizer: guaranteed analysis of 10.20.10.
- C. Secondary Fertilizer: guaranteed analysis of 15.15.15.

2.03 LAWN SEED

- A. Provide fresh, clean, new-crop seed; blue tag certified complying with the tolerance for purity and germination established by the Office of Seed Analysis of North America. Provide seed of the grass species, proportions and maximum percentages of weed seed. Provide seed in cleaned, sealed, properly labeled containers.
 - 1. Grass seed delivered to the site must be fully labeled according to the seed laws and regulations of the State of Connecticut.
 - 2. A letter from the seed supplier is to accompany the seed mixture delivered to the site certifying that the seed in the bags are the cultivars listed on the label.
 - 3. The seed mixture is to be inspected by the Owner or the Owner's representative prior to its acceptance. Seed that is wet, moldy, or otherwise damaged will not be accepted.

- B. Seed shall be handled in accordance with the manufacturer's recommendations for exposure to extremes of heat, cold, or moisture.
 - C. LAWN SEED QUALITY:
 - 1. Weed Seed: maximum of 0.50%, no noxious weed seed.
 - 2. Purity: minimum 97% pure.
 - 3. Crop: maximum 0.50%
 - 4. Germination Rate: minimum 80%
 - D. SEED MIXTURE: "Hart's Wear 'n Tear" prepared and packaged by the Chas. C. Hart Seed Co., P.O. Box 9169, Wethersfield, CT 06129. Tel: 860-529-2537. Grass seed mix is listed below showing percent by weight:
 - 35% Kentucky Bluegrass
 - 35% Creeping Red Fescue
 - 20% Fiesta 3 Perennial Ryegrass
 - 10% Express Perennial Ryegrass
- 2.04 SALT MARSH HAY: Air-dry condition and of proper consistency for placing with commercial mulch blowing equipment. Provide only salt marsh hay for lawn areas.
- 2.05 HYDROMULCH: "Hydro Mulch" manufactured by Conwed Fibers, Soil Guard Bonded Fiber Matrix as manufactured by Weyerhaeuser or approved equal.
- 2.06 EROSION CONTROL BLANKET: DS150 Erosion Control Blanket manufactured by North American Green, 14649 Highway 41 North, Evansville, IN 47711. Include staples as required by manufacturer for complete installation.
- 2.07 CHEMICAL PREVENTATIVES AND CONTROLS: Selection of materials and products for chemical preventatives and controls shall conform to State of Connecticut laws and regulations for application of these products on school grounds.
- 2.08 PRE-EMERGENCE CRABGRASS CONTROL: Selection of materials and products for pre-emergence crabgrass control shall conform to State of Connecticut laws and regulations for application of these products on school grounds.
- 2.09 WATER: Potable.

PART 3 EXECUTION

3.01 SEEDED LAWN: RATES OF APPLICATION

<u>Material</u>	<u>Application Rate</u>
Topsoil Fertilizer, Lime and Topsoil Conditioners	As recommended by the topsoil test report.
Grass Seed	5 lbs./1,000 S.F. (250 lbs./acre)
Hydromulch	As recommended by manufacturer.
Starter Fertilizer	10 lbs./1,000 S.F.
Secondary Fertilizer	6.5 lbs./1,000 S.F.
Crabgrass Preventative	See the State of Connecticut laws and regulations for application of these products on school grounds.
Lawn Pest/Disease Control	See the State of Connecticut laws and regulations for application of these products on school grounds.

<u>Material</u>	<u>Application Rate</u>
Soil Insect Control	See the State of Connecticut laws and regulations for application of these products on school grounds.
Broad Leaf Weed Control	See the State of Connecticut laws and regulations for application of these products on school grounds.

3.02 SEEDED LAWN: BED PREPARATION

- A. Apply lime, topsoil fertilizer, and other recommended conditioners at the rates recommended by the topsoil tests in all areas where topsoil and topsoil/compost mix have been installed. Cultivate topsoil to a 4" depth by spring-toothed harrow or other approved methods to thoroughly incorporate amendments into the topsoil. Maintain a loose friable seed bed. At no time will rubber tired loaders or graders having greater compaction than a small farm tractor be allowed on topsoil. Keep all heavy equipment and trucks off prepared topsoil. Do not prepare while ground is wet or frozen.
- B. Provide additional topsoil where and as required to properly meet all proposed finish grades.
- C. Remove any weeds, debris, foreign matter and stones having any dimension greater than 3/4". Remove from property.

- D. Fine grade to a smooth uniform surface. The entire area shall present an even grade with no depressions where water will stand. Grades shall be within 1/2" of designated elevation. Any protective fencing around existing trees shall be removed and disposed of by the Contractor at this time. Topsoil shall be smoothly blended to existing finish grades around trees, erosion control devices and adjacent existing conditions, maintain existing surface drainage patterns. Smoothly round-off all top and toe of slopes. Reinstall erosion control devices and protective fencing as required.
- E. Approval of surface by Engineer shall be obtained before seeding operations begin.
- F. All areas to receive seed shall be compacted evenly and uniformly using a two-hundred-pound (200 lb.) roller.
- G. Perform bulk density and compaction tests to monitor degree of soil compaction/seed bed friability where directed. Where required, loosen the seed bed to obtain no greater than 70% of the ASTM D-1557 modified optimum density.

3.03 SEEDED LAWN: DEVELOPMENT

- A. All disturbed areas not developed otherwise shall be developed as lawn with six (6) inches of topsoil as indicated on the drawings and as specified.

3.04 SEEDED LAWN: SEEDING PROCEDURE

- A. Seeding shall be done when wind does not interfere with uniform distribution of hydroseeding mixture.
- B. Apply starter fertilizer, seed and maximum 10% of mulch in one operation by the use of an approved spraying machine. Avoid spraying mix on adjacent surfaces, walks, building walls, and curbs.
- C. Apply remaining 90-100% of the mulch in a second separate application.
- D. Mix materials with water. Keep in an agitated state so that the materials are uniformly suspended in the water. Apply all materials at the specified rates.
- E. Do not overseed with unapproved quick-germinating species.

3.05 SEEDED LAWN: ESTABLISHMENT

- A. Maintain a moist seed bed at all times. Water seed bed so that the topsoil is wet to a depth of 2". Apply complete coverage to the seeded area as necessary to insure proper germination conditions.
- B. Protect all lawn areas with barricades, if necessary, to keep all traffic off the area. Repair all damage to lawn areas including topsoil replacement, at no additional cost to owner.

- C. Re-seed all areas which have failed to show a uniform stand of grass after the initial plants have appeared. All areas disturbed/prepared for reseeded in spring or summer shall receive crabgrass preventative.

3.06 SEEDED LAWN: MAINTENANCE

- A. Maintenance Period Required: Contractor shall maintain lawn from immediately after seeding and shall continue maintenance until final acceptance.
- B. Provide all reseeded, watering, mowing, weeding, insect or disease control, re-fertilizing, repair of washouts and other maintenance procedures which are necessary to produce a uniform stand of grass. The contractor shall provide all irrigation equipment and water as necessary to irrigate the seeded areas daily with $\frac{1}{4}$ acre inch of water per day using three (3) sets to keep the surface moist and to maintain soil moisture at or near field capacity so that the seed bed does not dry out and adequate rooting takes place. The amount of water and the number of sets may be adjusted at the request of the Owner. The irrigation schedule shall further be adjusted with the approval of the Owner after the seedling plants are well rooted. The quantity of water used per day shall be recorded and reported in writing daily to the Owner and Engineer for the first three weeks from seeding and weekly thereafter.
- C. Grass shall be maintained at a height of 1 $\frac{1}{2}$ " using a reel mower set at the height of 1 $\frac{1}{2}$ " (bench setting) in which the clip of the reel matches the mowing height. The reel blades and bed knife shall be kept sharp and evenly matched to provide a clean cut. The mower shall be operated within the speed range recommended by the manufacturer. Mowing frequency shall be at five (5) day intervals commencing as soon as the seedlings in the seeded areas reach 2 inches high and must be adequate to insure that no more than $\frac{1}{4}$ of the grass blade height is removed at any one time. Remove heavy clippings.
- D. Secondary Fertilization: Apply secondary fertilizer 14 days after seeding. Apply per manufacturer recommendations.

- 3.07 EROSION PREVENTATIVES: Install erosion control system in any seeded areas which receive concentrated run-off water and areas as required by the Owner or Owner's Representative. Erosion control materials shall be secured as recommended by the manufacturer or as indicated on the Drawings.

3.08 CRABGRASS AND BROADLEAF WEED CONTROL

- A. Treat any lawn areas infested with crabgrass or broadleaf weeds with weed control products in conformance with State of Connecticut laws and regulations for application of these products on school grounds.

3.09 DISEASE CONTROL

- A. Treat any diseased lawn areas with disease control product, as required after diagnosis of disease organisms in conformance with State of Connecticut laws and regulations for application of these products on school grounds.

3.10 PROJECT CLEAN-UP

- A. Upon completion of all lawn areas, remove all excess soil, debris, and other materials resulting from work operations of this Section. Restore all improvements to original condition. Broom clean all walks and pavements. All clean-up shall be completed at the end of each working day.
- B. Upon stabilization of lawn areas, remove all erosion control systems. Re-seed as required.

END OF SECTION 329200

SECTION 329300 - LANDSCAPE PLANTING

PART 1 GENERAL

1.01 CONDITIONS AND REQUIREMENTS

- A. The General Conditions, Supplementary Conditions, and Division 1 – General Requirements apply.

1.03 SECTION INCLUDES

- A. Provide all labor, materials, equipment, services etc. necessary and incidental for the completion of all landscape work as shown on the drawings and specified herein.
- B. The Contractor shall be liable for any damage to property caused by landscaping operations and all areas and construction disturbed shall be restored to their original condition to the satisfaction of the Engineer.
- C. The Contractor shall carefully correlate his work with that of other Contractors.
- D. The Contractor is required to install and maintain his finished work at his expense as specified.

1.04 RELATED SECTIONS

- A. Section 329113 - Topsoil
- B. Section 329200 - Lawn

1.05 SUBMITTALS

- A. Manufacturer's Data: Submit copies of the manufacturer's and/or source data for all materials specified, including soils.
- B. Samples: Submit samples of all topsoil, soil mixes, mulches, and organic materials. Samples shall weigh 2 lb and be packaged in plastic bags. Samples shall be typical of the lot of material to be delivered to the site and provide an accurate indication of color, texture, and organic makeup of the material.
- C. Plant Photographs: Submit color photographs of representative specimens of each type of tree and shrub on the plant list. Photos shall be 3 x 5 in. taken from angle that depicts the size and condition of the typical plant to be furnished. A scale rod or other measuring device shall be included in the photograph. For species where more than 20 plants are required, include a minimum of three photos that show the average plant, the best quality plant, and the worst quality plant to be provided. Label each photograph with the plant name, plant size, and name of the growing nursery.
- D. Nursery Sources: Submit a list of all nurseries that will supply plants, along with a list of the plants they will provide and the location of the nursery.
- E. Soil Test: Submit soil test analysis report for each sample of topsoil and planting mix per submittal requirements Section 329300 - Topsoil.

1.06 MATERIALS STORAGE AND CLEAN-UP

- A. The Contractor shall keep the premises free from rubbish and all debris at all times and shall arrange his material storage so as not to interfere with the operation of the project. All unused materials, rubbish and debris shall be removed from the site.

1.07 COMPLETION AND ACCEPTANCE

- A. The Contractor shall notify the Engineer when the work of this section is substantially complete. The Engineer shall then review the work and prepare the "punch list" of items remaining or work that is unacceptable. At this time the Engineer may issue the "Notification of Substantial Completion" if the majority of the work is complete to the satisfaction of said Engineer.
- B. The completion of the contract will be accepted and Notice of Completion recorded only when the entire contract is completed to the satisfaction of the Engineer.
- C. Work under this Section will be accepted by the Owner's Construction Representative upon satisfactory completion of all work including "punch list" items.

1.08 WARRANTY

- A. All plant material (tree, shrubs, etc.) and planting supplies (edging, bark mulch, etc.) shall be guaranteed for a period of one (1) year from the date of "Notification of Substantial Completion" of the landscaping installation.

1.09 LANDSCAPE MAINTENANCE

- A. The Landscape Contractor shall maintain his finished work for a period of not less than one (1) year commencing from the time the installation is complete to the satisfaction of the Engineer.
- B. IMPORTANT: It is the Contractor's responsibility to determine water application rates. Water if rainfall does not exceed 3/4" in any 8 day period.
- C. The Landscape Contractor shall maintain the landscaping until final acceptance.

PART 2 PRODUCTS

2.01 TOPSOIL

- A. Refer to Section 329113 - Topsoil

2.02 PLANTING SOIL MIXTURE

- A. Topsoil for backfilling plant pits and shrub bed areas shall be mixed with well rotted manure in the following proportions:

Seven (7) cubic yards of topsoil to two (2) cubic yards of manure. They shall be thoroughly mixed by placing the manure evenly over the topsoil piles and turning the piles at least three (3) times or until thoroughly mixed to the satisfaction of the Engineer.

2.03 PLANT STOCK

- A. Plant material shall be first quality stock and shall conform to the code of standards set forth in the current edition of the American Standards for Nursery Stock sponsored by the American Association of Nurserymen, Inc.
- B. Species and variety as specified on the drawings and delivered to the site shall be certified true to their genus, species and variety and as defined within the current edition of International Code

of Nomenclature for Cultivated Plants, issued by the International Union of Biological Sciences. Substitutions are not permitted without Engineer's written approval.

1. For plant size and types see Drawings for plant list.

- C. Plants shall be nursery grown and shall be of varieties specified in the plant list bearing botanical names.
- D. Planting stock shall be well-branched and well-formed, sound, vigorous, healthy, free from disease, sun-scale, windburn, abrasion, and harmful insects or insect eggs; and shall have healthy, normal unbroken root systems. Deciduous trees and shrubs shall be symmetrically developed, of uniform habit of growth, with straight trunks or stems, and free from objectionable disfigurements. Evergreen trees and shrubs shall have well-developed symmetrical tops with typical spread of branches for each particular species or variety. Plants shall have been grown under climatic conditions similar to those in the locality of the project. Plants budding into leaf or having soft growth shall be sprayed with an anti-desiccant at the nursery before digging.
- E. Stock Sizes: All stock measurements - caliper, height branching level, number of canes, ball sizes shall be in strict accordance with the latest edition of the American Standard for Nursery Stock. Minimum acceptable sizes as specified on the Drawings.
- F. All stock shall be balled and burlapped or container grown stock. Bareroot stock of any kind is unacceptable unless otherwise indicated on the Drawings.

2.04 MULCH FOR PLANTING PITS/BEDS (SHREDDED CEDAR BARK)

- A. Shredded cedar bark mulch shall be a natural forest product composed of shredded bark or wood not exceeding three inches (3") in length and one inch (1") in width. Mulch shall be derived from tree material, not from wood waste or by-products like sawdust, shredded palettes, or other debris. It shall be of a uniform grade and dark brown color with no additives or any other treatment. Mulch with leaves, twigs, and/or debris shall not be acceptable. The pH factor should range from 5.8 to 6.2.

2.05 WATER

- A. Water shall not contain elements toxic to plant life.

2.06 ANTI-DESICCANT

- A. Anti-desiccant shall be an emulsion that will provide a film over plant surfaces permeable enough to permit transpiration, and not damage the plant.

2.07 TREE WOUND DRESSING

- A. Tree wound dressing shall be a black asphalt-base antiseptic paint.

PART 3 EXECUTION

3.01 GENERAL PREPARATION

- A. Prior to beginning the work of this section, verify that site grading and preparation have been properly completed.

- B. Clearing shall consist of the satisfactory removal and disposal of brush and rubbish occurring within all lawn and planting areas.

3.02 UNDERGROUND OBSTRUCTIONS TO PLANTING

- A. If underground utilities, are encountered, other locations for planting may be selected by the Engineer. Damage to utility lines shall be repaired at the Contractor's expense at no additional cost to the Owner.
- B. Remove all miscellaneous debris below the ground surface and dispose of according to the specifications.

3.03 PREPARATION OF PLANTING MIXTURE

- A. Before mixing, clean topsoil of roots, plants, sod, stones, clay lumps and other extraneous materials harmful or toxic to plant growth, by screening.
- B. To prepare planting mixture mix recommended soil amendments and fertilizers with topsoil at rates specified. Delay addition of fertilizer if planting mixture will not be used within two (2) days.

3.04 TREE AND SHRUB PLANTING

- A. All planting shall be performed by personnel familiar with the accepted procedure of planting and under the constant supervision of a qualified planting foreman.
- B. All planting is to be done as shown on drawings and as specified herein and in strict accordance with standard horticultural practices.
- C. PLANTING SEASONS AND CONDITIONS
 - 1. Planting shall be done only when the ground is not frozen, snow covered, or in an otherwise unsuitable condition for planting.
 - 2. Unless otherwise directed by the Engineer, deciduous material shall be planted from March 1st to May 1st and from October 15th to December 15; evergreen material shall be planted from April 1st to May 15th and from September 1st to October 15th, or as approved by the Engineer.
- D. LAYOUT: Plant material locations and bed outlines shall be staked on the project site by the Contractor and approved by the Engineer before any plant pits or beds are excavated. Plant material locations may be adjusted by the Engineer to meet field conditions.
- E. INSTALLATION OF TREES AND SHRUBS
 - 1. Setting Plants:

- a. Balled and burlapped and container-grown plants shall be handled and moved only by the ball or container. Place stock on setting layer of compacted planting soil. Plants shall be set plumb and held in position until sufficient soil has been firmly placed around roots or ball. Plants shall be set in relation to surrounding grade so that they are even with the depth at which they are grown in the nursery, collecting field, or container. Fertilizer in tablet form shall be placed prior to backfilling and in accordance with the manufacturer's specifications. Do not use planting stock if ball or container is cracked.
 - b. Balled and burlapped stock shall be backfilled with planting soil mixture to approximately half the depth of the ball and then tamped and watered. Burlap, wire baskets, and tying materials shall be carefully removed or opened and folded back from top 1/3 of root ball. The remainder of backfill of planting soil mixture shall be tamped and watered. Earth saucers or water basins shall then be formed around the base of each plant.
 - c. Container-grown stock shall be removed from containers without damaging plant or root system. Planting shall be completed as specified for balled or burlapped plants.
2. Mulching:
- a. Organic bark mulch for planting beds shall be installed to a minimum depth of four inches (4") in all areas specified on the landscaping plans. Do not place mulch against trunks or stems.
 - b. Prior to the installation of bark mulch all areas to be covered shall be weed free and shall be treated with pre-emergent herbicide.
 - c. Mulching shall take place within 48 hours after planting.
 - d. Mulch shall be kept out of the crowns of shrubs and off buildings, sidewalks, light standards, and other structures.
 - e. The top of all areas of bark cover shall be 1" below the top of adjacent curb, walk or edge of pavement.
3. Pruning: New plant material shall be pruned in the following manner: Dead and broken branches shall be removed. Pruning of deciduous trees and shrubs shall be minimal. Evergreen plants shall not be pruned except to remove dead or broken branches. Typical growth habit of individual plants shall be retained with as much height and spread as is practicable. Cuts shall be made with sharp instruments, and shall be flush with trunk or adjacent branch to insure elimination of stubs. "Headback" cuts at right angles to line of growth shall not be permitted. Trees shall not be poled or the leader removed, nor shall the leader be pruned or "topped off". Trimmings shall be removed from the site.
4. Plant Sizes: For plant size and types see Drawings for plant list.

3.05 LANDSCAPE EDGING INSTALLATION

- A. Preparation: Ensure that all underground utility lines are located and will not interfere with the proposed edging installation before beginning work. Locate border line of edging with string or other means to assure border straightness and curves as designed. Dig trench 1 inch deeper than set of edging bottom.
- B. Install edging in accordance with manufacturer requirements/recommendations.
- C. Where edging sections turn at corners and at angled runs, cut edging partially up through its height from bottom and turn back to desired angle to form rounded exposed radius.
- D. Backfilling and Cleanup: Backfill both sides of edging, with material as indicated on the Drawings. Confirm and adjust if necessary that sections are securely held together, and compact backfill material along edging to provide top of edging at 1/4 inch +/- above lawn/gravel mulch/stone strip finish grade. Cleanup and remove excess material from site.

END OF SECTION 329300

Greenwich Public Schools JULIAN CURTISS SCHOOL

180 EAST ELM STREET - GREENWICH, CONNECTICUT 06830



Dr. Toni Jones - Superintendent
Daniel Watson - Director of School Facilities

PHASE I: ELEVATOR & ACCESSIBILITY UPGRADES
PHASE II: FRONT ENTRANCE & MAIN OFFICE SECURITY UPGRADES

ISSUED FOR PERMIT: JULY 17, 2024

HYGENIX
DIVISION OF PENONNI (HDP)
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CERTIFICATION:

CONSULTANT:

REVISIONS:		
	DATE	DESCRIPTION

Accessibility Upgrades: Elevator, Entrance, Front Office GREENWICH PUBLIC SCHOOLS

180 EAST ELM STREET
GREENWICH, CONNECTICUT 06830

		
SCALE: AS NOTED	DRAWN BY: RMR	REVIEWED BY: LMY

DATE: JULY 17, 2024	JOB NUMBER: 23015
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ALL PARTITIONS TO EXTEND TO BOTTOM OF METAL DECKING U.S. COLUMN ENCLOSURES. FINISH TOP ONE COURSE OR 6" ABOVE CEILING. IF PART OF A ROOM SEPARATION AT LEAST ONE WALL MUST GO TO THE DECK FOR ACoustIC SEALING OF THE ROOMS.

PARTITIONS THAT INTERSECT BEAMS, JOIST, ETC. SHALL BE CUT AT FIT AROUND SUCH OBSTRUCTIONS. PROVIDE ADDITIONAL BLOCKING/Furring, ETC. AS REQUIRED. ALL VOIDS SHALL BE SEALED WITH GEAUL INSULATION. SEALANT, SO AS TO MAINTAIN AN UNINTERRUPTED SMOKE BARRIER OR FIRE RATING EQUAL TO PARTITION.

AT STUD PARTITION USE 2" DEEP SILL TRACK TO ALLOW FOR PARTITION DEFLECTION - DO NOT FASTEN TOP STUD TO STUD TRACK.

REFER TO DRAWINGS FOR EXTENT OF FIRE RATED AND SMOKE RESISTANT PARTITION CONSTRUCTION FOR WALL AND EXISTING WALLS. ALL VOIDS AND PENETRATIONS THROUGH PARTITIONS SHALL BE SEALED ACCORDINGLY FOR SMOKE RESISTANCE OR FIRE RATING.

ALL MASONRY PARTITIONS NOT DENOTED WITH A PARTITION TYPE, SHALL BE TYPE I, U.O.N.

ALL SHAVED PARTITIONS NOT DENOTED WITH A PARTITION TYPE, SHALL BE TYPE 2, U.O.N.

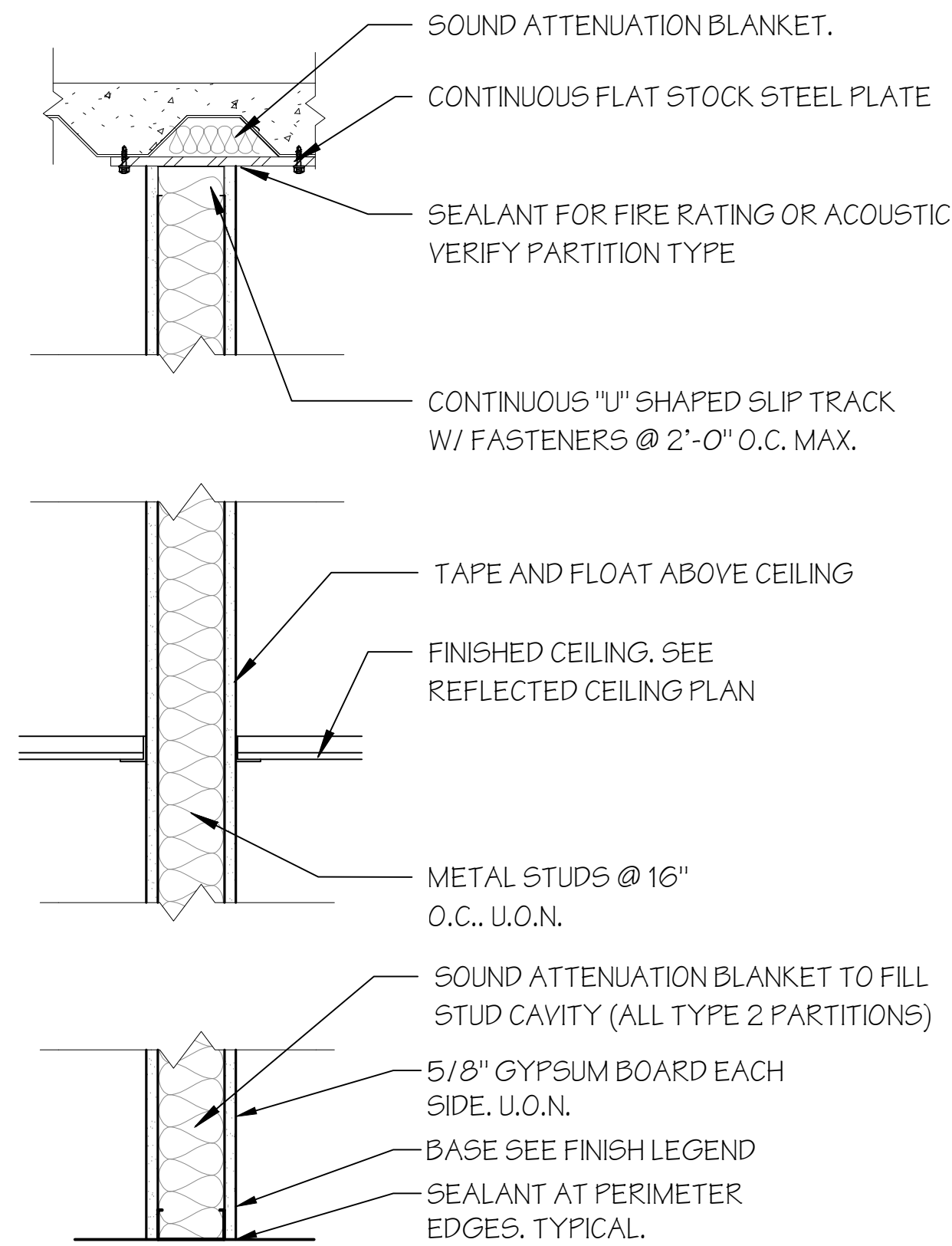
FOR PARTITIONS THAT ARE PARALLEL TO METAL DECK FLUTES, ALL CONTINUOUS FLUTE CAVITY WITH SOUND ATTENUATION PLANKETS. FOR PARTITIONS THAT ARE PERPENDICULAR TO METAL DECK FLUTES, USE NEOPRENE DECK CLOSURES FOR THE ENTIRE LENGTH OF PARTITION

PROVIDE SOUND ATTENUATION PLANKET (SIZED TO FIT IN THE STUD LENGTH) TO ACHIEVE ST LEVELS LISTED IN PARTITION SCHEDULE.

ALL NEW FIRE RATED WALLS OR WALLS REQUIRED HAVE PROTECTED OPENINGS OR PENETRATIONS SHALL BE MARKED ABOVE THE CEILING WITH IDENTIFICATION MEETING THE FOLLOWING: LETTERING SHALL BE A MIN. OF 3/4" HIGH MIN. 3/8" STROKE IN A CONTRASTING COLOR TO THE WALL, WORDING TO BE "FIRE RATED WALL - PROTECT ALL OPENINGS AND PENETRATIONS". WORDING SHALL BE LOCATED HORIZONTALLY WITHIN 15 FT OF WALL ENDS AND AT 30 FT INTERVALS-ALL WALLS REQUIRED TO HAVE PROTECTED OPENINGS OR PENETRATIONS SHALL BE MARKED ABOVE THE CEILING WITH IDENTIFICATION MEETING THE FOLLOWING: LETTERING SHALL BE A MIN. OF 3/4" HIGH MIN. 3/8" STROKE IN A CONTRASTING COLOR TO THE WALL, WORDING TO BE "FIRE RATED WALL - PROTECT ALL OPENINGS AND PENETRATIONS". WORDING SHALL BE LOCATED HORIZONTALLY WITHIN 15 FT OF WALL ENDS AND AT 30 FT INTERVALS-ALL WALL.

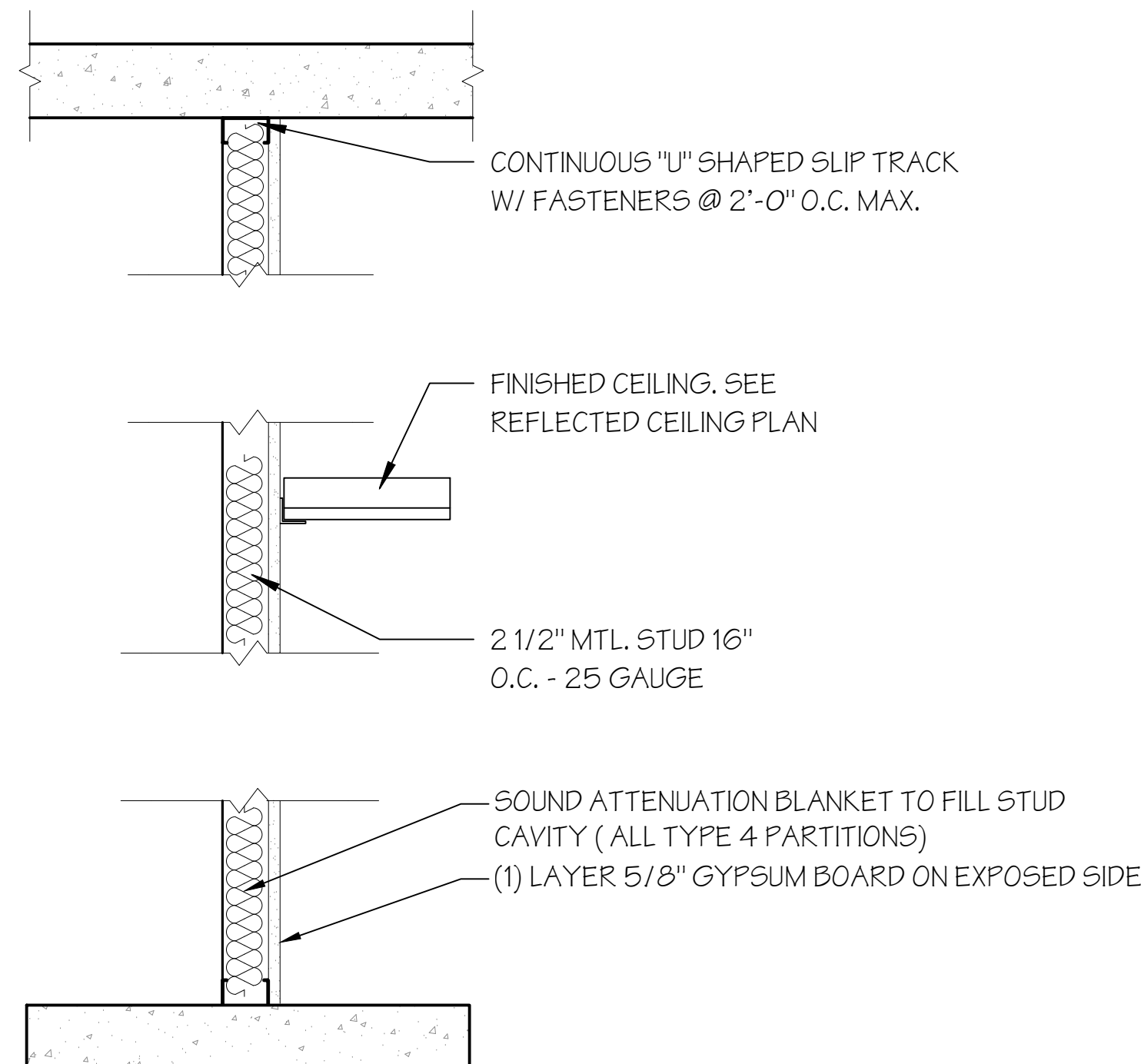
PROVIDE FIRE STOPPING AT RATED WALL PERIMETERS AND JOINTS FOR CONTINUITY OF RATING.

1 HOUR RATED CONCRETE MASONRY WALLS SHALL MEET THE MINIMUM EQUIVALENT THICKNESS OF SECTION 7223.2.3 OF THE ST BUILDING CODE.



MASONRY PARTITIONS- TYPE - 1					
TYPE	CMU	FIRE RATING	UL #	STC	COMMENTS
1A	11-5/8"				
1B	7-5/8"	1HR	UL905		SEE GENERAL NOTE 'K'
1C	3-5/8"				

METAL STUD PARTITIONS- TYPE 2					
TYPE	STUD	TOTAL WIDTH	FIRE RATING	UL #	COMMENTS
2A	6"	7 1/4"			1 LAYER OF 5/8" IMPACT RESISTANT BOARD ON BOTH SIDES
2B	6"	7 7/8"		45	2 LAYER OF 5/8" IMPACT RESISTANT GYPSUM BOARD (OUTER LAYER IS IMPACT RESISTANT) ON ONE SIDE AND 1 LAYER OF 5/8" MOISTURE RESISTANT BOARD ON TOILET SIDE.
2C	6"	7 7/8"		45	2 LAYER OF 5/8" IMPACT RESISTANT GYPSUM BOARD ON ONE SIDE AND 1 LAYER OF 5/8" IMPACT RESISTANT GYPSUM ON THE OTHER.
2D	3 5/8"	6 1/8"			2 LAYER OF 5/8" IMPACT RESISTANT GYPSUM BOARD ON BOTH SIDE AND 2 LAYER OF 5/8" IMPACT RESISTANT GYPSUM ON THE OTHER. (ADDITIONAL INFORMATION REFER TO DETAIL A5/A-902)



METAL STUD PARTITIONS- TYPE 4						
TYPE	STUD	TOTAL WIDTH	FIRE RATING	UL #	STC	COMMENTS
4A	35/8"	41/4"				(1) LAYER OF 5/8" MOISTURE RESISTANT BOARD ON TAG-SIDE.
4B	35/8"	41/4"				(1) LAYER OF 5/8" CEMENT BOARD ONLY.
4C	15/8"	25/8"	1HR	X520		2 LAYER OF 1/2" GYPSUM BOARD ON ONE SIDE

PROJECT SCOPE:	ADA Accessibility Improvements
LOCATION:	180 East Elm Street, Greenwich, CT
IEBC COMPLIANCE METHOD: (IEBC 301.1)	Prescriptive, Work Area <50%; Alteration Level 2
DATE OF PROJECTED CONSTRUCTION:	2024-25
ESTIMATED DATE OF COMPLETION:	2025

CONSTRUCTION TYPE: Existing Type IIB
(Chapter 6, Table 601) **Actual Provided:** No change

	REQUIRED	PROVIDED
Shaft enclosures (713.4):	1	1
Corridors (Table 1020.2):	1	1

SPRINKLER PROTECTION: No
(107.7)

CODES TO WHICH THIS PROJECT WAS DESIGNED:

State Building Code w/ Supplement(s):	2022 State Building Code - State of Connecticut 2021 International Building Code 2021 International Existing Building Code 2021 International Mechanical Code 2021 International Plumbing Code 2020 NFPA 70 National Electrical Code 2021 International Energy Conservation Code
State Fire Code w/ Supplement(s):	2017 ICC / ANSI A117.1 Accessible and Usable Building and Facilities 2022 Connecticut State Fire Safety Code 2022 Connecticut State Fire Prevention Code
State Health Code:	Current
O.S.H.A.:	Title 29 / Labor (current)
Federal Laws:	2010 ADA Standards for Accessible Design Section 504 of the 1973 Rehabilitation Act

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CERTIFICATION:

CONSULTANT:

REVISIONS:

	DATE	DESCRIPTION
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Accessibility Upgrades: Elevator, Entrance, Front Office

GREENWICH PUBLIC SCHOOLS

180 EAST ELM STREET
GREENWICH, CONNECTICUT 06830

DRAWING TITLE:

OVERALL SITE PLAN

DOI: 10.1002/for

1" = 50'-0"

REVIEWED BY:

LMY

DRAWING NO.

SP-1

DATE: _____

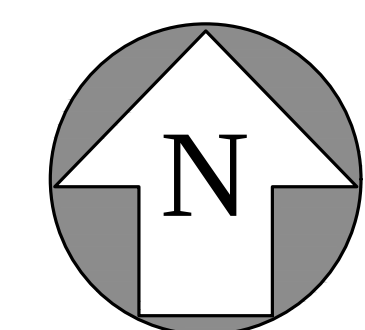
CG NUMBER:

JULY 17, 2024

23015

OVERALL SITE PLAN
SCALE: 1" = 50'

REFER TO SP-3 FOR
ZONING DATA TABLE &
ADDITIONAL INFORMATION



CERTIFICATION:

CONSULTANT:

REVISIONS:

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Accessibility Upgrades: Elevator, Entrance, Front Office

180 EAST ELM STREET
GREENWICH, CONNECTICUT 06830

ENLARGED SITE PLAN

DRAWING NO.

SD 2

SF-2

DATE:	JOB NUMBER:
JULY 17, 2024	27015

JULY 17, 2024	23013
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SCALE: 1" = 20'



CERTIFICATION:

CONSULTANT:

REVISIONS:

	DATE	DESCRIPTION
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PHASED RENOVATIONS
GREENWICH PUBLIC SCHOOLS
108 EAST ELM STREET
GREENWICH, CONNECTICUT 06830

DRAWING TITLE

LANDSCAPE SITE PLAN

SCALE:

 $1'' = 10$ $1'' = 10$

DRAWING NO.

100

DATE: 07/17/2024

DATE:	JOB NUMBER:
07/17/2024	23015

EVERGREEN TREE

DECIDUOUS SHADE TREE

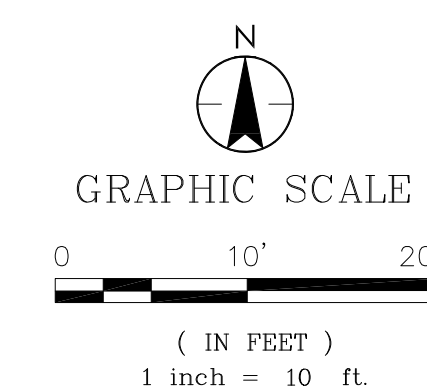
LARGE SHRUB

SMALL SHRUBS

NEW PLANTING BED

LANDSCAPE NOTES

1. NO TREES CAN BE STORED ON SITE. ALL TREES MUST BE SHIPPED DIRECTLY FROM THE NURSERY AND IMMEDIATELY PLANTED ON SITE.
2. ALL PLANT MATERIAL SHALL CONFORM TO THE GUIDELINES ESTABLISHED BY THE AMERICAN STANDARD FOR NURSERY STOCK, PUBLISHED BY THE AMERICAN ASSOCIATION OF NURSERYMEN, INC. ALL PLANTS SHALL BE FULLY REPRESENTATIVE OF THEIR NORMAL SPECIES AND BE HEALTHY, WELL FORMED, FREE FROM ANY DEFECTS AND BE LEGIBLY TAGGED WITH THEIR PROPER NAMES. ALL PLANT MATERIAL SHALL BE OF SPECIMEN QUALITY.
3. NO SUBSTITUTIONS OF TREE SPECIES WILL BE ALLOWED UNLESS APPROVED IN ADVANCE BY THE LANDSCAPE ARCHITECT. ANY PROPOSED SUBSTITUTIONS OF PLANT SPECIES SHALL BE WITH SPECIES OF AN EQUIVALENT OVERALL FORM, HEIGHT, BRANCHING HABIT, FLOWER, LEAF, COLOR, FRUIT AND CULTURE AND ONLY AFTER WRITTEN APPROVAL OF THE LANDSCAPE ARCHITECT.
4. NO DETERIORATED OR DAMAGED PLANT MATERIALS WILL BE ACCEPTED.
5. ALL PLANTS TO BE BALLED IN BURLAP WITH NATURAL FIBER ROPE. NO SYNTHETIC FIBER WILL BE ACCEPTED. WIRE BASKETS MUST BE CUT AND REMOVED.
6. ALL PLANT MATERIALS MUST BE DELIVERED IN ENCLOSED TRUCKS OR UNDER TARPS MADE SPECIALLY FOR COVERING PLANT MATERIALS IN TRANSPORT. ALL UNCOVERED SHIPMENTS OF PLANTS WILL BE REJECTED.
7. ALL PROPOSED TREES SHALL BE STAKED OUT IN THEIR APPROXIMATE LOCATION BY THE CONTRACTOR. THE CONTRACTOR SHALL ADJUST THE LOCATIONS OF THE TREES AS REQUIRED AFTER THE LANDSCAPE ARCHITECT HAS ACCOUNT FOR SUBSURFACE UTILITIES AND OTHER FIELD DIGGING OF TREE PIPS AND THE DELIVERY OF MATERIALS FOR PLANTING. LANDSCAPE ARCHITECT MAY REQUIRE CONTRACTOR TO ADJUST FINAL PLACEMENT OF PLANTS BEFORE ACCEPTANCE OF PLANTING.
8. NO TREES SHALL BE PLANTED BEFORE ACCEPTANCE OF ROUGH GRADING. TREES SHALL BE PLANTED 2" HIGHER THAN ORIGINAL NURSERY GRADE. SHRUBS AND BUSHES SHALL BE PLANTED TO THE SAME RELATIONSHIP TO GRADE AS THE BORE TO PREVIOUS GRADE AT THE NURSERY. ALL PLANTS WHICH SETTLE OUT OF PLUMB OR BELOW GRADE MUST BE IMMEDIATELY REPLANTED.
9. ALL PLANTING SHALL BE DONE UNDER THE FULL-TIME, ON-SITE SUPERVISION OF A CERTIFIED LANDSCAPE PROFESSIONAL OR CERTIFIED ARBORIST EMPLOYED BY THE PLANTING CONTRACTOR. PROVIDE VERIFICATION OF CERTIFICATION FOR LANDSCAPE ARCHITECTS APPROVAL.
10. ALL PLANTS ARE TO BE THOROUGHLY WATERED AFTER INSTALLATION, AT LEAST TWICE WITHIN THE FIRST 24 HOURS. MAINTENANCE SHALL BEGIN IMMEDIATELY AFTER EACH PLANT IS PLANTED AND CONTINUE UNTIL ACCEPTANCE.
11. NO PRUNING WILL BE PERFORMED EXCEPT BY DIRECTION OF LANDSCAPE ARCHITECT DURING INSTALLATION. ALL PRUNING SHALL BE DONE IN ACCORDANCE WITH THE SPECIFICATIONS.
12. THE CONTRACTOR SHALL SUPPLY ALL NEW PLANT MATERIAL IN QUANTITIES SUFFICIENT TO COMPLETE THE PLANTING SHOWN ON THE DRAWINGS.
13. CONTRACTOR SHALL LOCATE AND VERIFY ALL EXISTING UTILITY LINES PRIOR TO PLANTING AND SHALL REPORT ANY CONFLICTS TO THE LANDSCAPE ARCHITECT.
14. ALL PLANT BEDS TO RECEIVE THREE INCHES (3") OF BARK MULCH AS PER SPECIFICATIONS.
15. ALL DISTURBED LANDSCAPE AREAS NOT SHOWN AS PLANTING BED (EXISTING OR PROPOSED) SHALL RECEIVE 6" TOPSOIL, AND BE SEEDED PER THE SPECIFICATIONS AND DETAILS, UNLESS OTHERWISE NOTED ON THE PLANS.



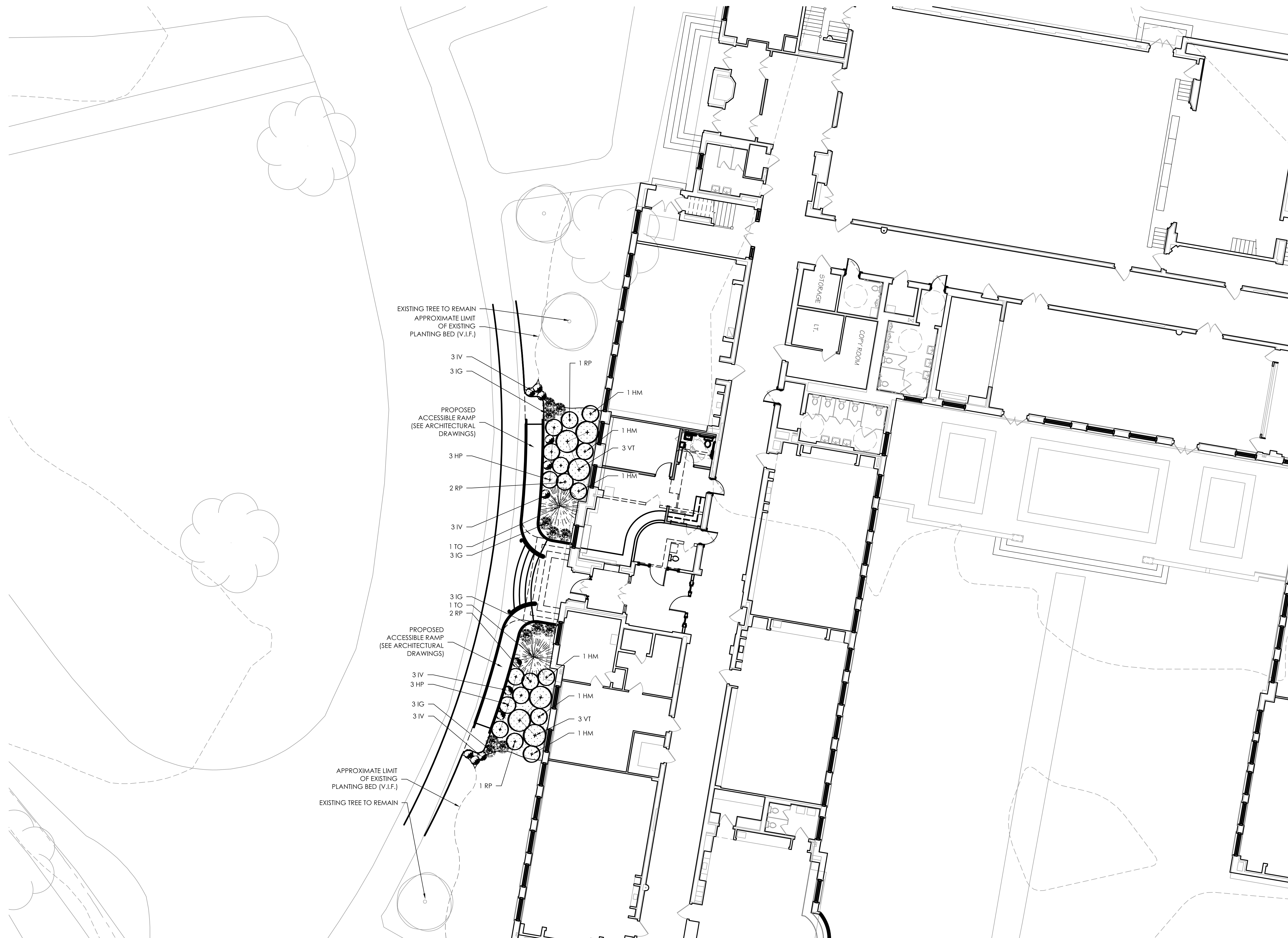
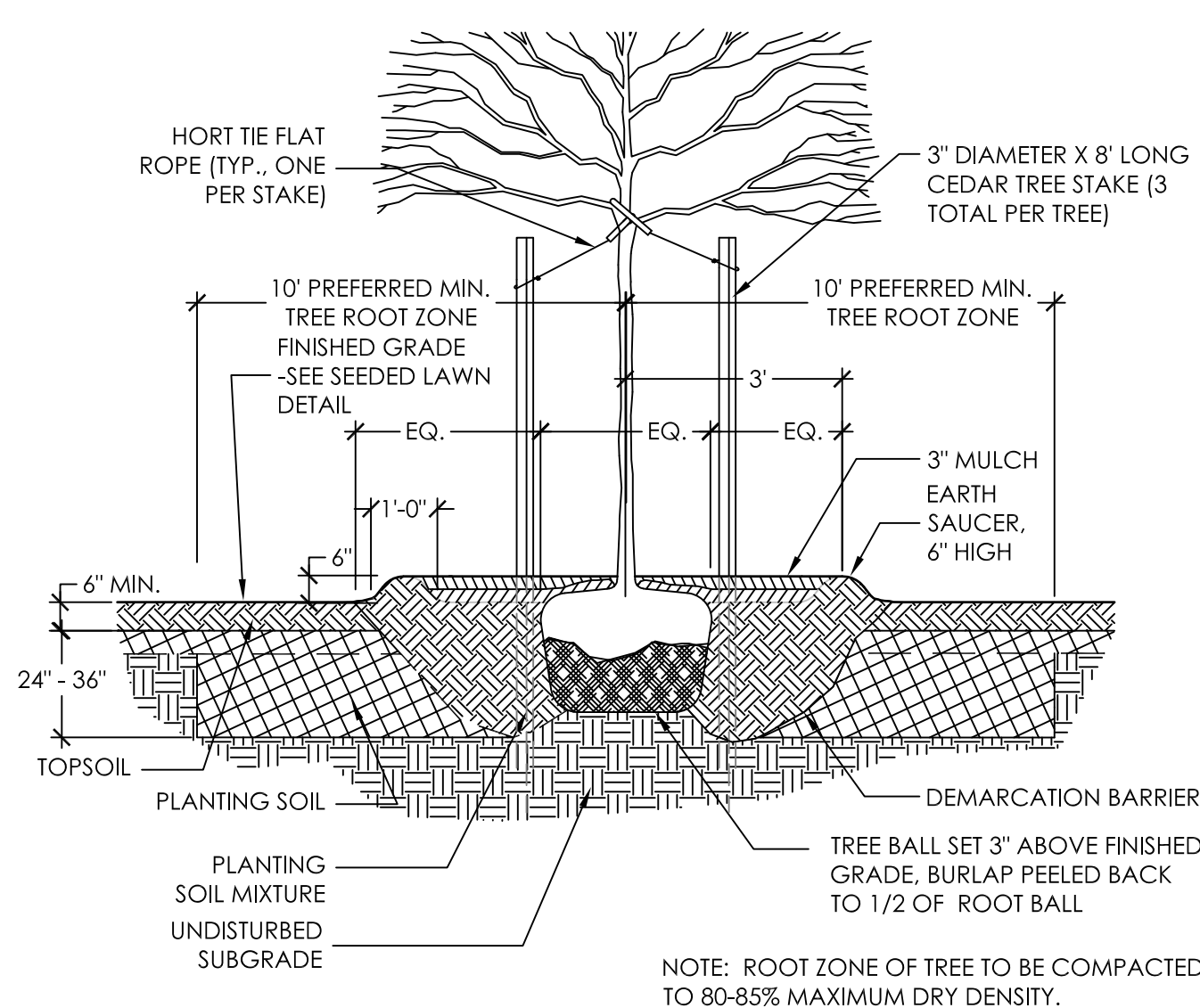
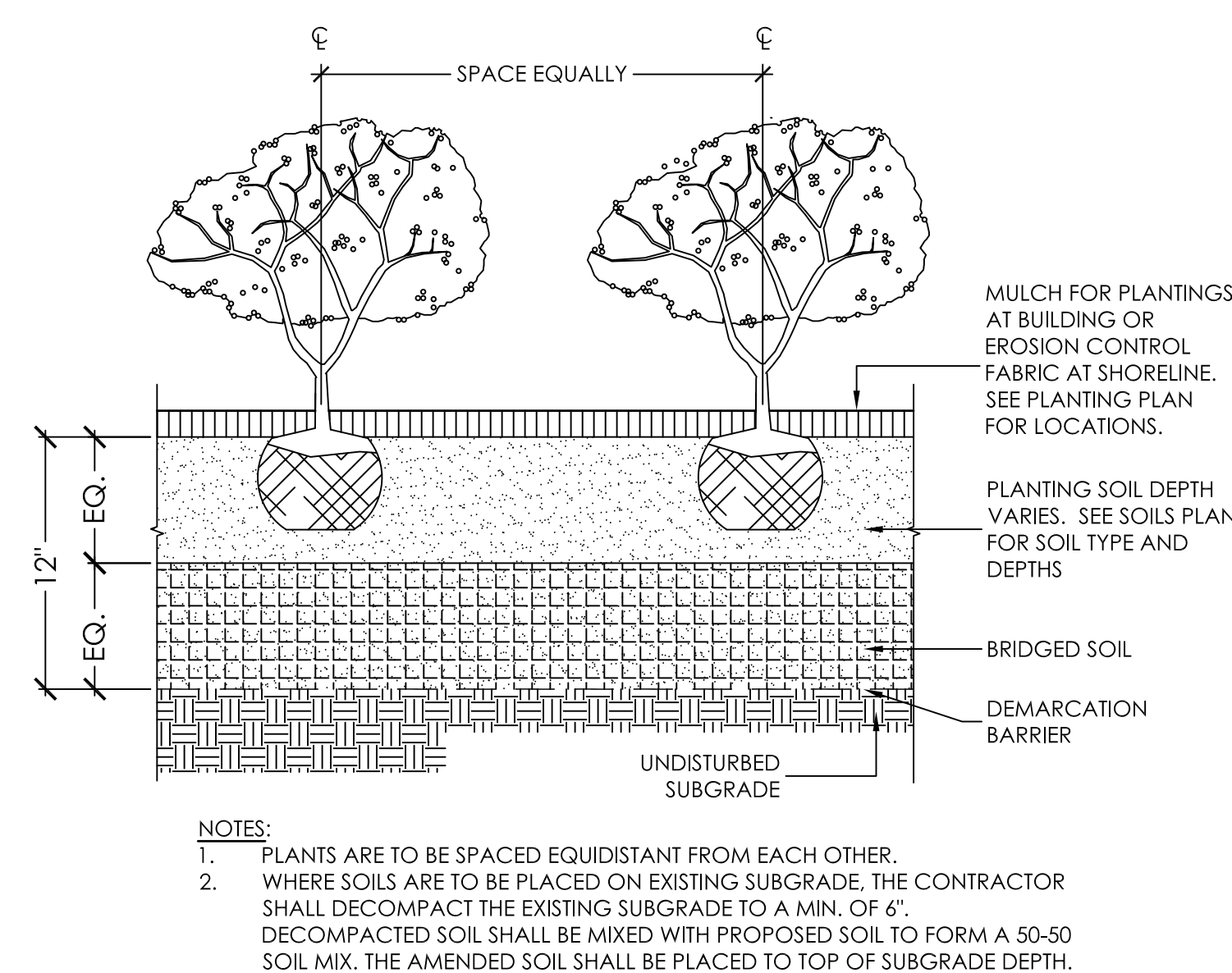
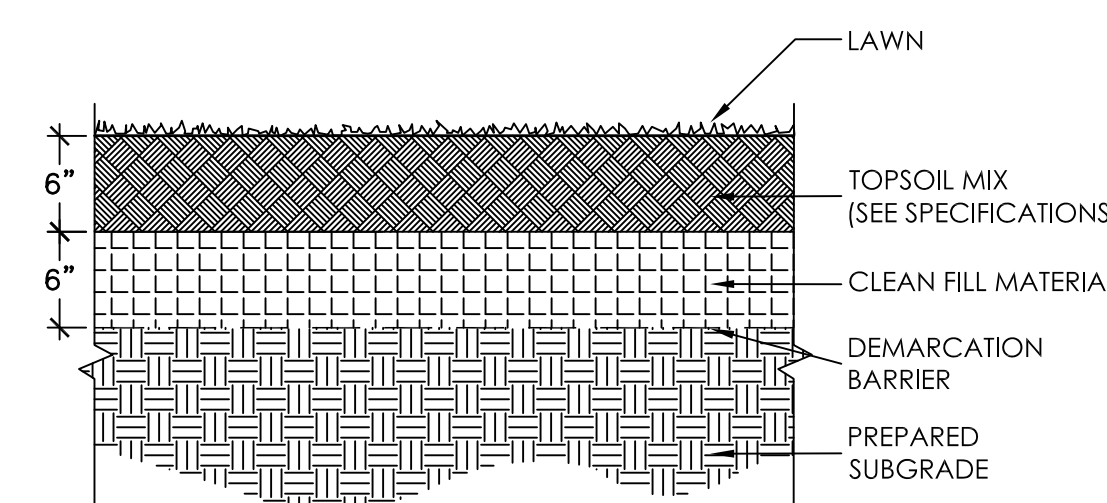
SYMBOL	BOTANICAL NAME	COMMON NAME	QTY.	SIZE	NOTES
EVERGREEN TREES					
TO	THUJA OCCIDENTALIS 'DEGROOT'S SPIRE'	DEGROOT'S SPIRE ARBORVITAE	2	4 - 6' H. B&B	8-12' W
SHRUBS					
HM	HYDRANGEA MACROPHYLLA ENDLESS SUMMER	ENDLESS SUMMER HYDRANGEA	6	#5 CONT.	3-5' H+W
HP	HYDRANGEA PANICULATA LITTLE LIME	LITTLE LIME HYDRANGEA	6	#6 CONT.	3-5' H+W
IV	ILEX VERTICILLATA	COMMON WINTERBERRY	12	#3 CONT.	2-4' H+W
IG	ILEX GLABRA 'GEM BOX'	GEM BOX INKBERY	12	#3 CONT.	2-4' H+W
RP	RHODODENDRON 'P.J.M. COMPACT'	COMPACT P.J.M. RHODODENDRON	6	#3 CONT.	4' H+W
VT	VIBURNUM TRILOBUM 'COMPACTUM'	COMPACT AMERICAN CRANBURY	6	#3 CONT.	5-6' H+W

NOTE: WHERE SOILS ARE TO BE PLACED ON EXISTING SUBGRADE, THE CONTRACTOR SHALL DECOMPACT THE EXISTING SUBGRADE TO A MIN. OF 6". DECOMPACTED SOIL SHALL BE MIXED WITH PROPOSED SOIL TO FORM A 50-50 SOIL MIX. THE AMENDED SOIL SHALL BE PLACED TO TOP OF SUBGRADE DEPTH.

3 SEEDING LAWN
SCALE: N.T.S.

2 SHRUB PLANTING - TYPICAL DETAIL
SCALE: N.T.S.

1 TREE PLANTING - TYPICAL DETAIL
SCALE: N.T.S.



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CERTIFICATE

PRELIMINARY
APRIL 30, 2024
NOT FOR CONSTRUCTION

CONSULTANT

[illegible]

JULIAN CURTISS SCHOOL

Accessibility Upgrades: Elevator, Entrance, Front Office
GREENWICH PUBLIC SCHOOLS
180 EAST ELM STREET
GREENWICH, CONNECTICUT 06830

DRAWING

HAZARDOUS MATERIALS
ABATEMENT BASEMENT PLAN

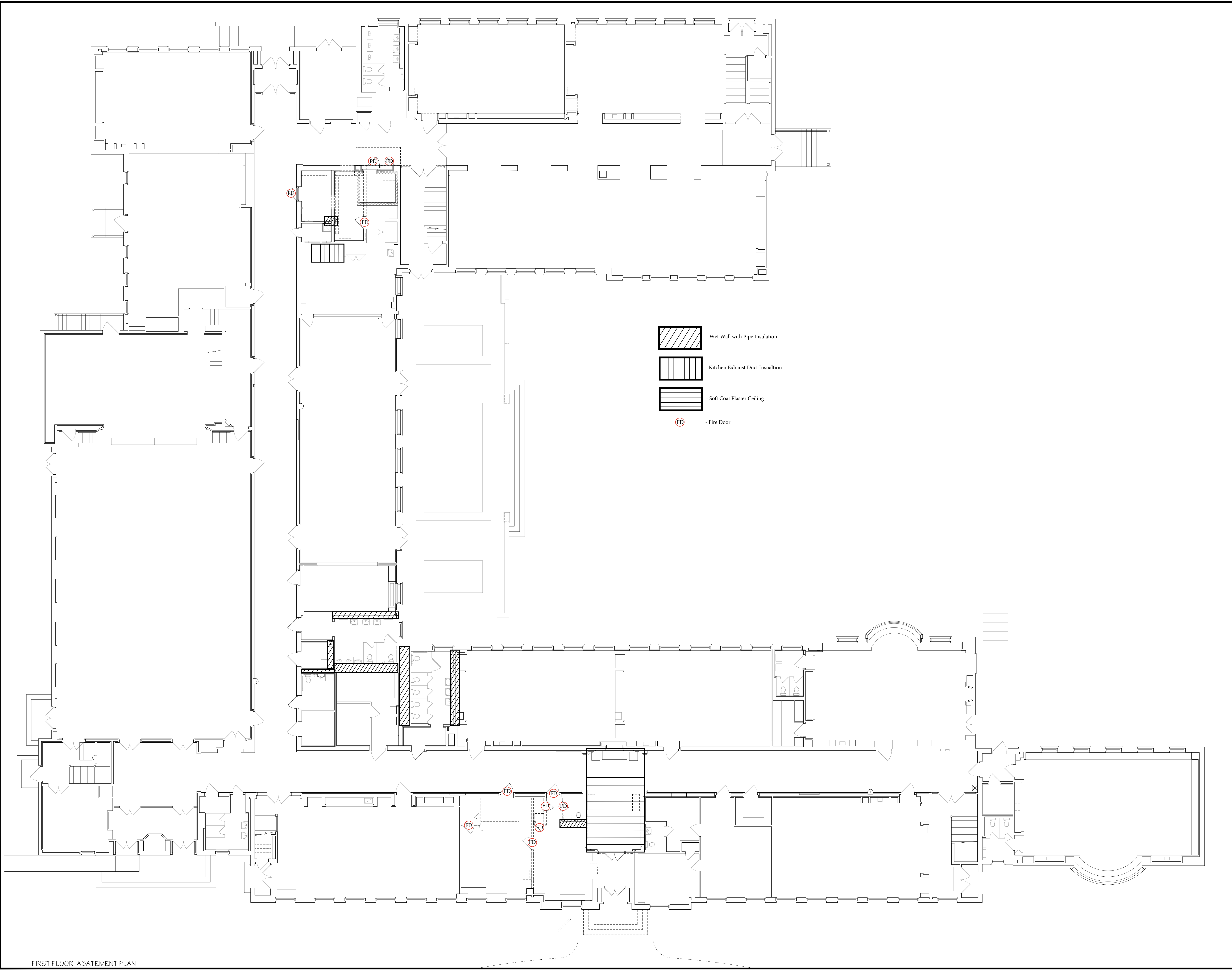
SCALE: AS NOTED	DRAWN BY:	REVIEWED BY:
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DRAFTING

HZ-100

DATE: JULY 17, 2024	JOB NUMBER: 23015
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BASEMENT ABATEMENT PLAN
SCALE: 1/8" = 1'-0"



FIRST FLOOR ABATEMENT PLAN

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ANTINOZZI ASSOCIATES, P.C.
271 Fairfield Avenue
Bridgeport, Connecticut 06604
Tel: (203) 377-1300 Fax: (203) 378-3002 www.antinozzi.com

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CERTIFICATION:

CONSULTANT:

REVISIONS:		
Δ	DATE	DESCRIPTION

JULIAN CURTISS SCHOOL
Accessibility Upgrades: Elevator, Entrance, Front Office
GREENWICH PUBLIC SCHOOLS
180 EAST ELM STREET
GREENWICH, CONNECTICUT 06830

DRAWING TITLE:		
HAZARDOUS MATERIALS ABATEMENT FIRST FLOOR PLAN		
SCALE: AS NOTED	DRAWN BY:	REVIEWED BY:
DRAWING NO:		
HZ-101		
DATE: JULY 17, 2024	JOB NUMBER: 23015	

CERTIFICATION:

CONSULTANT:

[illegible]

Accessibility Upgrades: Elevator, Entrance, Front Office
GREENWICH PUBLIC SCHOOLS

180 EAST ELM STREET
GREENWICH, CONNECTICUT 06830

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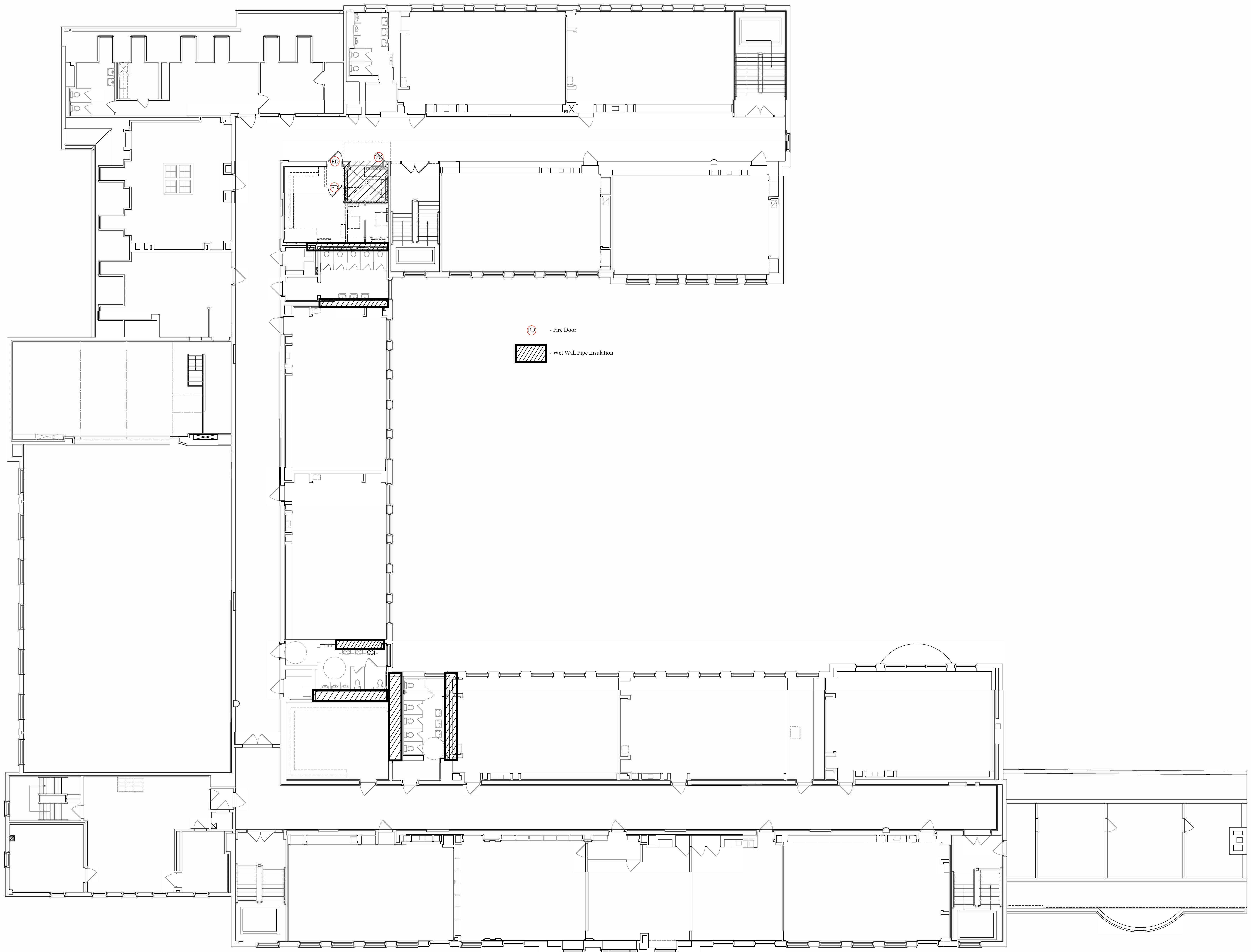
SCALE:
AS NOTED

DRAWING NO.

HZ-102

DATE:
JULY 17, 20

JOB NUMBER:	23015
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SECOND FLOOR ABATEMENT PLAN
SCALE: 1/8" = 1'-0"

CERTIFICATION

CONSULTANT:

[illegible]

Accessibility Upgrades: Elevator, Entrance, Front Office

180 EAST ELM STREET
GREENWICH, CONNECTICUT 06830

DRAWING BY

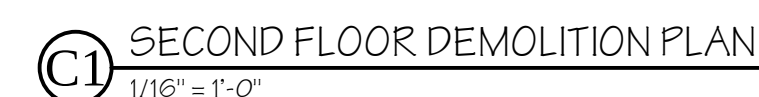
OVERALL DEMOLITION
FLOOR PLANS

SCALE: AS NOTED	DRAWN BY: RMR	REVIEWED BY: LMY
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DRAWING NO.

D-101

DATE:	JOB NUMBER:
JULY 17, 2024	23015



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CERTIFICATION

CONSULTANT:

REVIEWS

[illegible]

JULIAN CURTISS SCHOOL

Accessibility Upgrades: Elevator, Entrance, Front Office

GREENWICH PUBLIC SCHOOLS

GREENWICH, CONNECTICUT 06830

DRAWING TITLE:

PARTIAL ROOF PLANS: DEMO & NEW

SCALE

AS NO

DRAWN BY:
RMR

REVIEWED BY
LMY

DRAWING NO.

A-1R1

DATE: JULY 17, 2024

JOB NUMBER
23015

GENERAL ROOF NOTES

- A. ALL DIMENSIONS TO BE VERIFIED IN FIELD.
- B. ROOFING CONTRACTOR IS RESPONSIBLE FOR ALL WOOD BLOCKING AND FLASHING AT DRAINS, CURBS, ROOF TRANSITIONS, ETC. ALL WOOD BLOCKING TO BE PRESSURE TREATED, TYPICAL.
- C. CONTRACTOR SHALL CONFIRM THE DIMENSIONS OF THE EXISTING EQUIPMENT BASES REQUIRED TO KEEP WATER OFF THE UNITS.
- D. ALL NEW ROOFS SHALL SLOPE AT 1/4" PER FOOT (MIN).
- E. PROVIDE INSULATED EDGE STRIPS TO TRANSITIONS ROOFING BETWEEN HIGH POINTS AND LOW POINTS.
- F. WHERE MECHANICALLY FASTENING RIGID ROOF INSULATION TO ANY CONCRETE OR MASONRY BASE MATERIAL, PRE DRILL ALL HOLES PER MANUFACTURER INSTRUCTIONS.
- G. PATCH ALL ROOF OPENINGS, INCLUDING BUT NOT LIMITED TO FORMER MECHANICAL PENETRATIONS, VENT PIPE, ETC. AS REQUIRED.
- H. PROVIDE ALL NEW PIPE EXTENSIONS AT EXISTING VENT PIPE PENETRATION.
- I. ALL NEW ROOFS SHALL SLOPE AT 1/4" PER FOOT (MIN) WITH 1/2" CREEPER (TYP.).
- J. WHERE MECHANICALLY FASTENING RIGID ROOF INSULATION TO ANY CONCRETE OR MASONRY BASE MATERIAL, PRE DRILL ALL HOLES PER MANUFACTURER INSTRUCTIONS.
- K. PROVIDE INSULATED EDGE STRIPS TO TRANSITIONS ROOFING BETWEEN HIGH POINTS AND LOW POINTS.
- L. WHERE NEW AND EXISTING ROOFING ASSEMBLIES ADJUT, PROVIDE TRANSITION DETAILS.
- M. ALL FLASHED ROOF PENETRATIONS MARKED EXISTING TO REMAIN (HOOFS, EXHAUST FANS, STACK VENTS, ETC.) SHALL BE EVALUATED ON A CASE BY CASE BASIS TO DETERMINE IF AN 8" MINIMUM CLEARANCE FROM ROOF TO FLASHING CAN BE MAINTAINED. UNITS FALLING SHORT TO MINIMUM CLEARANCE SHALL BE REPAIRED SO THAT MECHANICAL CURB IS SUFFICIENT FLARED TO THE 8" MIN. CLEAR DIMENSION.

GENERAL ROOF DEMOLITION NOTES

- A. THESE NOTES ARE FOR INTENT PURPOSES ONLY. CONTRACTOR TO BE RESPONSIBLE FOR REMOVING ALL QUANTITIES OF ALL ITEMS AS REQUIRED TO COMPLETE THIS PROJECT AS SHOWN ON THE CONSTRUCTION DOCUMENTS.
- B. ALL SURFACES DISTURBED BY DEMOLITION & NEW CONSTRUCTION OPERATIONS SHALL BE PATCHED & REPAIRED TO MATCH & BLEND WITH EXISTING ADJACENT SURFACES U.O.N.
- C. ALL CUTTING, PATCHING & DEMOLITION REQUIRED BY ALL TRADES FOR THIS PROJECT IN NEW AND EXISTING AREAS SHALL BE PERFORMED BY THE CONTRACTOR.
- D. DISCONNECT OR DISABLE ALL AFFECTED UTILITIES PRIOR TO COMMENCING WORK. ALL ABANDONED UTILITY LINES (PLUMBING, ELECTRICAL, PADA, ALARM) SHALL BE CUT & CAPPED BELOW FLOOR LINE OR BEHIND WALL LINE. FLOOR OR WALL SHALL BE FINISHED TO MATCH EXISTING ADJACENT SURFACES.
- E. CONTRACTOR TO CONFIRM STAGING AREAS WITH OWNER TO MINIMIZE THE DISTURBANCE OF DAILY BUILDING OPERATIONS AND TO PROTECT EXISTING SITE ELEMENTS (PAVEMENT, SIDEWALKS, LANDSCAPING, ETC.).
- F. AT NO TIME SHALL THE CONTRACTOR REMOVE MORE OF THE EXISTING ROOF THAN WHAT CAN BE INSTALLED IN NEW ROOFING ON THE WORKDAY. CONSIDER WEATHER FORECAST PRIOR TO REMOVAL EACH DAY.

ROOF DEMOLITION NOTES

1. REMOVE ROOFING MEMBRANE, BUILT UP CRICKETS & INSULATION, CONCRETE DECK AS REQUIRED FOR NEW STRUCTURE.
2. PARTIALLY REMOVE AND RELOCATE EXISTING EXHAUST FANS AND DUCTS.COORDINATE WITH FIELD CONDITIONS AS REQUIRED FOR NEW WORK.
3. REMOVE PORTION OF CONCRETE ROOF DECK FOR NEW STRUCTURE. REFER TO STRUCTURAL DRAWINGS.
4. REMOVE ROOF HATCH ASSEMBLY AND INTERIOR LADDER ASSEMBLY. COMPLETE.
5. EXISTING ROOF DRAIN TO REMAIN.
6. EXISTING EQUIPMENT AND CURB TO BE TEMPORARILY REMOVED, STORED AND REINSTALLED,

ROOF CONSTRUCTION NOTES Ⓢ

1. NEW FULLY ADHERED EPDM SYSTEM
2. NEW 36" / 36" ROOF HATCH AND NEW P.T. BLOCKING AS REQUIRED. PROVIDE NEW WALL MOUNTED INTERIOR FIXED WALL LADDER & BRACKETS, IN SIMILAR LOCATION. EXACT HEIGHT FROM FLOOR TO TOP OF ROOF HATCH TO BE VERIFIED IN FIELD.
3. RENEW ALL MECHANICAL UNITS WITH REPAIR AND OR EXTENSION OF EXISTING PIPING, WIRING AS REQUIRED FOR COMPLETE INSTALLATION.
4. NEW MECHANICAL EQUIPMENT, LOCATION TO BE COORDINATE WITH FIELD CONDITIONS. MAINTAIN A MIN. OF 10'-0" AWAY FROM ROOF EDGE.
5. EXISTING MECHANICAL EXHAUST FAN TO BE REINSTALLED IN EXACT LOCATION. PROVIDE NEW P.T. BLOCKING AS REQUIRED.
6. RENEW EXISTING MECHANICAL EXHAUST DUCTS WITH REPAIR AND OR EXTENSION OF EXISTING PIPING, WIRING, BLOCKING, AS REQUIRED FOR COMPLETE INSTALLATION. COORDINATE WITH FIELD CONDITIONS AS REQUIRED FOR NEW WORK.

ROOF GRAPHIC LEGEND

- | | | | |
|---|---|---|--|
|  | FULLY ADHERED EPDM ROOFING SYSTEM. RIGID INSULATION TAPEFIED 1/4" PER FOOT FOR DRAINAGE |  | ROOF PENETRATIONS |
|  | AREA NOT IN CONTRACT (NIC) |  | ROOF TOP FAN |
|  | FULLY ADHERED EPDM ROOFING SYSTEM RIGID INSULATION ON EXISTING CONCRETE SLAB. DECKING, MATCHING SLOPE FOR DRAINAGE. |  | DIRECTION OF TAPEFIED INSULATION |
| | |  | TAPEFIED INSULATION CRICKET AT 1/2" PER FOOT |
| H.P. | ROOF HIGH POINT |  | R.D. |
| L.P. | ROOF LOW POINT | | DIRECTION OF STRUCTURAL SLOPE |

Ⓒ1 PARTIAL ROOF DEMOLITION PLAN

SCALE: 1/8" = 1'-0"

① PARTIAL ROOF PLAN

SCALE: 1/8" = 1'-0"

DATE:	JULY 17, 2024	JOB NUMBER:	23015
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CERTIFICATION:

CONSULTANT:

REVISIONS:

[illegible]

Accessibility Upgrades: Elevator, Entrance, Front Office GREENWICH PUBLIC SCHOOLS

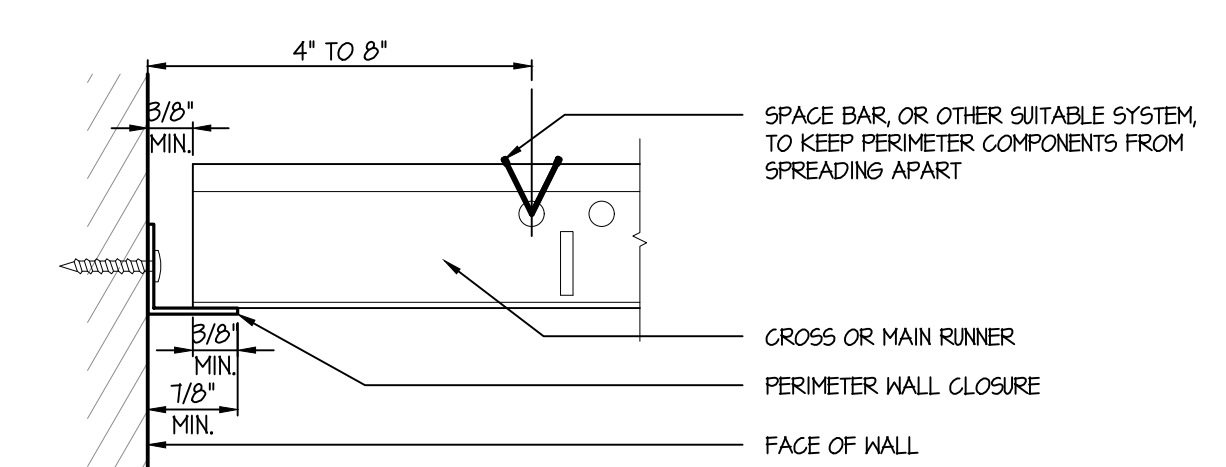
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GREENWICH, CONNECTICUT 06830

DRAWING TITLE

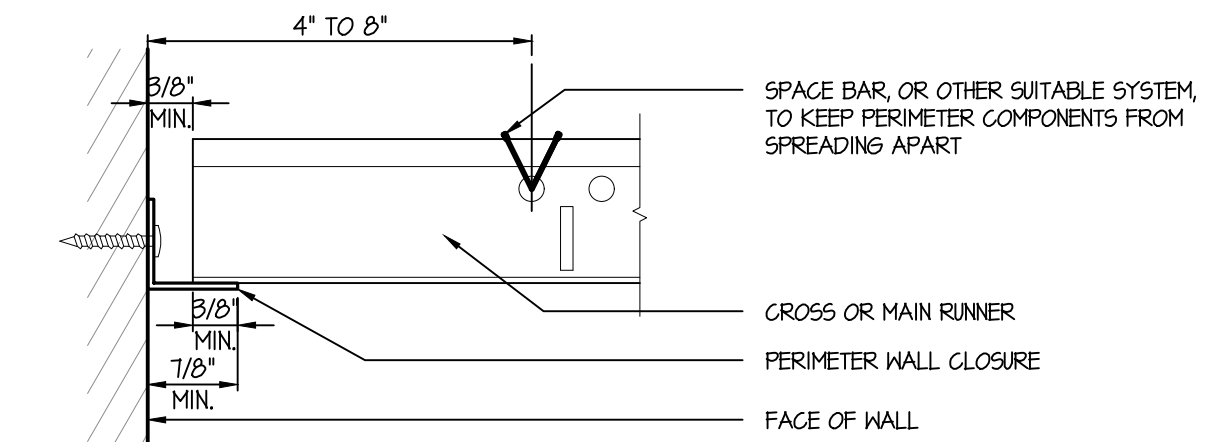
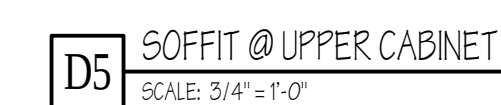
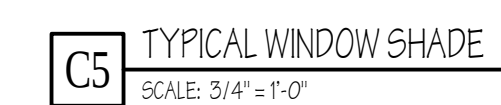
SCALE: AS NOTED	DRAWN BY: RMR	REVIEWED BY: LMY
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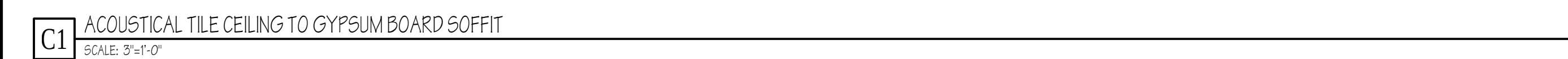
DATE:	JOB NUMBER:
JULY 17, 2024	23015



NOTE:
TREATMENT OF CROSS RUNNERS, MAIN
RUNNERS, AND WALL CLOSURES AT TERMINAL
ENDS



D5 SOFFIT @ UPPER CABINET
SCALE: 3/4" = 1'-0"



C1 ACOUSTICAL TILE CEILING TO GYPSUM BOARD SOFFIT
SCALE: 3/8"=1'-0"

C5 TYPICAL WINDOW SHADE
SCALE: 3/4" = 1'-0"

180 EAST ELM STREET
GREENWICH, CONNECTICUT 06830

SCALE: 1/4" = 1'-0"

SUMP PIT D
SCALE: 1/2" = 1'-0"

(B4) SCALE: 1/4" = 1'-0"

B4 ELEVATOR
SCALE: 3" = 1'-0"

1. COORDINATE LOCATIONS OF ALL DEVICES IN THE MACHINE ROOM-LESS ELEVATOR SHAFT WITH THE ELEVATOR MANUFACTURER AND LOCAL AHP PRIOR TO ROUGH-IN. ALL DEVICES AND CONNECTIONS SHALL BE MADE IN LOCATIONS ACCEPTABLE TO THE ELEVATOR MANUFACTURER AND THE AHP. CHANGES IN LOCATIONS AS A RESULT OF THIS COORDINATION SHALL BE MADE AT NO COST TO THE OWNER.
2. COORDINATE MACHINE ROOMS, HOISTWAYS AND ELEVATOR WALLS WITH ELEVATOR MANUFACTURER, SIMILAR ON ALL FLOORS.
3. REFER TO SHEET INFO 2 FOR TYPICAL ELEVATOR CONTROL DETAILS.
4. COORDINATE UNDERPINNING OF EXISTING FOOTINGS/FOUNDATION WITH STRUCTURAL DRAWINGS.
5. COORDINATE EXISTING MASONRY WALL TO MINIMIZE WALL PENETRATIONS IN EXISTING WALLS. COORDINATE OPENINGS WITH ELEVATOR MANUFACTURER.

KEY PLAN
SCALE: 1/64" = 1'-0"



DEMOLITION NOTES 

1. REMOVE ALL INTERIOR PARTITIONS (SHOWN IN DASHED LINES) AS REQUIRED FOR NEW CONSTRUCTION.
2. REMOVE DOORS, FRAMES, SIDELIGHTS, THRESHOLD AND ALL ASSOCIATED HARDWARE.
3. CAREFULLY REMOVE ARCH ASSEMBLY COMPLETE INCLUDING DOORS, HARDWARE, SIDELIGHTS & TRANSOM.
4. REMOVE ALL MILLWORK/CASEWORK CABINERY (SHELVING, COUNTERS, BOOKCASES, WITHIN CABINETS INCLUDING DOORS, LEADERS, DISPLAY CASES, BENCHES FASTENERS, ETC.) (U.O.N.)
5. REMOVE PORTION OF INTERIOR WALL SEGMENTS AS REQUIRED FOR NEW CONSTRUCTION AS SHOWN IN DASHED. COORDINATE WITH NEW FLOOR PLANS.
6. DISCONNECT AND REMOVE ALL PLUMBING FIXTURES. COMPLETE
7. REMOVE ALL TOILET ACCESSORIES, INCLUDING BUT NOT LIMITED TO: PAPER TOWEL TREAT DISPENSERS, GRAB BARS, MIRRORS, SOAP DISPENSERS, ETC.
8. REMOVE PUBLIC ANNOUNCEMENT SYSTEM. COMPLETE.
9. REMOVE WALL SAFE. COMPLETE.
10. CAREFULLY REMOVE AND SALVAGE PLAQUES. PLAQUES TO REINSTALLED AS INDICATED BY OWNER.

CONSTRUCTION NOTES

1. INFILL EXISTING WALL OPENINGS.MATCH ADJACENT WALL CONSTRUCTION. TYPICAL.
2. NEW SMARTBOARD SCREEN WITH WALL BRACKET.
3. NEW WHITE BOARD. REFER TO INTERIOR ELEVATIONS.
4. SMART BOARD WITH ADJUSTABLE BRACKET.
5. NEW TACKBOARD. REFER TO INTERIOR ELEVATIONS.
6. NEW LCD SCREEN AND BRACKET.
7. NOT USED
8. WALL MOUNTED SECURITY MONITORS.
9. CARD READER.
10. RELOCATED ARCH,SIDELIGHTS & TRANSOM ASSEMBLIES.
11. REPAIR, RESTORE & REPLACE AS REQUIRED BASED PANES, WAINSCOT, CAP, MOULDING TRIM IN AREA OF WORK. PAINT GRADE - COLOR T.B.O.
12. COUNTER TO WRAP AROUND EXISTING HEATING UNIT. ADD SUPPORTS AS NEEDED.
13. PROVIDE NEW 5/8"GYPSUM BOARD OVER EXISTING.

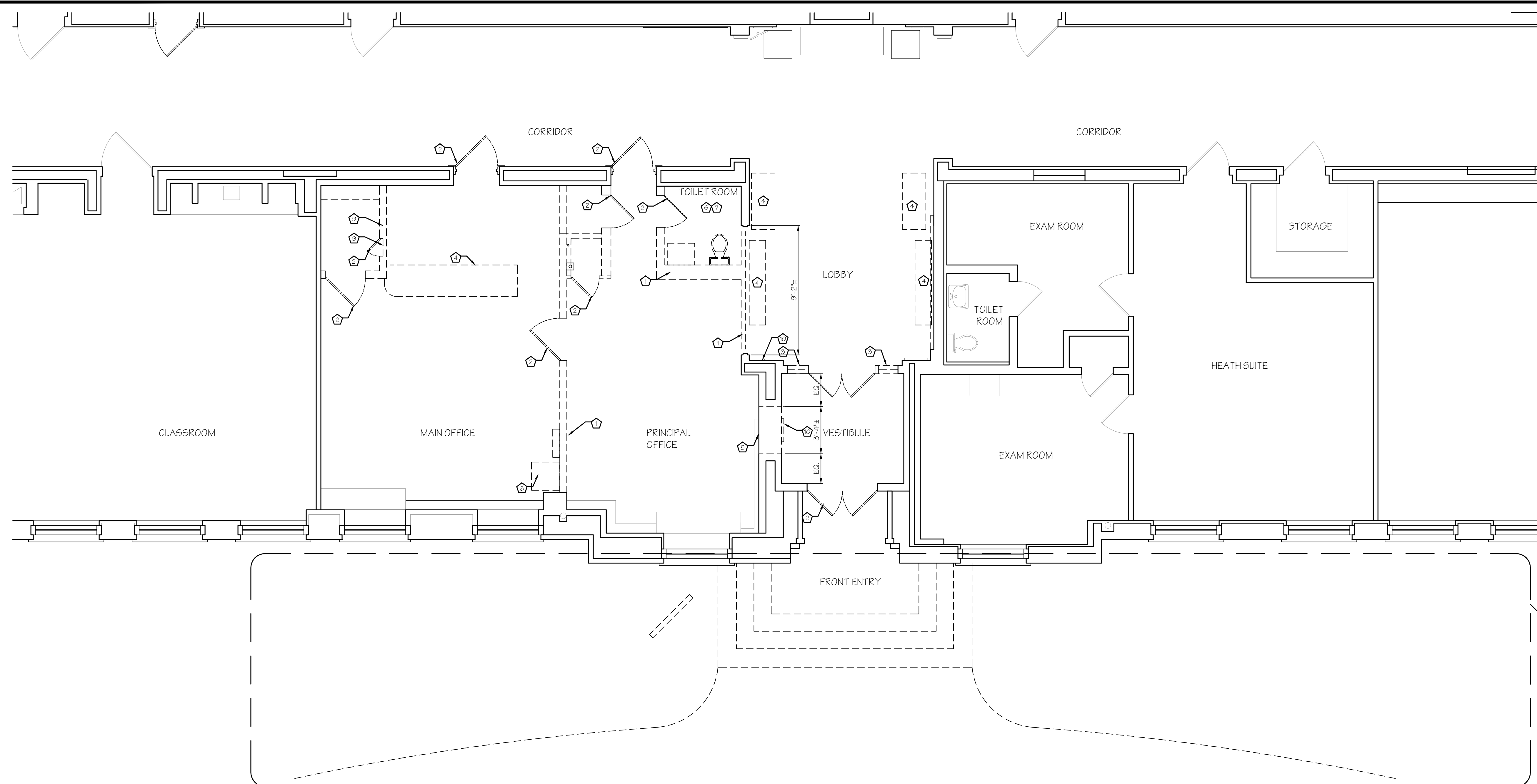
ACCESSORIES LEGEND:

- | | | | |
|----|--|----|---|
| A. | 1 1/2" DIA. STAINLESS STEEL GRAB BAR - 36" LONG | E. | SURFACE MOUNTED PAPER TOWEL DISPENSER |
| B. | 1 1/2" DIA. STAINLESS STEEL GRAB BAR - 42" LONG | F. | 18" X 30" STAINLESS STEEL FRAMED MIRROR |
| C. | 1 1/2" DIA. STAINLESS STEEL GRAB BAR - 18" LONG (VERTICAL) | G. | WALL MOUNTED SOAP DISPENSER |
| D. | SURFACE MOUNTED TOILET TISSUE DISPENSER | H. | SURFACE MOUNTED SAN. NAPKIN DISPOSAL |

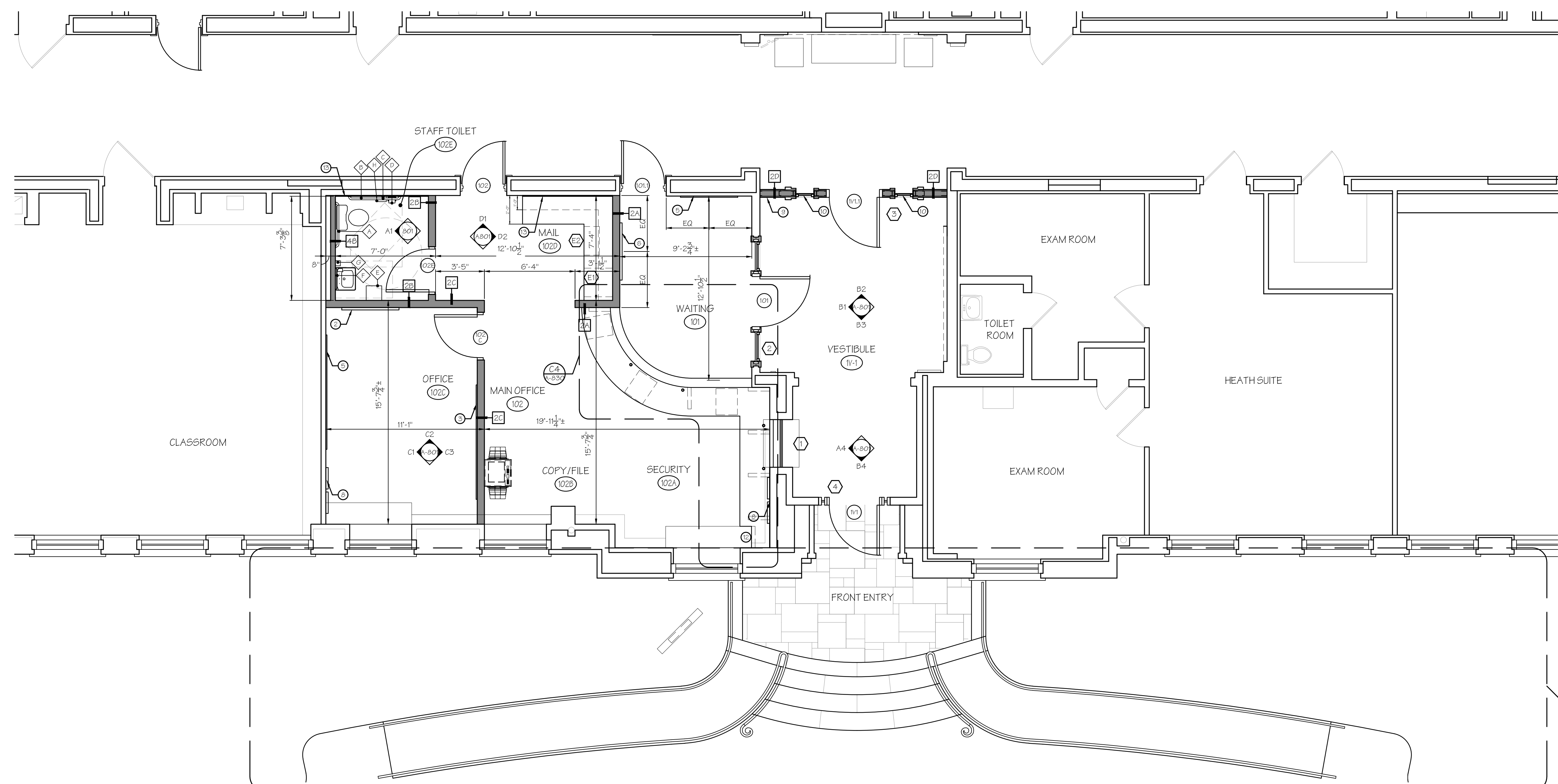
GENERAL TOILET ROOM NOTES

NOTE: THE FOLLOWING NOTES APPLY TO ALL AREAS OF REQUIRED WORK.

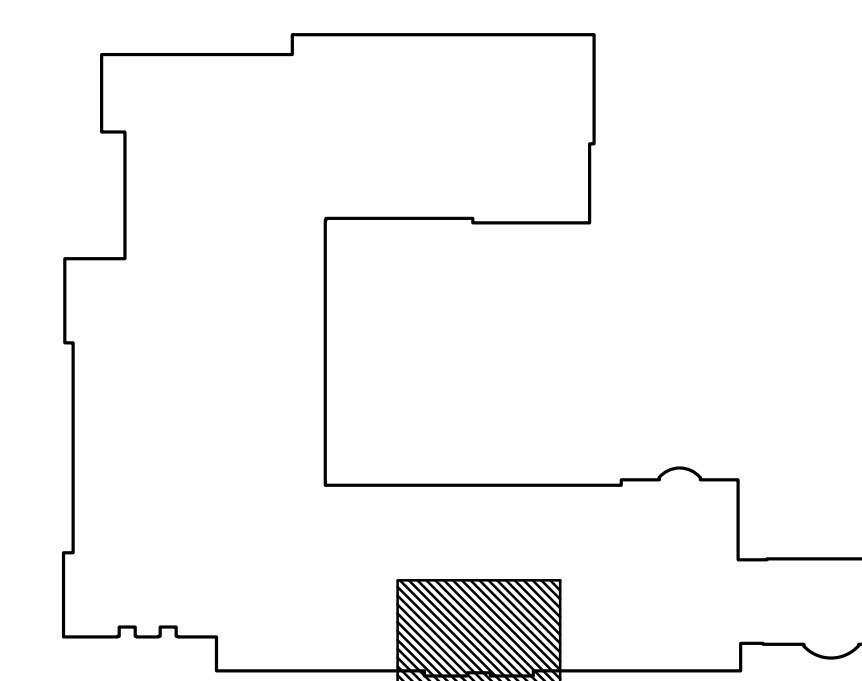
1. REFER TO INFO-1 FOR ALL MOUNTING HEIGHTS FOR HANDICAPPED ACCESSIBLE FIXTURES AND TYPICAL DIMENSIONS AT ACCESSIBLE TOILETS.
2. PROVIDE FIRE TREATED BLOCKING AS REQUIRED PER TYPICAL MOUNTING HEIGHTS AT STUD PARTITIONS.
3. SEE SPECIFICATION SECTION 102800; TOILET BATH AND LAUNDRY ACCESSORIES FOR ADDITIONAL INFORMATION.
4. REFER TO FINISH PLANS FOR ALL FINISHES IN TOILET ROOMS.
5. REVISIT TO BE WHITE POPS/COLOR ANULON.



(A1) ENLARGED FIRST FLOOR DEMOLITION PLAN - ENTRY
SCALE: 1/4" = 1'-0"



(A1) ENLARGED FIRST FLOOR - ENTRY
SCALE: 1/4" = 1'-0"



KEY PLAN
SCALE: 1/64" = 1'-0"



CERTIFICATION

CONSULTANT:

REVISIONS:

[illegible]

Accessibility Upgrades: Elevator, Entrance, Front Office
GREENWICH PUBLIC SCHOOLS

180 EAST ELM STREET
GREENWICH, CONNECTICUT 06830

DRAWING TO

SCALE: AS NOTED	DRAWN BY: RMR	REVIEWED BY: LMY
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DRAWING NO.

A-614

DATE:	JULY 17, 2024	JOB NUMBER:	23015
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1. REFER TO LANDSCAPE AND LIGHTING PLAN FOR TREE REMOVAL/PROTECTION
2. ANY TREES SHOWN TO BE REMOVED SHALL BE MARKED (WITH RIBBON ONLY) AND SHALL BE REVIEWED BY THE CITY AND LANDSCAPE ARCHITECT PRIOR TO REMOVAL
3. EXCAVATE AND BACKFILL FOR NEW RAMPS AND LANDINGS.
4. REFER TO SP DRAWINGS (SITE MATERIAL AND LAYOUTS) FOR GENERAL SITE NOTES, GRADING NOTES AND REQUIREMENTS TO CONCRETE WASHOUT AREAS.

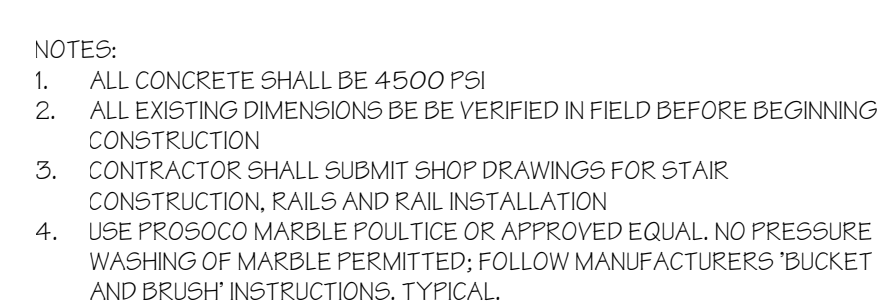
1. REMOVE DOORS, FRAMES, SLEDGHTS, THRESHOLD AND ALL ASSOCIATED HARDWARE.
2. REMOVE, SLAB, & PROTECT PLANTERS. COORDINATE WITH OWNER IF PLANTERS WILL BE REUSED/RELOCATED OR TO BE DISPOSED OF. COORDINATE WITH OWNER.
3. CAREFULLY REMOVE EXTERIOR STAIR ASSEMBLY, COMPLETE INCLUDING BUT NOT LIMITED TO: FOUNDATIONS, FOOTING,BRICK, GRANITE & PAVERS.
4. REMOVE PORTION OF CONCRETE SIDEWALK.
5. REMOVE EXISTING SIGN AND RETURN TO OWNER FOR POTENTIAL REUSE. TAKE PRECAUTIONS TO MINIMIZE DAMAGE TO THE SIGN AND/OR OTHER ADJACENT SIGN CAN BE DETACHED. WRAP SIGN COMPONENTS FOR PROTECTION BEFORE GIVING TO OWNER.

1. LANDING BLUESTONE IN RANDOM RECTILINEAR PATTERN. SMALLEST PIECES SHALL BE 12 INCHES SQUARE, PROVIDE 12" BORDER, JOINTS AS SHOWN.
2. NEW CONCRETE RAMP WITH BROOM FINISH.
3. NEW SQUARE TILE STEEL GUARDRAIL WITH POST BRACKETS, REFER TO IMAGE B1/A-G15, (IMAGE FOR REFERENCE ONLY.)
4. NEW CONCRETE SIDEWALK, BROOM FINISH. TIE NEW CONCRETE SIDEWALK TO EXISTING CONCRETE SIDEWALK.
5. NEW BRICK VENEER, CURVED ALONG RAMPS.
6. CUT ALONG CURVE AND TOOL NOSING PER DETAIL, PROVIDE JOINTS AS SHOWN, REFER TO DETAILS FOR RISERS.
7. CARD READER.
8. NOT USED.
9. SCRAPE, REMOVE ANY LOOSE PAINT,S AND ALL SURFACES. PRIME ALL BARE WOOD, CAULK, PATCH AND PAINT AS SPECIFIED.
10. ALL MARBLE INCLUDING BUT NOT LIMITED TO: COLUMNS, PANELS, CARVINGS AND SIGNAGE BLOCK, TO BE CLEANED IN AREA OF FRONT ENTRY. USE PROSCIO MARBLE POLISHITE OR APPROVED EQUIVALENT. NO PRESSURE WASHING OF MARBLE PERMITTED. FOLLOW MANUFACTURERS' PATCH & BRUSH INSTRUCTIONS.
11. BLUESTONE PROVIDE A FLAMED BLUE SELECT BY CT STONE OR APPROVED EQUAL. BLUESTONE IN BLUE GRAY COLOR RANGE.
12. TERMINATE RAILINGS AT POSTS SET 1 1/2" FROM FACE OF BUILDING. TYPICAL.
13. LATERAL SCROLL TERMINATION TO MATCH RAILING PROFILE (JULIUS BULM 4428)



180 EAST ELM STREET
GREENWICH, CONNECTICUT 06830

DATE:	JOB NUMBER:
JULY 17, 2024	23015



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CERTIFICATE

CONSULTANTS

REVISIONS:

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Accessibility Upgrades: Elevator, Entrance, Front Office
GREENWICH PUBLIC SCHOOLS
180 EAST ELM STREET
GREENWICH, CONNECTICUT 06830

DRAWING TITLE:
ENLARGED TOILET ROOM
DEMOLITION & NEW
CONSTRUCTION PLANS

SCALE: AS NOTED	DRAWN BY: RMR	REVIEWED BY: LMY
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A-620

DATE:	JOB NUMBER:
JULY 17, 2024	23015

GENERAL DEMOLITION NOTES

- A. THESE NOTES CONVEY INTENT ONLY. CONTRACTOR IS RESPONSIBLE FOR REMOVING ALL QUANTITIES OF ALL ITEMS AS REQUIRED TO COMPLETE THIS PROJECT AS SHOWN ON THE CONSTRUCTION DOCUMENTS.
- B. ALL CUTTING, PATCHING, REMOVALS & DEMOLITION REQUIRED BY ALL TRADES FOR THIS PROJECT IN NEW AND EXISTING AREAS SHALL BE PERFORMED BY THE CONTRACTOR.
- C. DISCONNECT OR MAKE ALL AFFECTED UTILITIES PRIOR TO COMMENCING WORK. ALL ABANDONED UTILITY LINES (PLUMBING, ELECTRICAL, DATA, ALARM) SHALL BE CUT & CAPPED BELOW FLOOR LINE OR BEHIND WALL LINE (INCLUDING BUT NOT LIMITED TO, CONCRETE PIPING, ETC.). FLOOR OR WALL SHALL BE PATCHED & FINISHED TO MATCH ADJACENT SURFACES.
- D. ANY UNUSED ELECTRICAL, SECURITY, OR OTHER SUCH JUNCTION BOXES OR CONTROL PANELS SHALL BE REMOVED.
- E. CONTRACTOR TO CONFIRM STAGING AREAS WITH OWNER TO MINIMIZE THE IMPACT OF DAILY BUILDING OPERATIONS AND TO PROTECT EXISTING SITE ELEMENTS (PAVEMENT, SIDEWALKS, LANDSCAPING, ETC.) FROM DAMAGE.
- F. REMOVE HAZARDOUS MATERIALS ABATEMENT REPORT FOR ADDITIONAL DEMOLITION SPECIFICATIONS AND COORDINATE ALL WORK SHOWN ON THESE DRAWINGS WITH HAZARDOUS MATERIALS ABATEMENT REPORT. ALL WORK SHOWN ON HAZARDOUS MATERIALS ABATEMENT SPECIFICATIONS, MUST BE COMPLETED IN COMPLIANCE WITH ALL APPLICABLE REGULATIONS OUTLINED IN ALL APPLICABLE SPECIFICATIONS.
- G. REFER TO STRUCTURAL, MECHANICAL ELECTRICAL & PLUMBING DRAWINGS FOR ADDITIONAL DEMOLITION SPEC.
- H. REMOVE ALL EXISTING CEILING IN AREA OF WORK, I.D.O., INCLUDING BUT NOT LIMITED TO: SOFFITS, ACCESS PANELS, CEILING TILES, SUSPENDED GRIDS AND CEILING PANELS UP TO THE EXISTING ROOF DECK. REMOVE ASSOCIATED SUPPORT STRUCTURES ALONG WITH ATTACHED CEILING DEVICES, LIGHT FIXTURES, HVAC DEFLECTORS AND RETURN.
- I. REMOVE ALL EXISTING VISUAL BARRIERS INCLUDING BUT NOT LIMITED TO MARKER BOARDS, DRY ERASE BOARDS, CHALKBOARDS AND TACK-BOARDS AND ALL ASSOCIATED HARDWARE.
- J. PROPERLY SHORE ALL MASONRY OPENINGS. COORDINATE NEW OPENINGS WITH ARCHITECTURAL PLANS.
- K. ALL EQUIPMENT, WHETHER SCHEDULED FOR SALVAGE OR TO BE DISPOSED OF, SHALL BE DISCONNECTED BY THE APPROPRIATE MEP TRADE(S) PRIOR TO REMOVAL. ALL ASSOCIATED ACCESSORIES FOR SALVAGED ITEMS TO BE STORED WITH THE ITEM.
- L. REMOVE ALL WALLS AS SHOWN AND AS REQUIRED FOR NEW CONSTRUCTION. COORDINATE WITH NEW ARCHITECTURAL AND STRUCTURAL DRAWINGS. ALL EXISTING INTERIOR PARTITIONS ARE MASONRY U/LN.
- M. ALL DIMENSIONS SHOWN ARE FOR REFERENCE ONLY.
- N. ALL DEMOLITION AND REMOVAL OF EXISTING MATERIALS NOT LIMITED TO NEW OPENINGS, AREAS WHERE PERPENDICULAR WALLS HAVE BEEN REMOVED, ETC., NEAT AND READY FOR PATCHING AND REPAIR TO MATCH ADJACENT SURFACES.
- O. COMPLETELY REMOVE EXISTING WALL MOUNTED PLASTER AND/OR WALL MOUNTED BANNERS, SALVAGE AND STORE FOR RE-INSTALLATION OR RETURN TO OWNER AS DETERMINED. QUANTITY TO BE VERIFIED IN FIELD. BANNERS TO BE DRY CLEANED AND RENSTALLED.
- P. PROVIDE TEMPORARY PROTECTIVE COVER OVER ANY FLOORING TO REMAIN DURING THE COURSE OF DEMOLITION AND THROUGHOUT CONSTRUCTION.
- Q. PROTECT ALL TERRAZZO FINISHED SURFACES (I.D.O.)
- R. ALL EQUIPMENT INCLUDING BUT NOT LIMITED TO: MEP EQUIPMENT, RECESSED RADIATORS, WALL CLOCKS, EXTERIOR EQUIPMENT, MOVABLE PARTITIONS AND ANY ASSOCIATED EQUIPMENT AND/OR FURNITURE AREA OF WORK SHALL BE PROTECTED FOR MORE INFORMATION. INITIAL AND PATCH AS REQUIRED FOR NEW WALL FINISH.

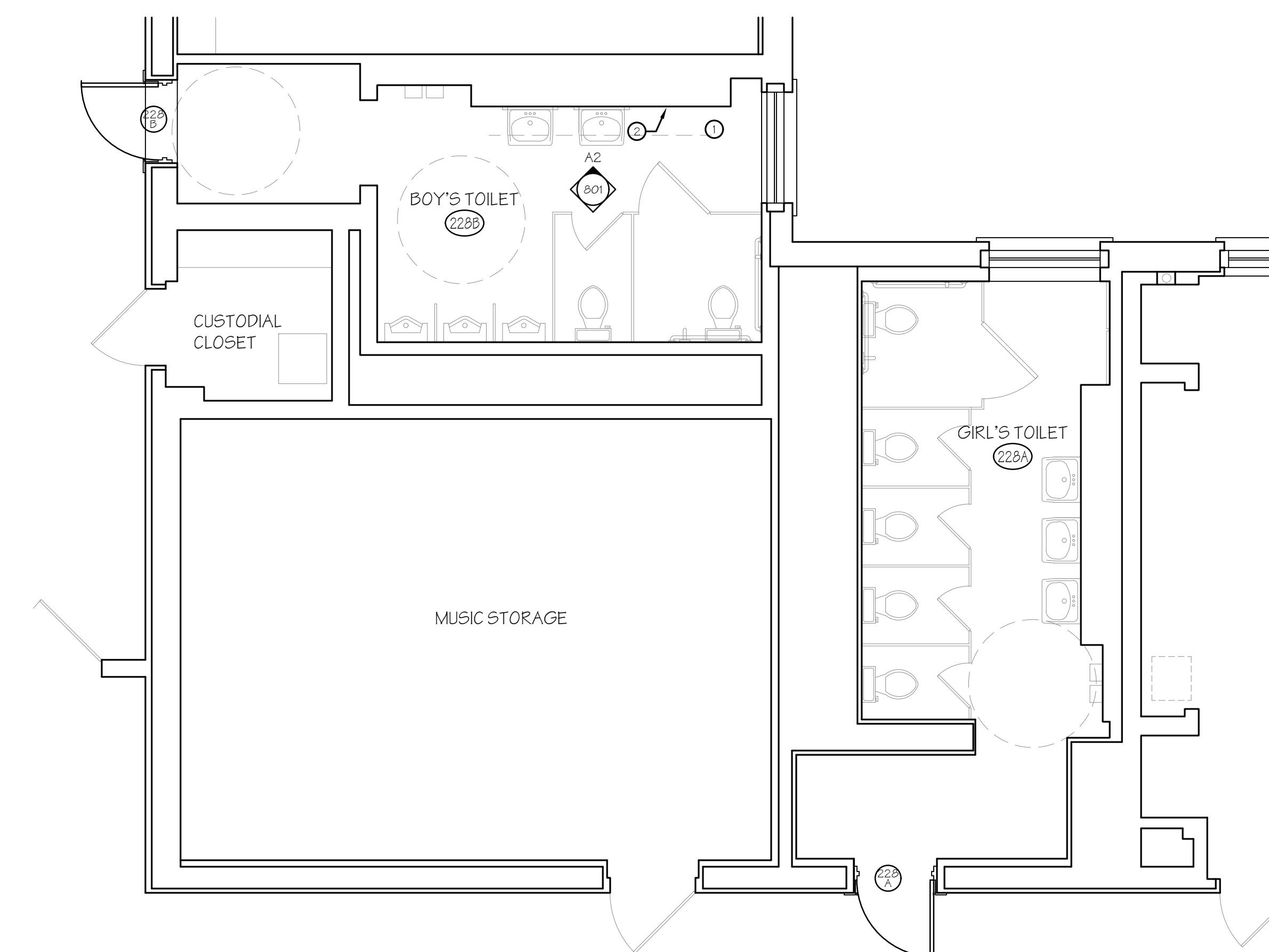
REFER TO A-611 FOR ACCESSORIES LEGEND

DEMOLITION NOTES

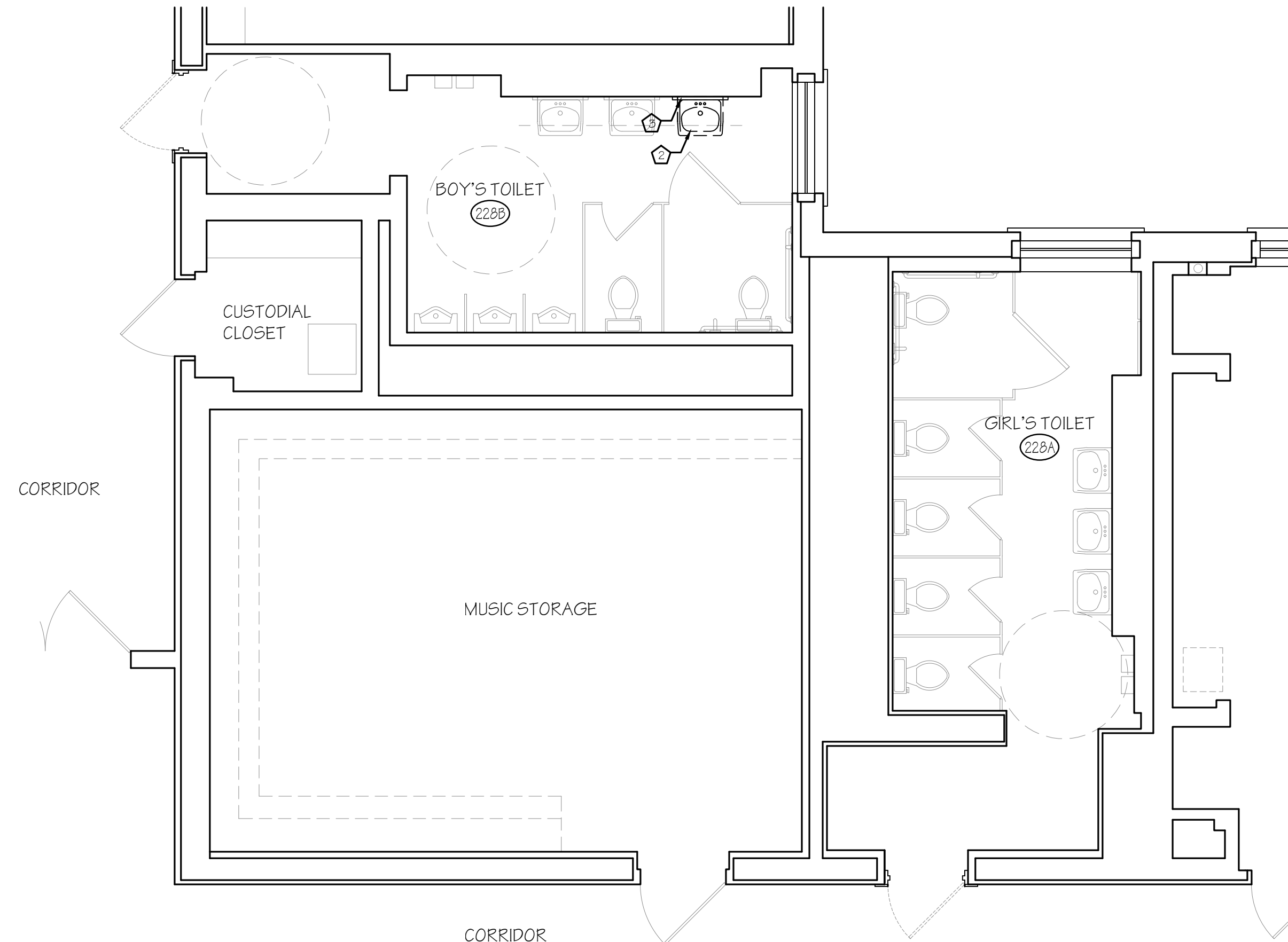
1. DISCONNECT AND REMOVE WALL/FLOOR MOUNTED URINAL COMPLETE.
2. DISCONNECT AND REMOVE WALL MOUNTED SINK.
3. CAREFULLY REMOVE AND PROTECT WALL MOUNTED MIRROR & ALL ASSOCIATED HARDWARE. RETURN TO OWNER FOR FUTURE USE.
4. REMOVE MIRROR COMPLETELY.
5. REMOVE GRAB BAR ASSEMBLIES.
6. TEMPORARILY REMOVE PLUMBING FIXTURE ON WET WALL FOR INSTALLATION OF NEW WALL FINISH

CONSTRUCTION NOTES ②

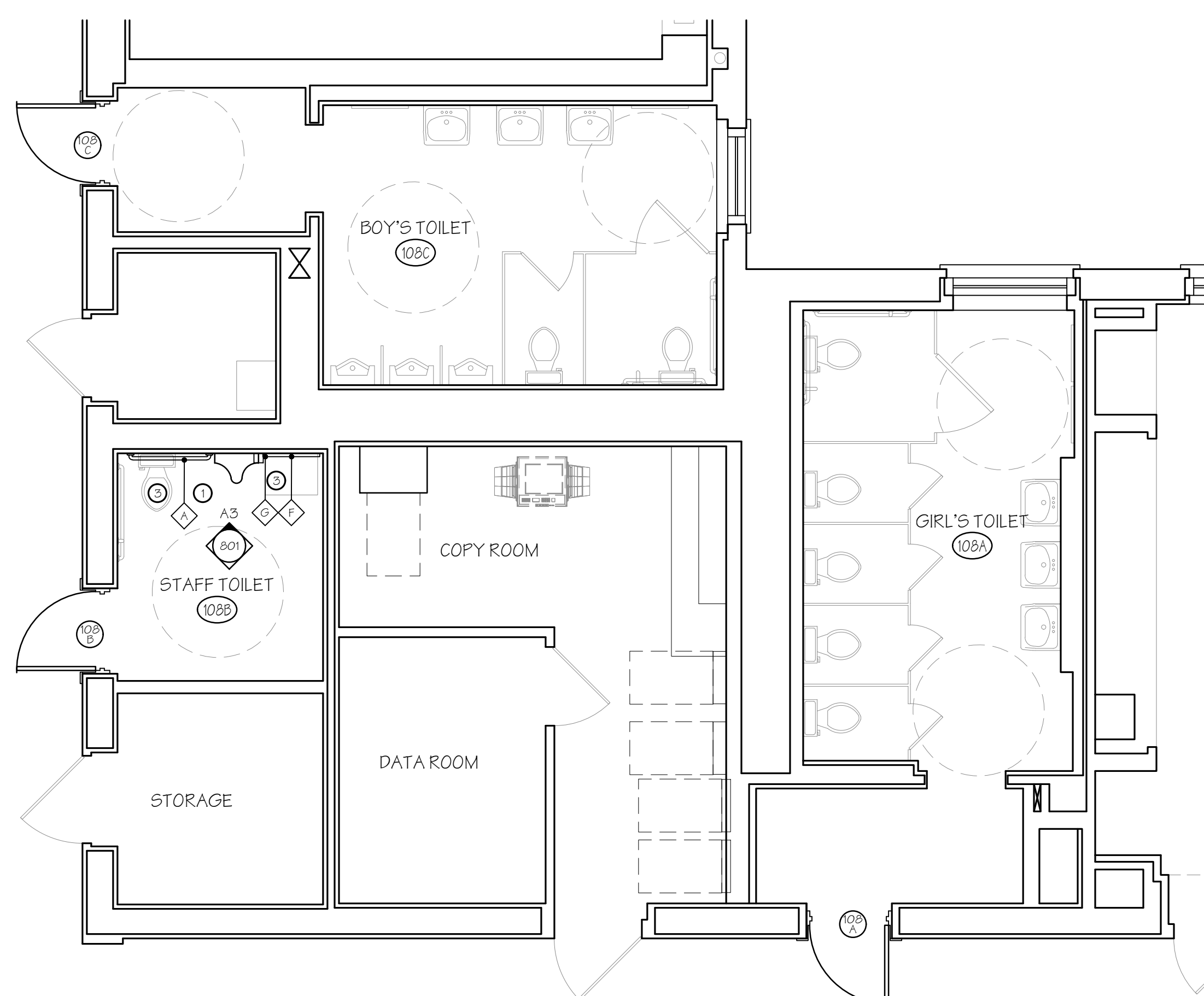
1. NEW TILE AT WET WALL. REFER TO INTERIOR ELEVATIONS
2. PROVIDE STAINLESS STEEL WALL COVER PLATE AT CAPPED PLUMBING
3. REINSTALL EXISTING PLUMBING FIXTURES.



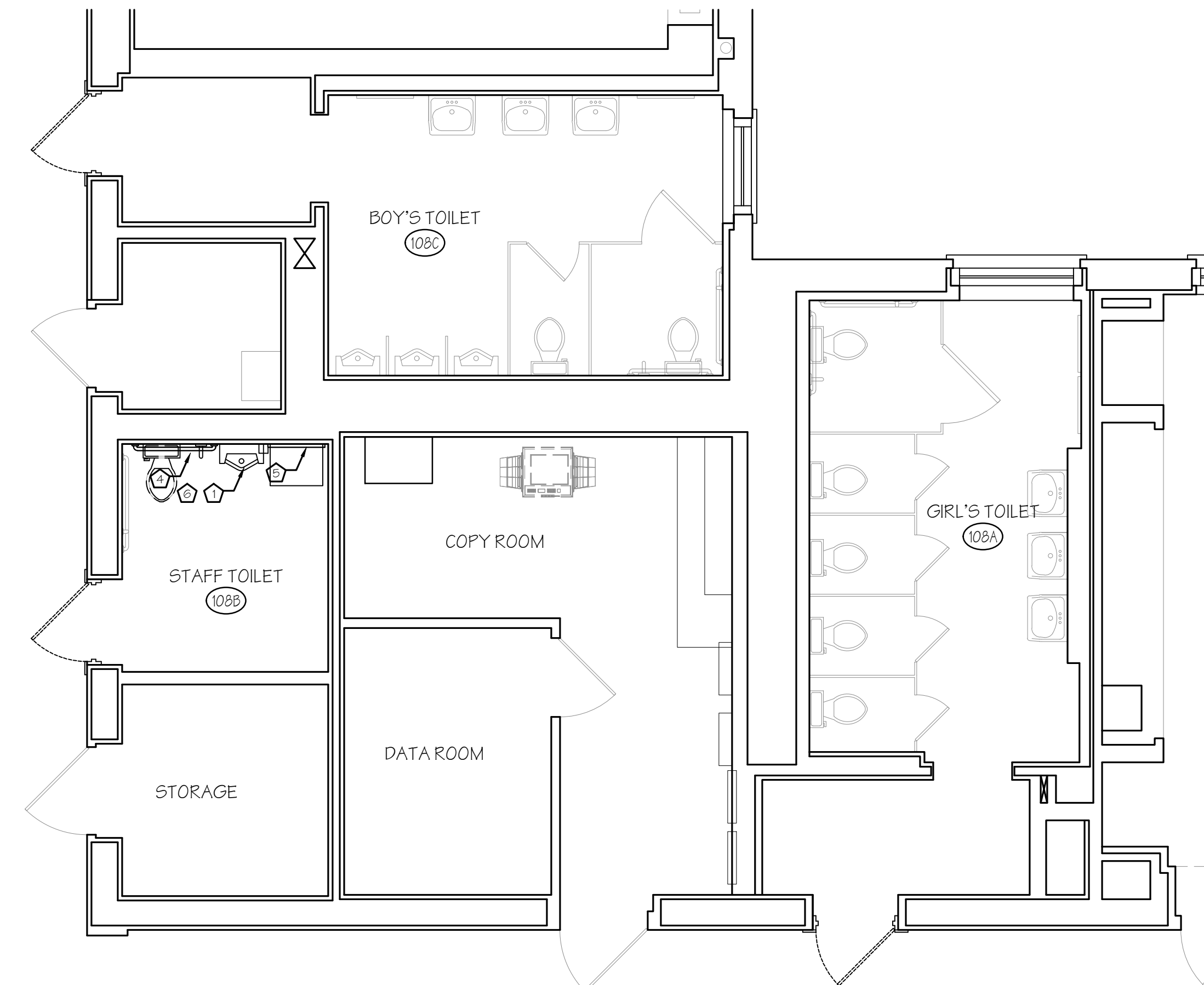
C1 SECOND FLOOR TOILET ROOM
SCALE: 1/4" = 1'-0"



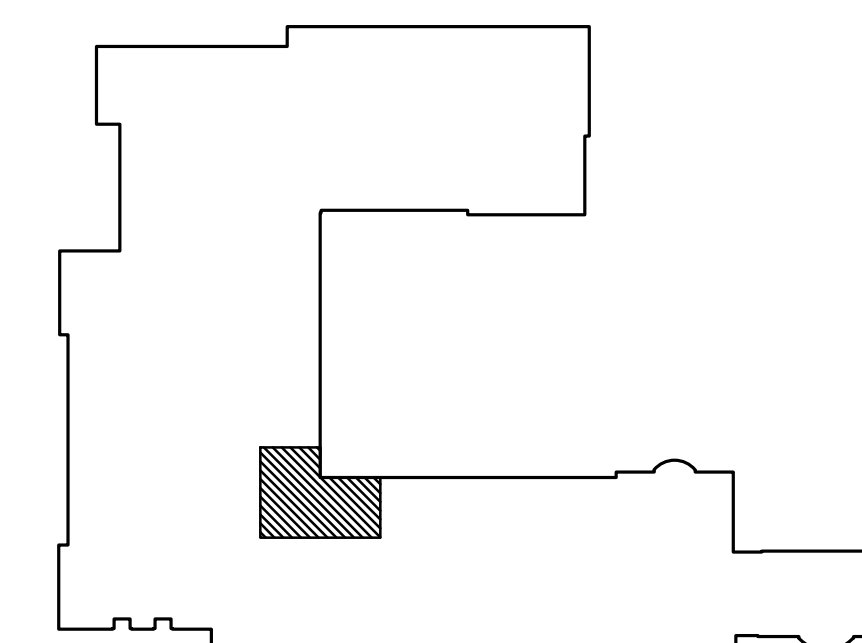
C3 SECOND FLOOR DEMOLITION - TOILET ROOM
SCALE: 1/4" = 1'-0"



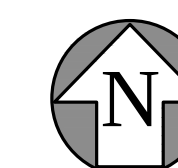
A1 FIRST FLOOR TOILET ROOM
SCALE: 1/4" = 1'-0"



(A3) FIRST FLOOR DEMOLITION - TOILET ROOM
SCALE: 1/4" = 1'-0"



KEY PLAN
SCALE: 1/64" = 1'-0"

 PROJECT
NORTH

CERTIFICATION

CONSULTANT:

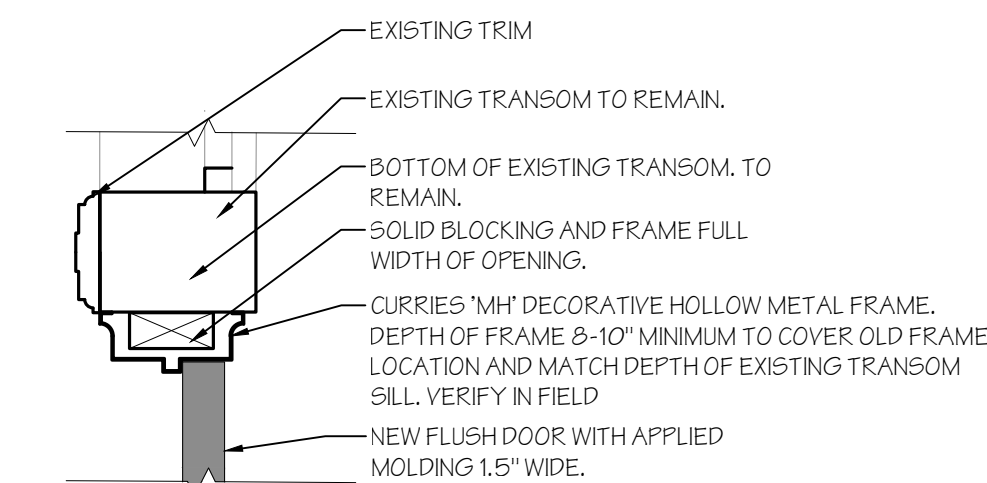
REVISIONS:

Accessibility Upgrades: Elevator, Entrance, Front Office GREENWICH PUBLIC SCHOOLS

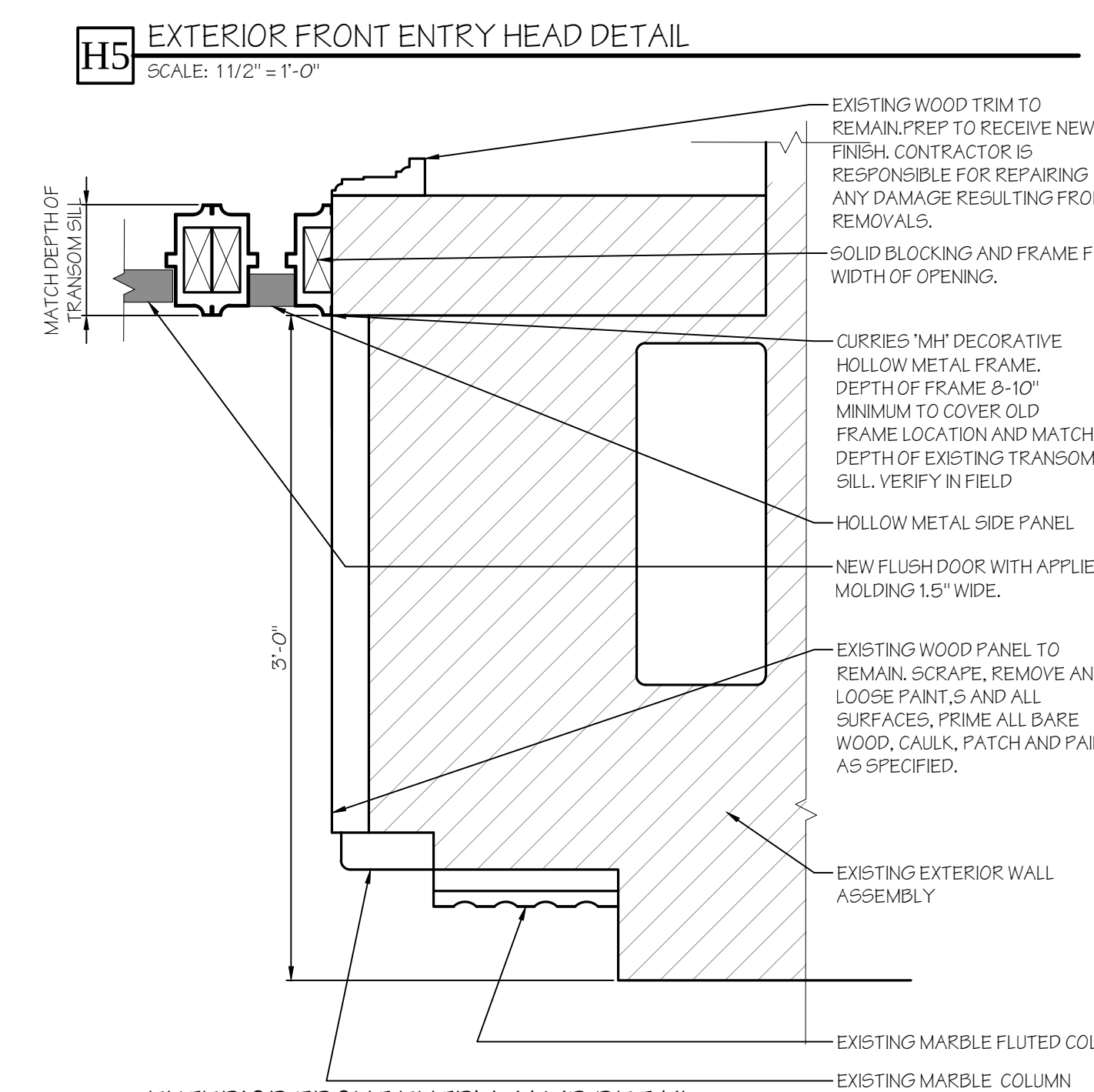
180 EAST ELM STREET
GREENWICH, CONNECTICUT 06830

DRAWING NO.

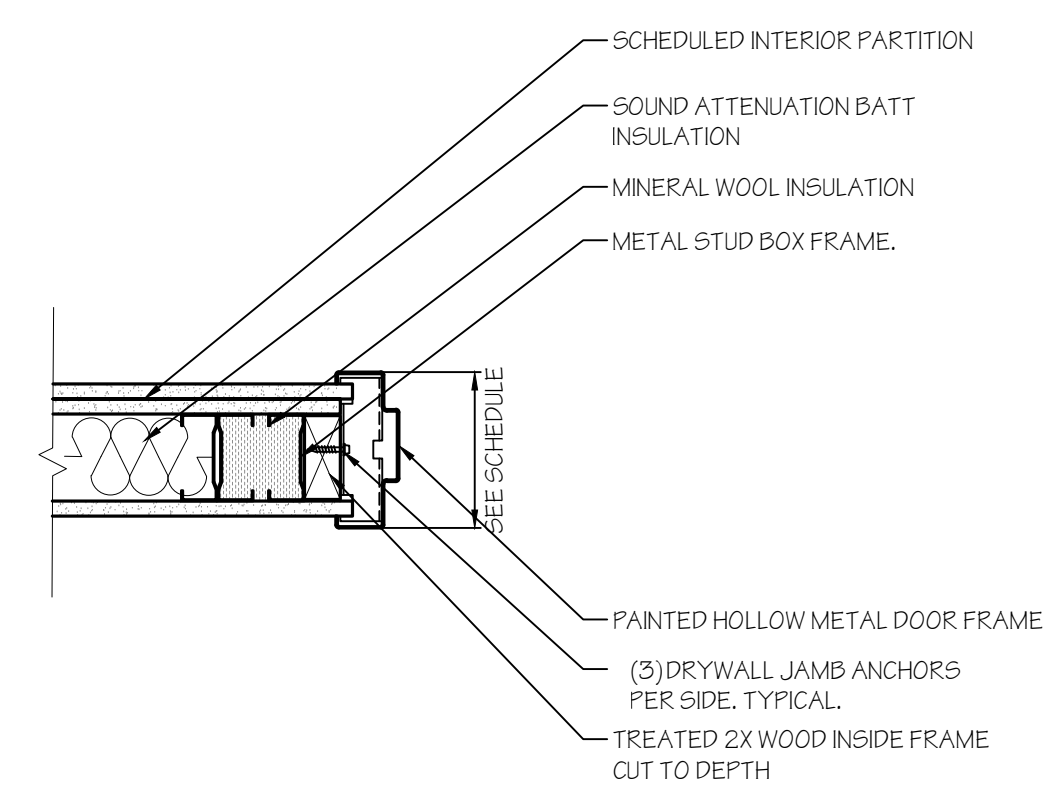
DATE:	JOB NUMBER:
JULY 17, 2024	23015



H4 HEAD DETAIL
SCALE: 1 1/2" = 1'-0"

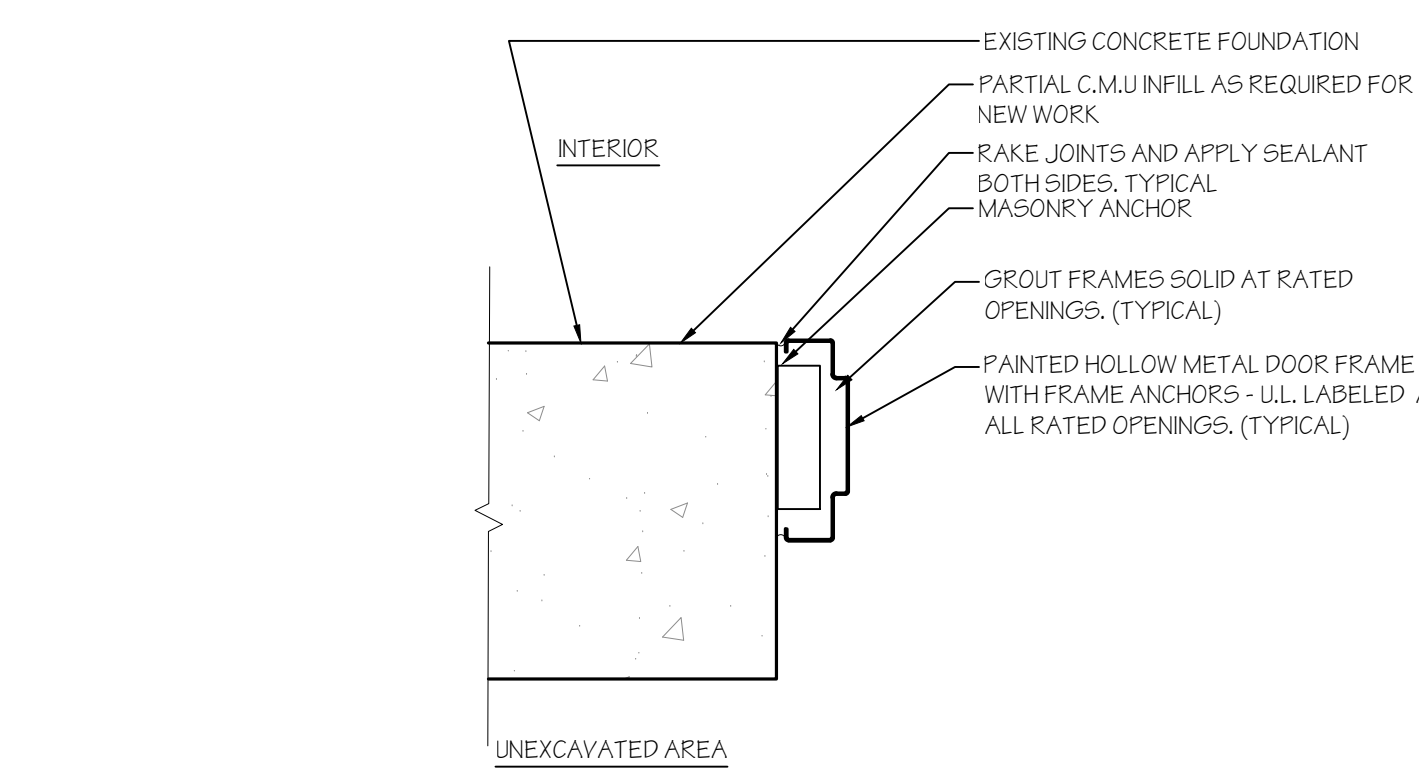


J5 EXTERIOR FRONT ENTRY JAMB DETAIL
SCALE: 1 1/2" = 1'-0"

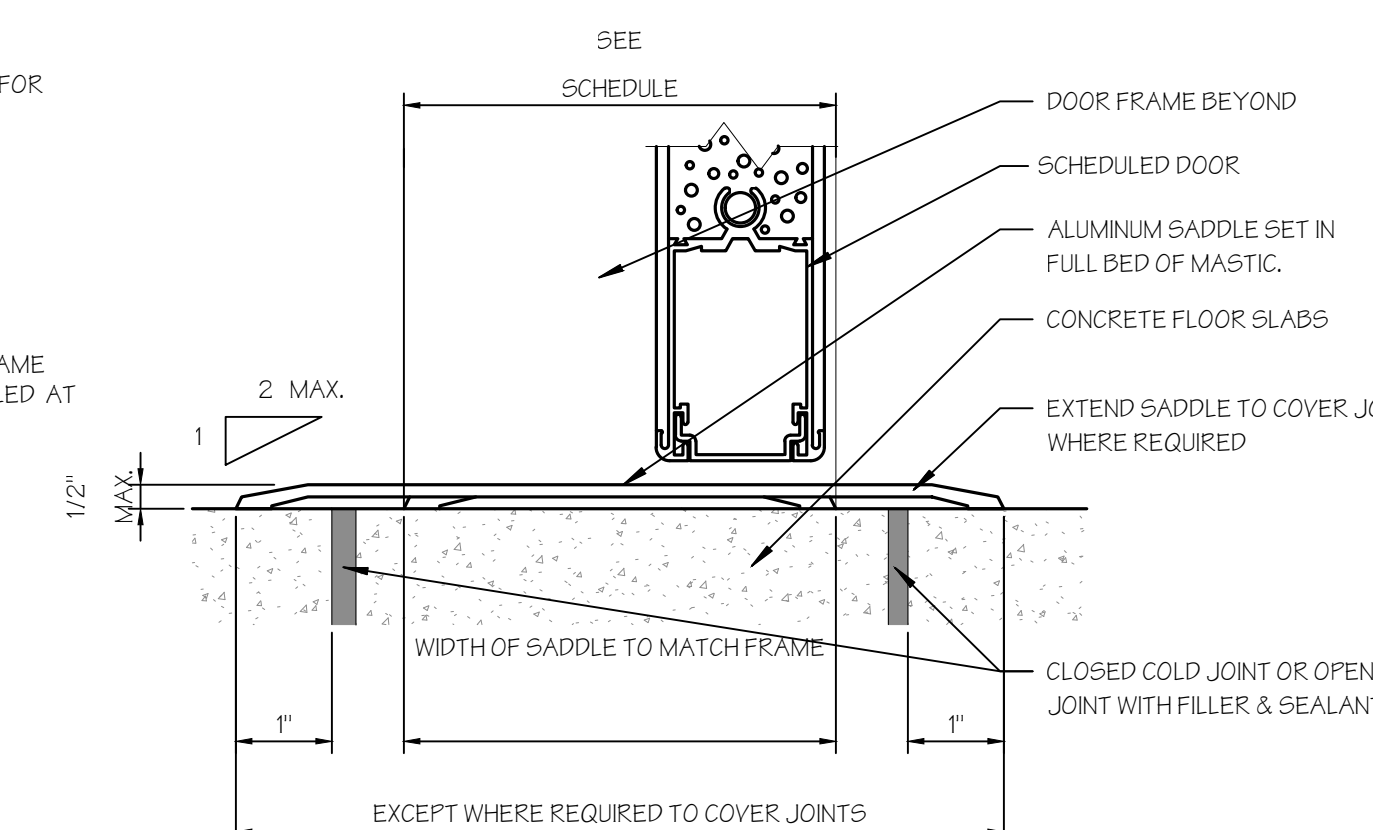


J2 JAMB DETAIL (HEAD SIMILAR)
SCALE: 1 1/2" = 1'-0"

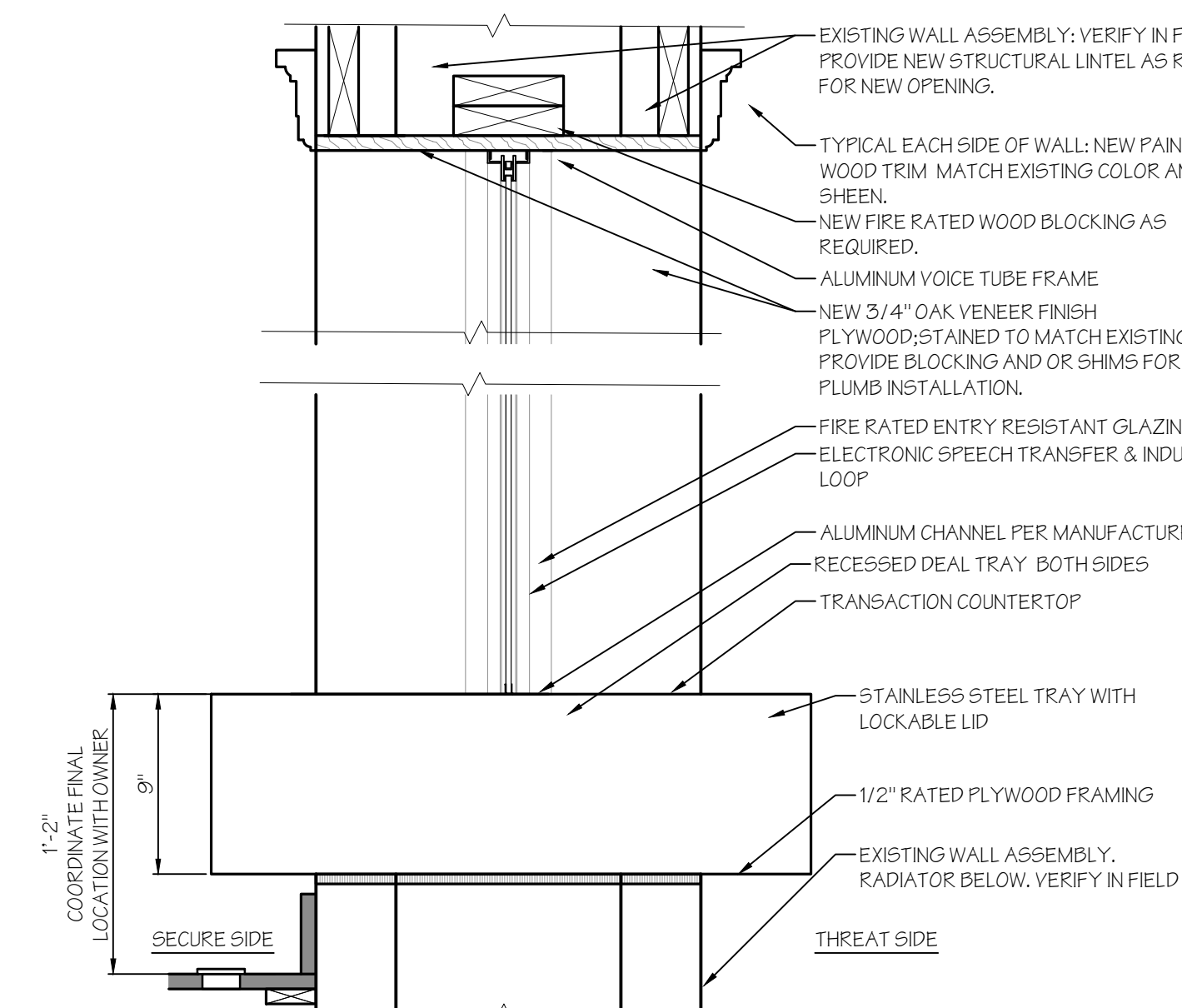
J3 JAMB DETAIL
SCALE: 1 1/2" = 1'-0"



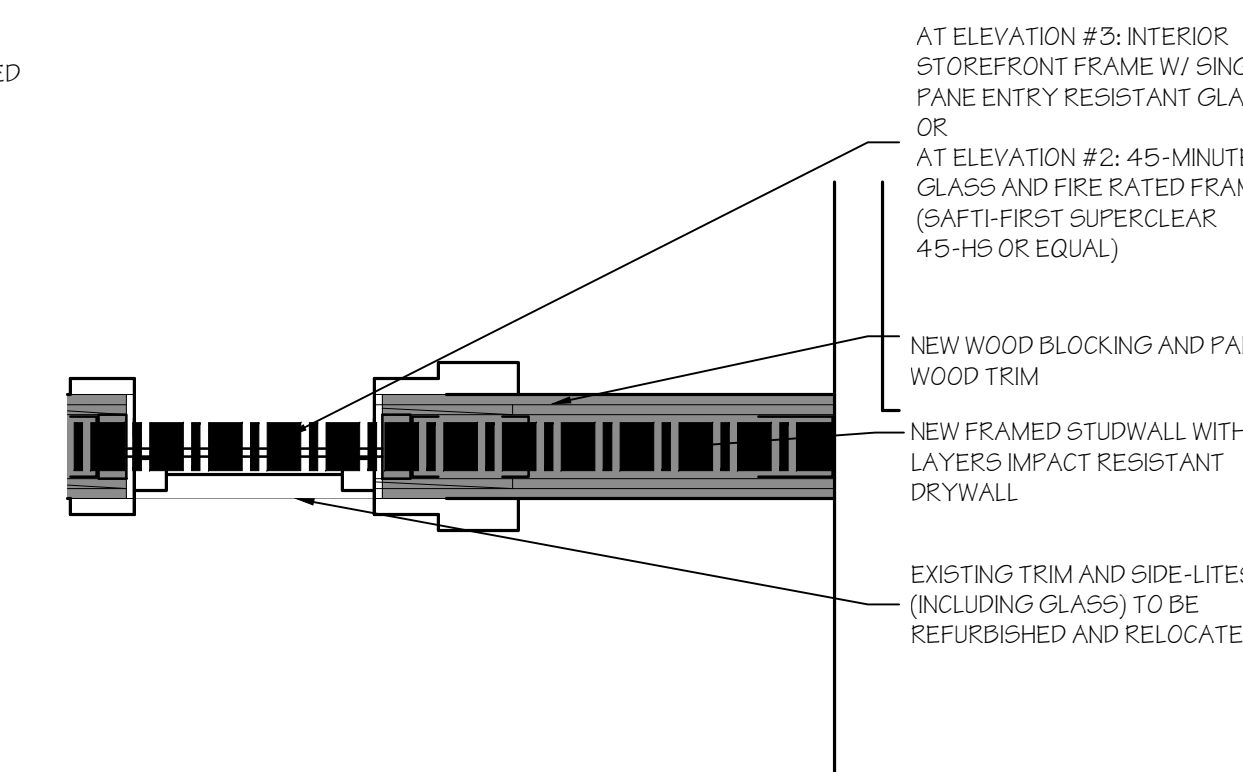
J4 HEAD DETAIL
SCALE: 1 1/2" = 1'-0"



T1 THRESHOLD
SCALE: 6" = 1'-0"



A4 TRANSACTION WINDOW SILL & HEAD DETAIL (JAMB SIM)
SCALE: 1 1/2" = 1'-0"

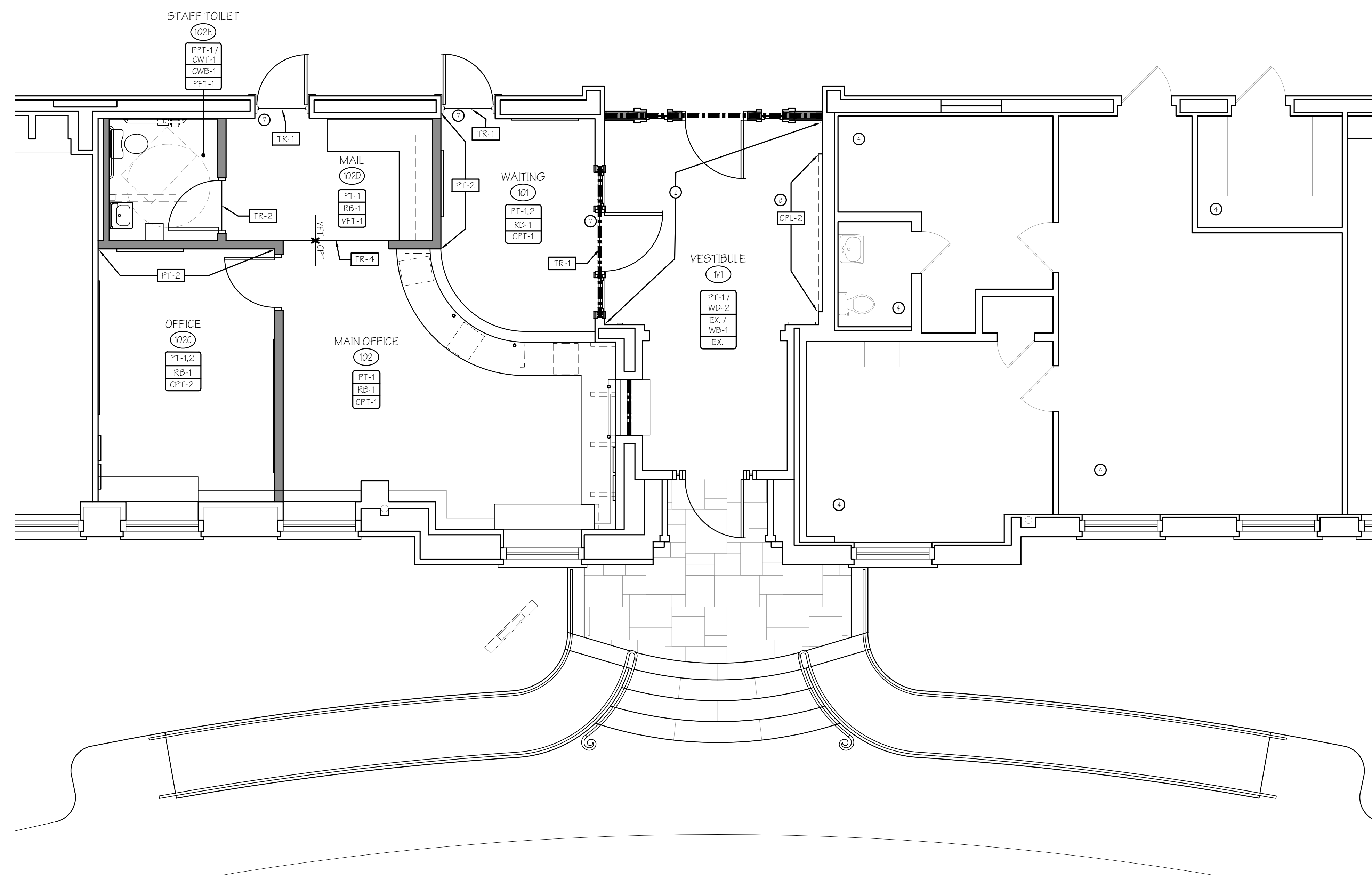


A5 STOREFRONT DETAIL
SCALE: 1" = 1'-0"

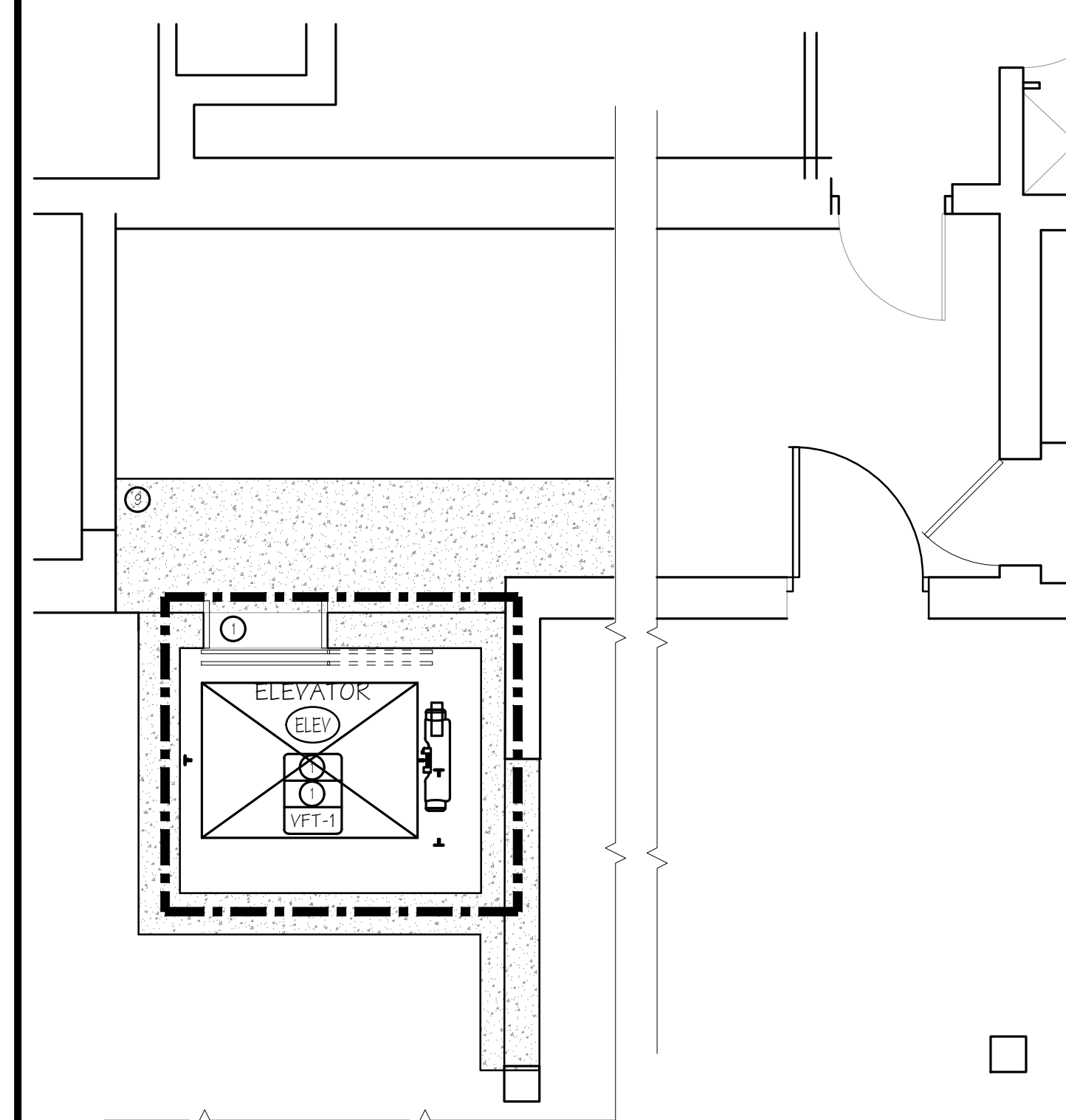
- A. REFER TO GENERAL SPECIFICATIONS FOR DETAILS ON FINISHES.
- B. REFER TO (F) SERIES DRAWINGS FOR DETAILED FLOOR FINISHES.
- C. FINISH FLOOR PLANS SHALL BE USED IN CONJUNCTION WITH FINISH LEGEND, INTERIOR ELEVATIONS, AND GENERAL SPECIFICATIONS. IF THERE IS A DISCREPANCY BETWEEN INFORMATION GIVEN ON THE FINISH LEGEND WITH ANY DRAWING OR SPECIFICATION, CONTRACTOR SHALL CONTACT ARCHITECT FOR CLARIFICATION.
- D. ALL FLOOR FINISHES TO EXTEND TO MEET WALLS U.O.N.
- E. PAINTING SCHEDULE: ALL PAINTING SHALL BE AS INDICATED BY PLAN NOTES AND FINISH LEGEND.
 - a. WALLS, GYPSUM BOARD SURFACES AND OTHER PAINTED SURFACES - (EGGSHELL)
 - a.a. ONE (1) PRIME COAT & TWO (2) FINISH COATS
 - a.b. DOOR FRAMES (SEE CLOSING FINISHES)
 - a.c. ONE (1) PRIME COAT & TWO (2) FINISH COATS
 - c. CEILINGS, GYPSUM BOARD SURFACES AND OTHER PAINTED SURFACES - (FLAT FINISH)
 - c.a. ONE (1) PRIME COAT & TWO (2) FINISH COATS
- F. ALL CEILINGS, SOFFITS AND FASCAS TO BE PAINTED (PT-4) AND RECEIVE A FLAT FINISH, U.O.N. SEE FINISH LEGEND AND CEILING PLANS FOR DELINEATIONS OF COLORS.
- G. ALL HOLLOW METAL DOOR FRAMES SHALL BE PAINTED (PT-3) U.O.N.
- H. ALL WOOD DOORS SHALL RECEIVE WOOD FINISH (W-1), U.O.N. REFER TO DOOR SCHEDULE.
- I. ALL TRANSITIONS IN FLOORING TO OCCUR AT CENTERLINE OF DOOR, U.O.N.
- J. ALL RUBBER BASE IN AREAS WITH CARPET TO BE 4" HIGH "STRAIGHT" BASE.
- K. ALL RUBBER BASE IN AREAS WITH RESILIENT FLOORING TO BE 4" HIGH "STRAIGHT" BASE.
- L. ALL WINDOW SILLS SHALL BE (SGF-1), U.O.N.
- M. ALL WALLS IN TOILET ROOMS, CUSTODIAL CLOSETS AND KITCHEN SHALL RECEIVE EPOXY BASED PAINT, U.O.N.

SHOWN AS:

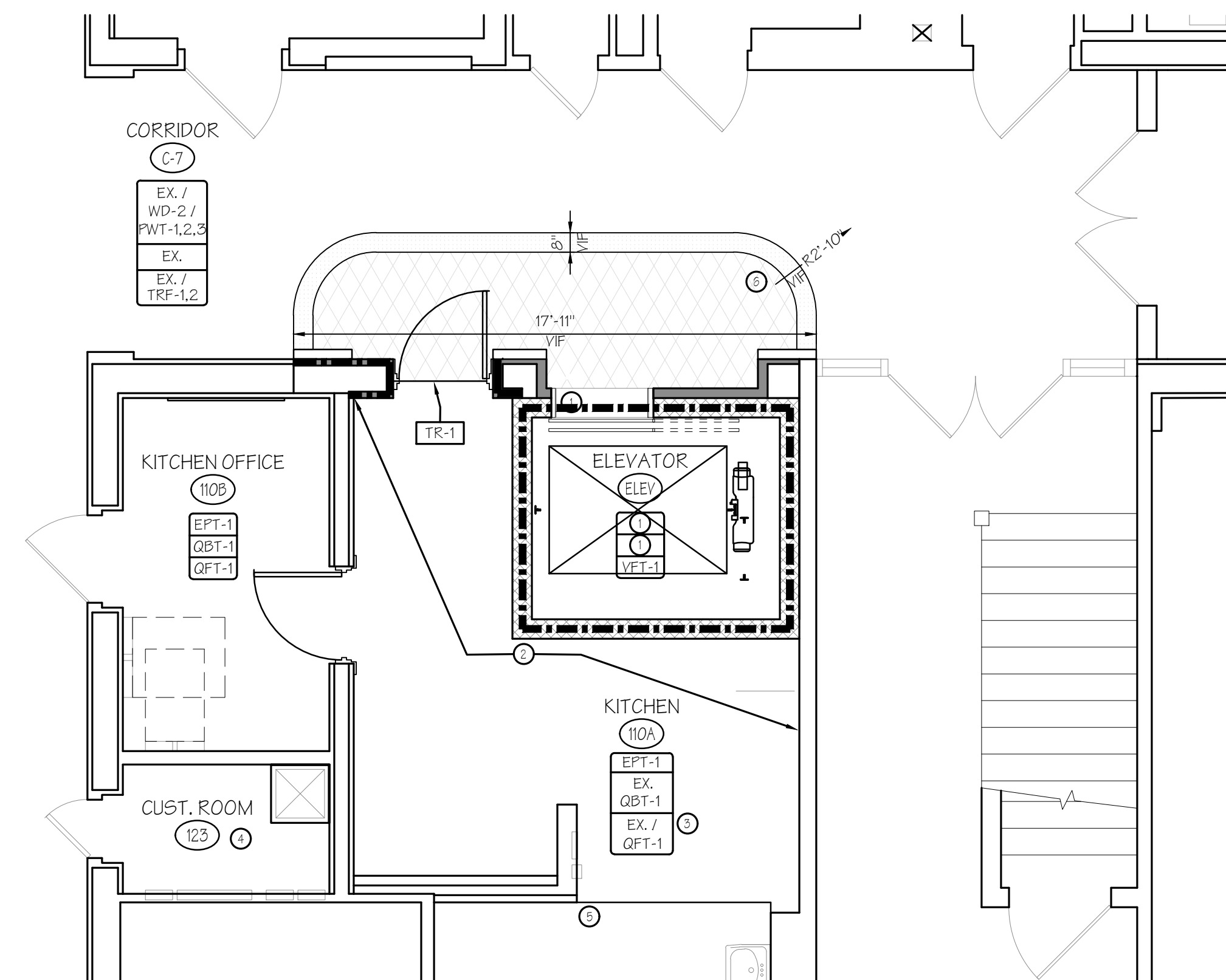
- 1 ELEVATOR SHALL RECEIVE FINISH FROM ELEVATOR MANUFACTURER'S STANDARD FINISH LINE.
- 2 NEW WALL BASE TO MATCH EXISTING
- 3 VERIFY IN FIELD THICKNESS OF EXISTING FLOORING
- 4 EXISTING FINISHES TO REMAIN
- 5 TERMINATION LINE BETWEEN NEW QUARRY TILE AND EXISTING FLOORING
- 6 NEW TERRAZZO TO BE FLUSH WITH EXISTING TERRAZZO
- 7 VERIFY EXISTING TERRAZZO FLOOR FOR FLOOR FINISH TRANSITIONS
- 8 INFILL EXISTING RECESSED OPENING WITH TACK BOARD MATERIAL
- 9 NEW CONCRETE INFILL REFER TO FINISH LEGEND FOR FINISH COAT (SCF-1)
- 10 MIN. 3' CLEARANCE FOR ELECTRICAL PANELS



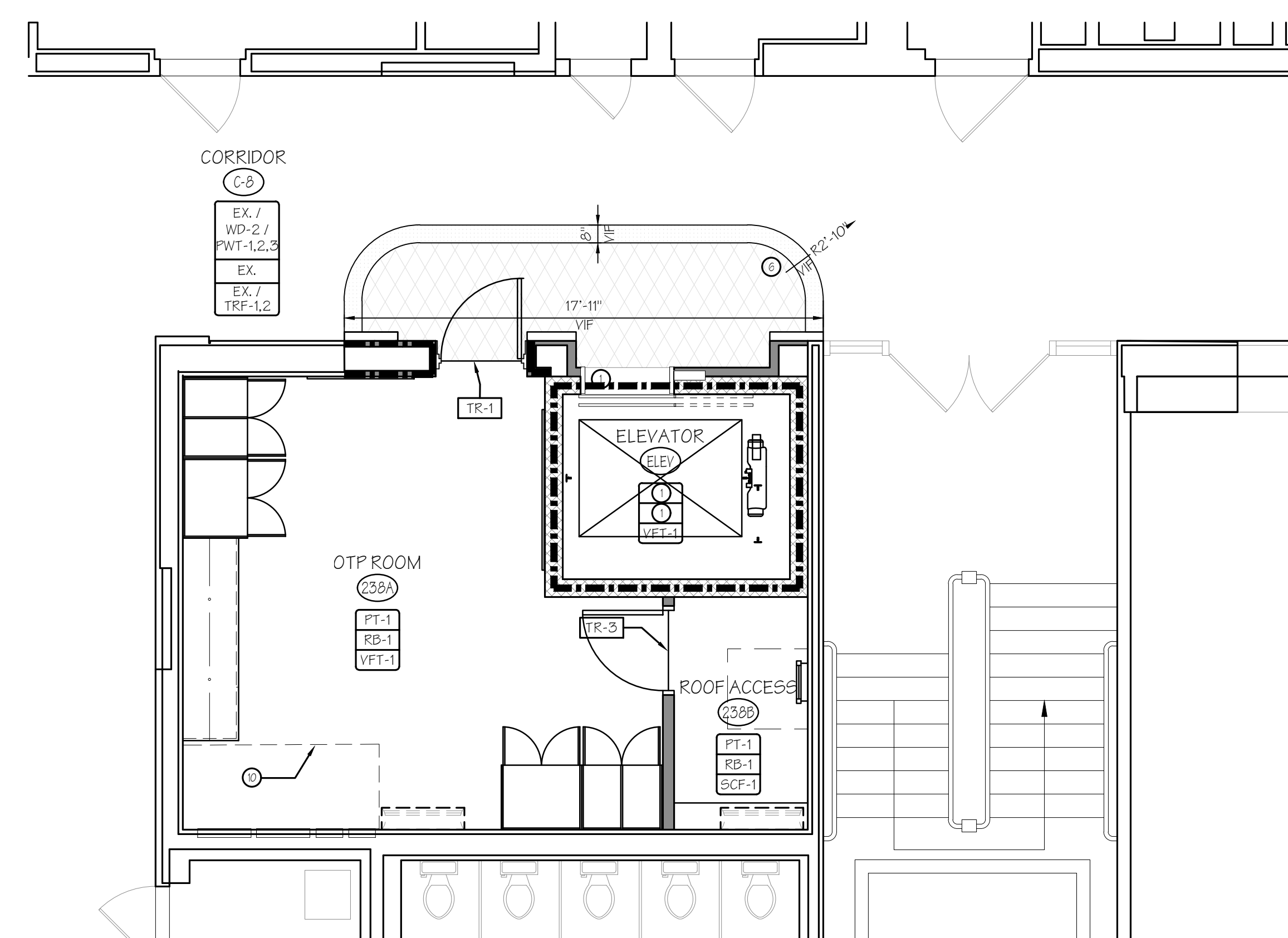
(B3) ENLARGED FIRST FLOOR FINISH PLAN: MAIN LOBBY
1/4" = 1'-0"



A1 ENLARGED FIRST FLOOR FINISH PLAN: ELEVATOR
1/4" = 1'-0"



(A2) ENLARGED FIRST FLOOR FINISH PLAN: KITCHEN
1/4" = 1'-0"



(A3) ENLARGED SECOND FLOOR FINISH PLAN: OTF
1/4" = 1'-0"

[illegible]

JULIAN CURTISS SCHOOL

PHASED RENOVATIONS GREENWICH
PUBLIC SCHOOLS
108 EAST ELM STREET
GREENWICH, CONNECTICUT 06830

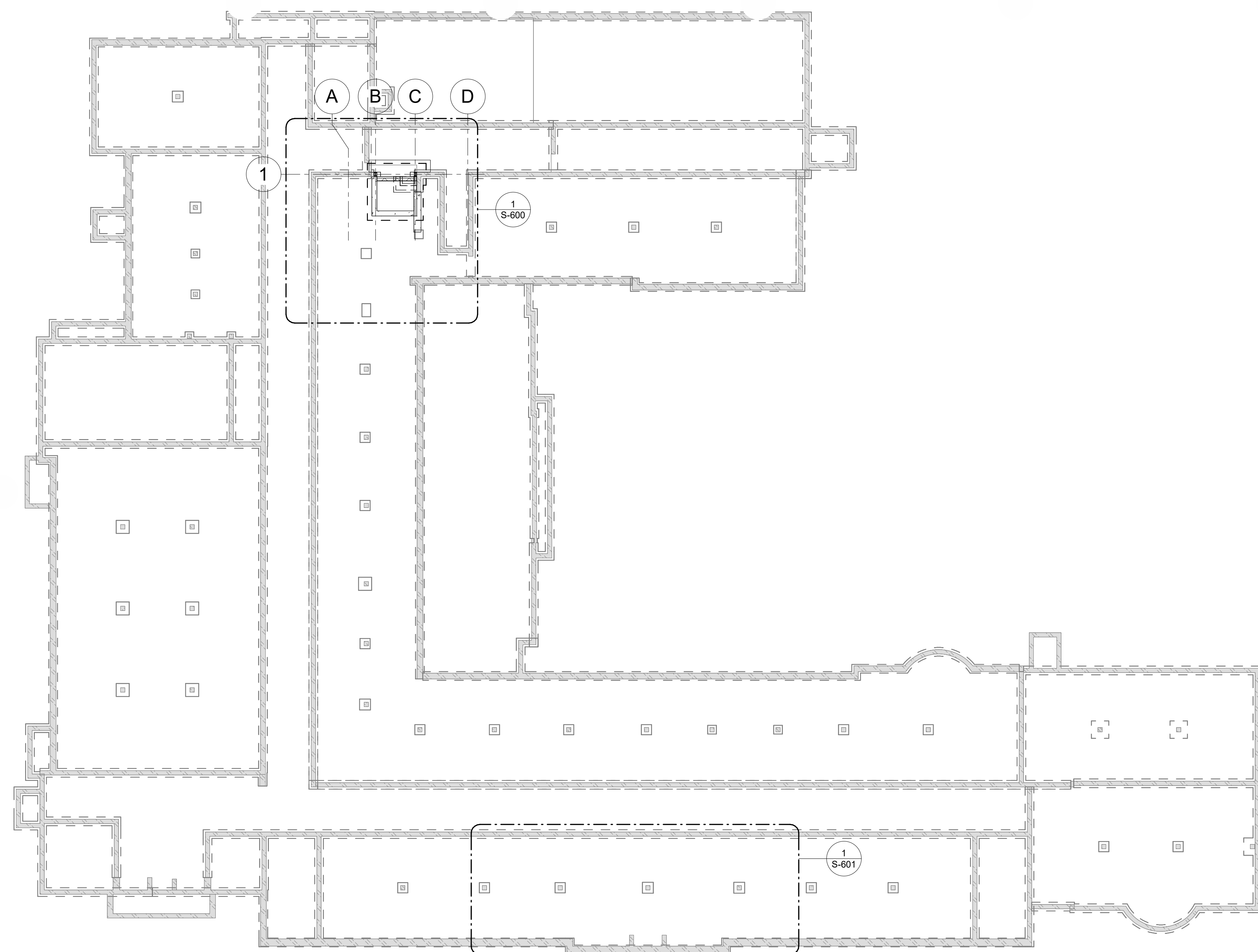
DRAWING TITLE:
OVERALL STRUCTURAL PLANS

SCALE: 1/16" = 1'-0"	DRAWN BY: KEM	REVIEWED BY: RSE
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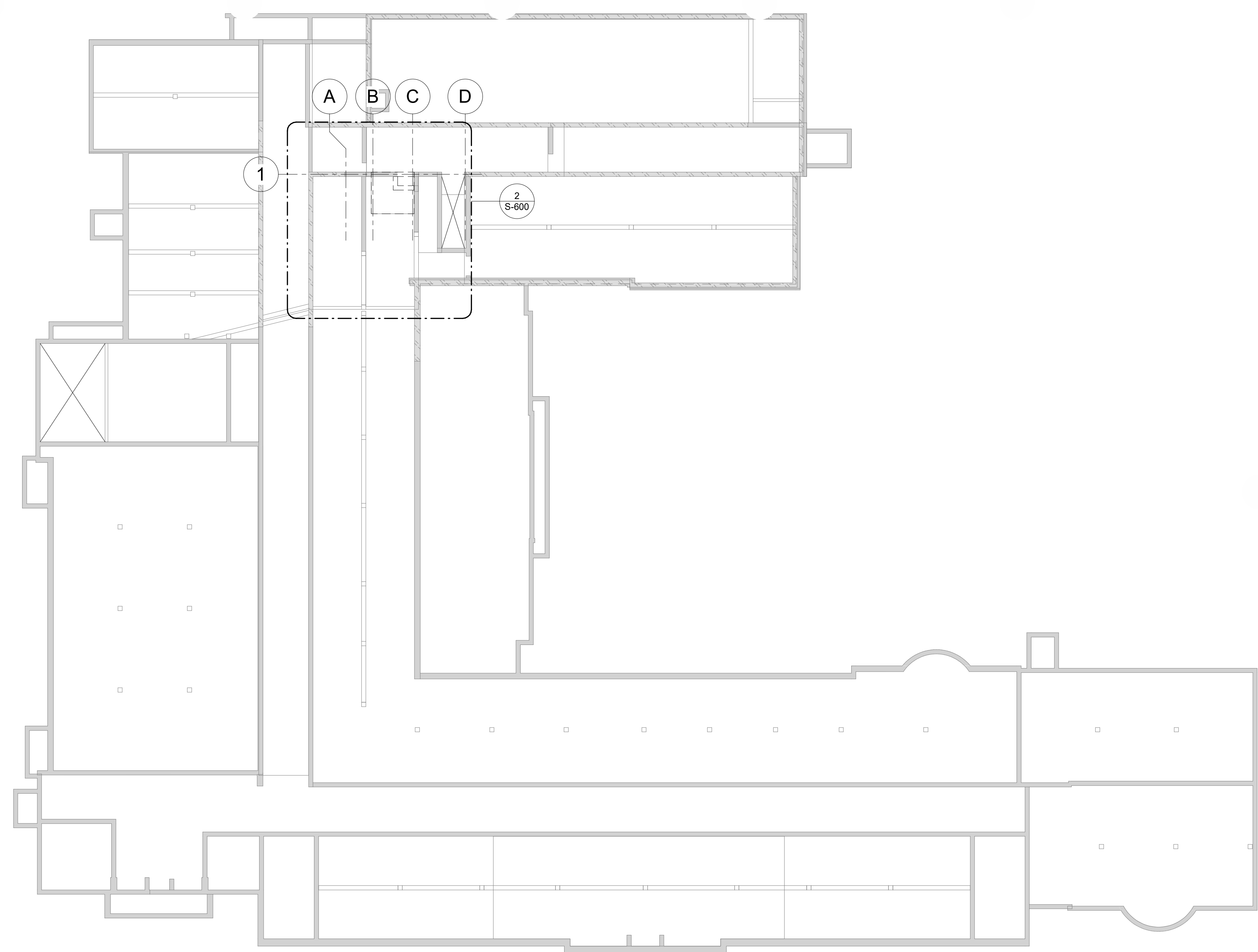
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DATE:
JULY 17, 2024

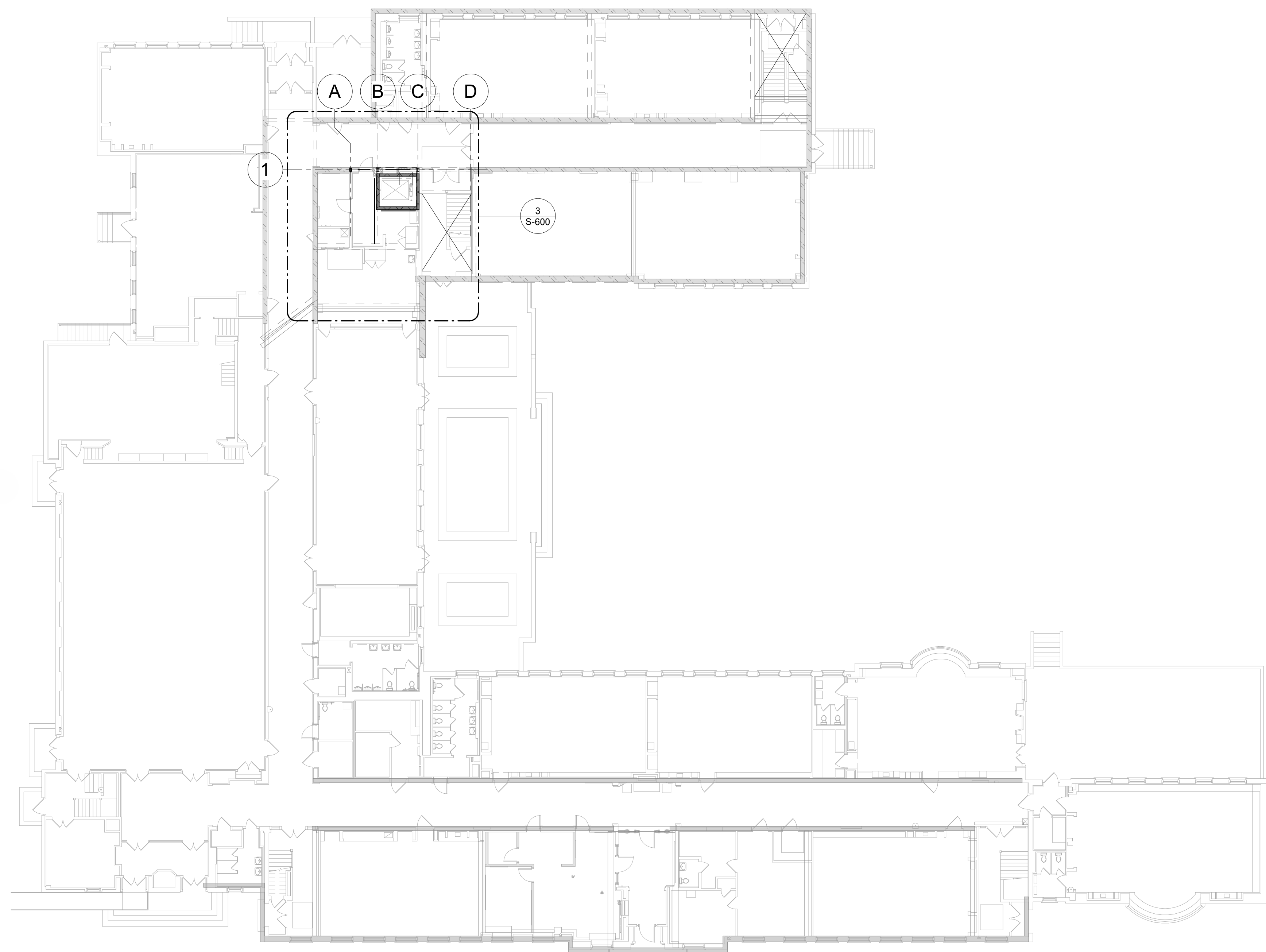
JOB NUMBER
23015



1 OVERALL FOUNDATION MODIFICATION PLAN
S-101 1/16" = 1'-0"



2 OVERALL 1ST FLOOR FRAMING MODIFICATION PLAN
S-101 1/16" = 1'-0"



3 OVERALL 2ND FLOOR FRAMING MODIFICATION PLAN
S-101 1/16" = 1'-0"

4 OVERALL ROOF FRAMING MODIFICATION PLAN
S-101 1/16" = 1'-0"



1. THE TYPICAL TOP OF STEEL FRAMING ELEVATION SHALL BE AS NOTED ON THE PLANS. COORDINATE W/ EXISTING CONDITIONS
2. REFER TO TYPICAL DETAILS FOR DECK REINFORCING A/ OR ADDITIONAL STEEL MEMBERS AT MISCELLANEOUS RL DECK OPENINGS THAT ARE NOT LABELLED ON THIS SHEET.
3. SEE THE BEAM LEGEND, ON TYPICAL DETAIL SHEET, FOR INFORMATION TO UNDERSTAND THE INTENDED SHEAR STIFFENING OF APPLICABLE CAMBER, TOP OF STEEL ELEVATION OFFSET, AND END CONNECTION FORCES FOR EACH BEAM.
4. SEE THE TYPICAL DETAILS FOR THE MINIMUM ALLOWABLE CONNECTION DESIGN CAPACITIES. THE DESIGN OF BEAM END CONNECTIONS IDENTIFIED WITH A CONNECTION MARK THAT IS HIGHER THAN 1" CAMBER, TOP OF STEEL ELEVATION CONNECTION SHALL BE THE RESPONSIBILITY OF THE STEEL FABRICATOR.
5. SEE GENERAL NOTE SHEET FOR ADDITIONAL INFORMATION.
6. REFER TO OTHER DRAWINGS FOR FOR BASE PLATE AND ANCHOR ROD INFORMATION.
7. ALL BEAM FRAMING SHALL HAVE EQUAL SPACING BETWEEN COLUMNS, UNLESS NOTED OTHERWISE.
8. COORDINATE ALL DIMENSIONS AND ELEVATIONS WITH ARCHITECTURAL DRAWINGS.
9. COORDINATE ALL WALL PENETRATIONS, UTILITIES AND MECHANICAL CHASES WITH ARCHITECTURAL TRADES.
10. COORDINATE DECK OPENING SIZES AND LOCATIONS FROM ARCHITECTURAL DRAWINGS. COORDINATE WITH THE MEMBERS AND / OR REINFORCEMENT AS REQUIRED BY TYPICAL STRUCTURAL DETAILS, EVEN IF NOT SHOWN ON THE PLANS.
11. COORDINATE WITH ELECTRICAL, MECHANICAL, PLUMBING, AND FIRE PROTECTION DRAWINGS FOR QUANTITIES, SIZES, AND LOCATIONS OF ALL WALL PENETRATIONS, DUCT CHASES, AND HOUSEKEEPING PADS.
12. REFER TO ARCHITECTURAL DWGS FOR STEEL FRAMING FIREPROOFING REQUIREMENTS.

REVISIONS[illegible]

JULIAN CURTISS SCHOOL
PHASED RENOVATIONS GREENWICH
PUBLIC SCHOOLS
108 EAST ELM STREET
GREENWICH, CONNECTICUT 06830

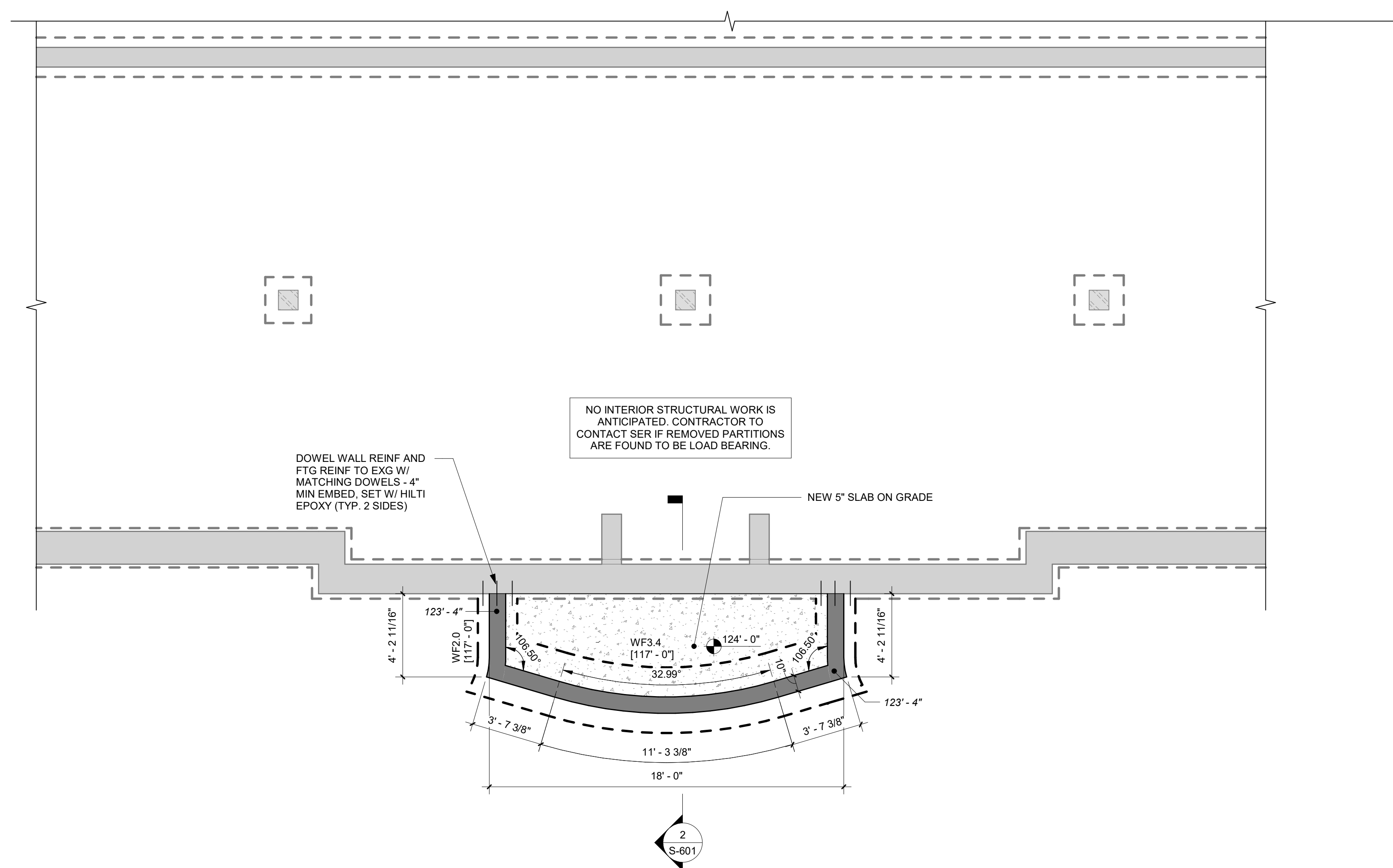
DRAWING TITLE:
STRUCTURAL PLANS - FRONT
ENTRANCE

SCALE: As indicated	DRAWN BY: KEM	REVIEWED BY: RSE
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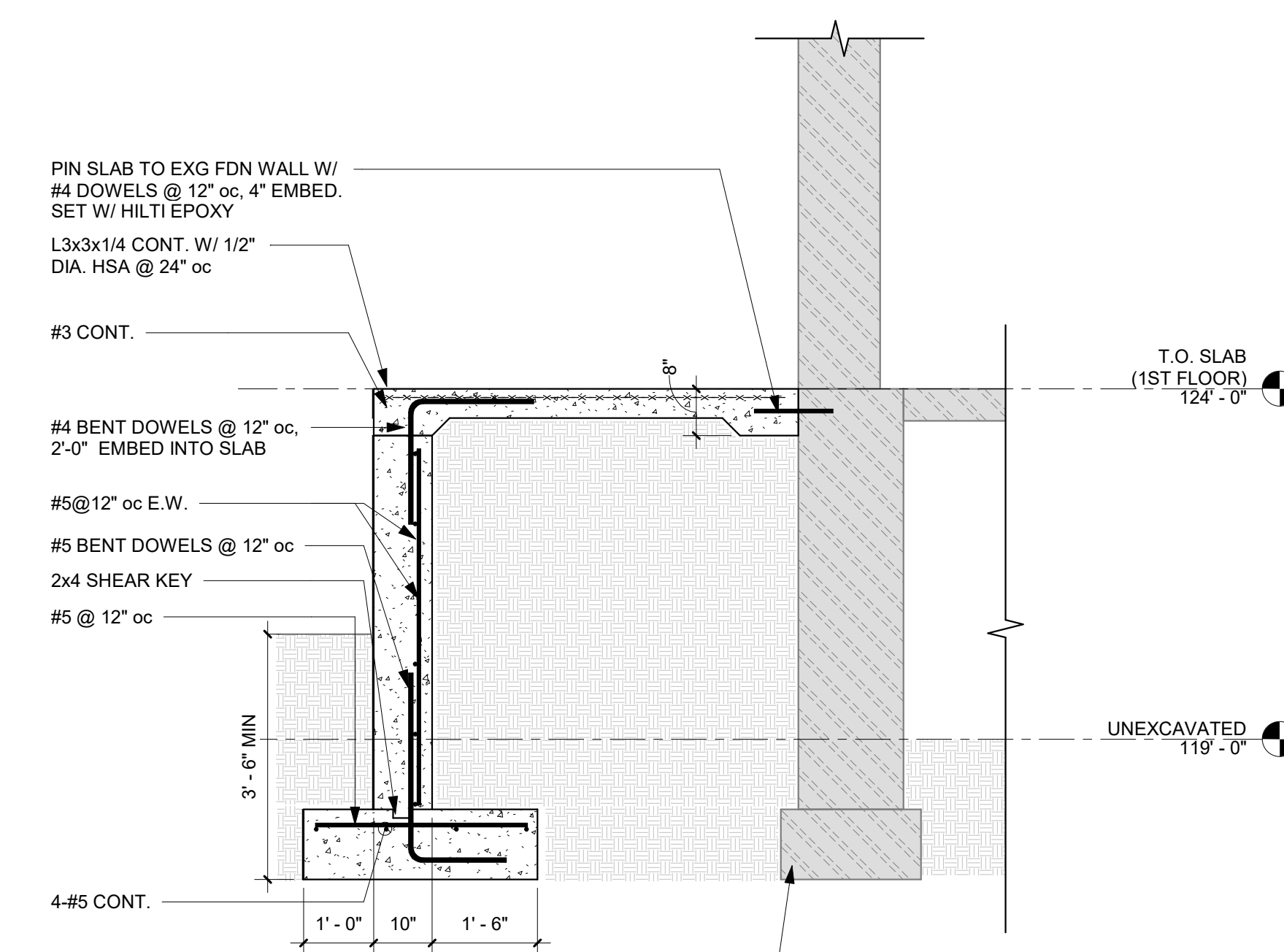
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S-601

DATE:	JOB NUMBER
JULY 17, 2024	230



FOUNDATION MODIFICATION PLAN - FRONT ENTRANCE



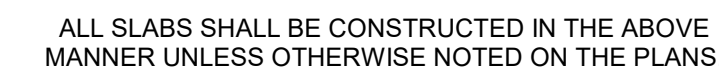
SECTION
1/2" = 1'-0"

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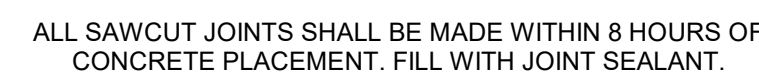


6 **TYPICAL SINGLE PLATE CONNECTION DETAIL**

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TYPICAL SLAB ON GRADE CONSTRUCTION



TYPICAL SLAB ON GRADE CONTROL JOINT

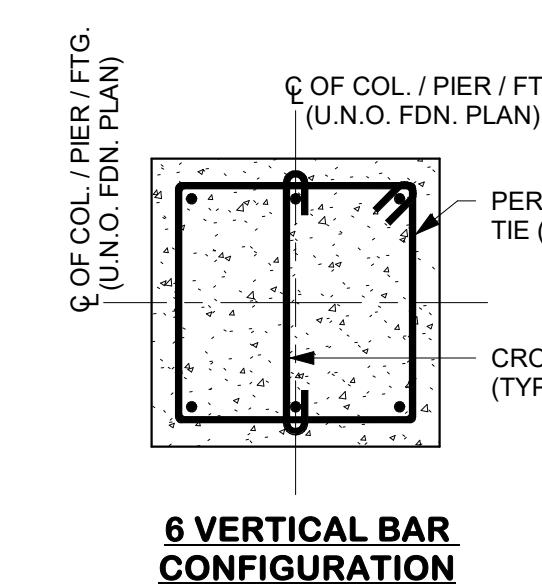


- SLAB ON GRADE SUBGRADE PREPARATION NOTES:**
1. REMOVE EXISTING FILL AND SILT BELOW SLABS ON GRADE TO THE TOP OF PROPERLY PREPARED SUBGRADE. REPLACE WITH CLEAN CRUSHED STONE PER DETAIL.
 2. SLAB ON GRADE SOIL SUBGRADES SHALL BE EXCAVATED LEVEL.
 3. SOFT AREAS SHALL BE OVER-EXCAVATED AND REPLACED WITH ADDITIONAL CLEAN CRUSHED STONE. EXTENT OF SOFT AREA EXCAVATION SHALL BE DETERMINED BY THE GENERAL CONTRACTOR.
 4. STEPS SHALL BE TAKEN BY THE CONTRACTOR TO CONTROL SURFACE-WATER RUNOFF AND TO REMOVE WATER AND PRECIPITATION FROM PREPARED SUBGRADES.
 5. REFER TO FOUNDATION NOTES ON THE GENERAL NOTES SHEET FOR ADDITIONAL INFORMATION.



- FOOTING SUBGRADE NOTES:**

1. REMOVE EXISTING FILL AND SILT BELOW FOUNDATION AREAS WITHIN 1'-0" OF FOOTING EINGS AND OUTWARD AT A 1:1H:1V SLOPE TO THE TOP OF PROPERLY PREPARED SUBGRADE. REPLACE WITH CLEAN CRUSHED STONE PER DETAIL.
2. FOOTING SOIL SUBGRADES SHALL BE EXCAVATED AND REPLACED.
3. SOFT AREAS SHALL BE OVER-EXCAVATED AND LEveled WITH ADDITIONAL CLEAN CRUSHED STONE. EXTENT OF SOFT AREA EXCAVATION SHALL BE DETERMINED BY THE GENERAL CONTRACTOR.
4. STEPS SHALL BE TAKEN BY THE CONTRACTOR TO CONTROL SURFACE-WATER RUNOFF AND TO REMOVE WATER AND PRECIPITATION FROM PREPARED SUBGRADES.
5. REFER TO FOUNDATION NOTES ON THE GENERAL NOTES SHEET FOR ADDITIONAL INFORMATION.



6 VERTICAL BAR CONFIGURATION



WALL PLATE DETAILS



TAG SYMBOLS	
DIFFUSER TAG	
VRF TAG	
EQUIPMENT	<u>TAG-#</u>

MECHANICAL DEMOLITION LEGEND	
SYMBOL	DESCRIPTION
	DEMOLISH EXISTING DUCTWORK LINETYPE
	EXISTING DUCTWORK AND/OR PIPING
	DEMOLISH EXISTING CEILING GRILLE
	RELOCATE EXISTING
	EXISTING TO REMAIN
	CONNECT TO EXISTING
	DISCONNECT FROM EXISTING

DRAWING TITLE: MECHANICAL ABBREVIATIONS, NOTES AND SYMBOLS		
SCALE: NTS	DRAWN BY: TPG	REVIEWED BY: AJS
DRAWING NO. M0.00		
DATE: 7/17/2024	JOB NUMBER: 23015	

CERTIFICATION:

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DRAWING TITLE:

MECHANICAL
DEMOLITION
FLOOR PLAN

DRAWING NO.		
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DATE:	JOB NUMBER:
7/17/2024	23015



1 MECHANICAL DEMOLITION SECOND FLOOR PARTIAL PLAN - ELEVATOR
3/8" = 1'-0"

REVISION:	DATE	DESCRIPTION
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JULIAN CURTISS SCHOOL
PHASED RENOVATIONS
GREENWICH PUBLIC SCHOOLS
108 EAST ELM STREET
GREENWICH, CONNECTICUT 06830

DRAWING TITLE:
MECHANICAL
FLOOR PLAN

SCALE:
3/8" = 1'-0"

DRAWN BY:
TPG

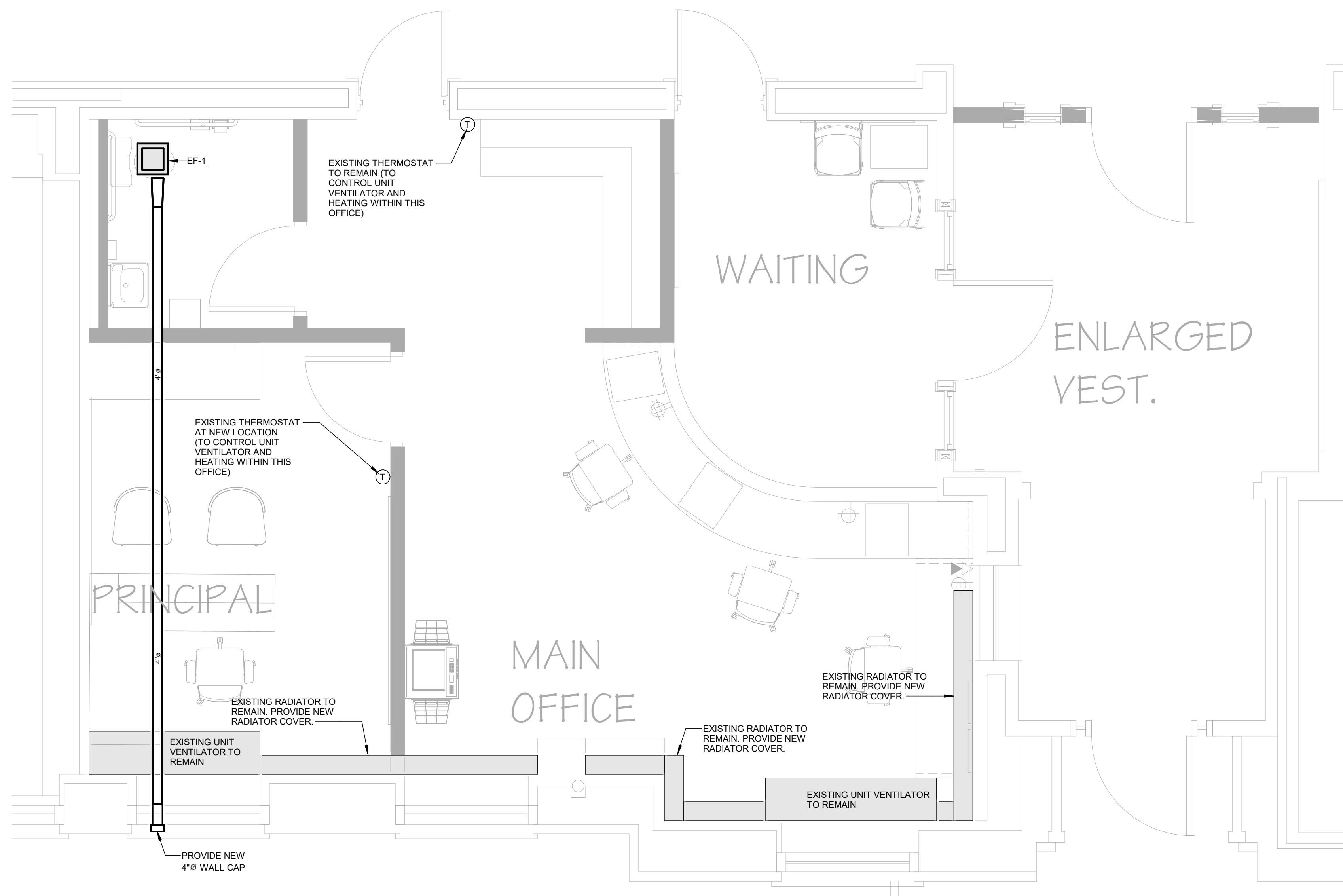
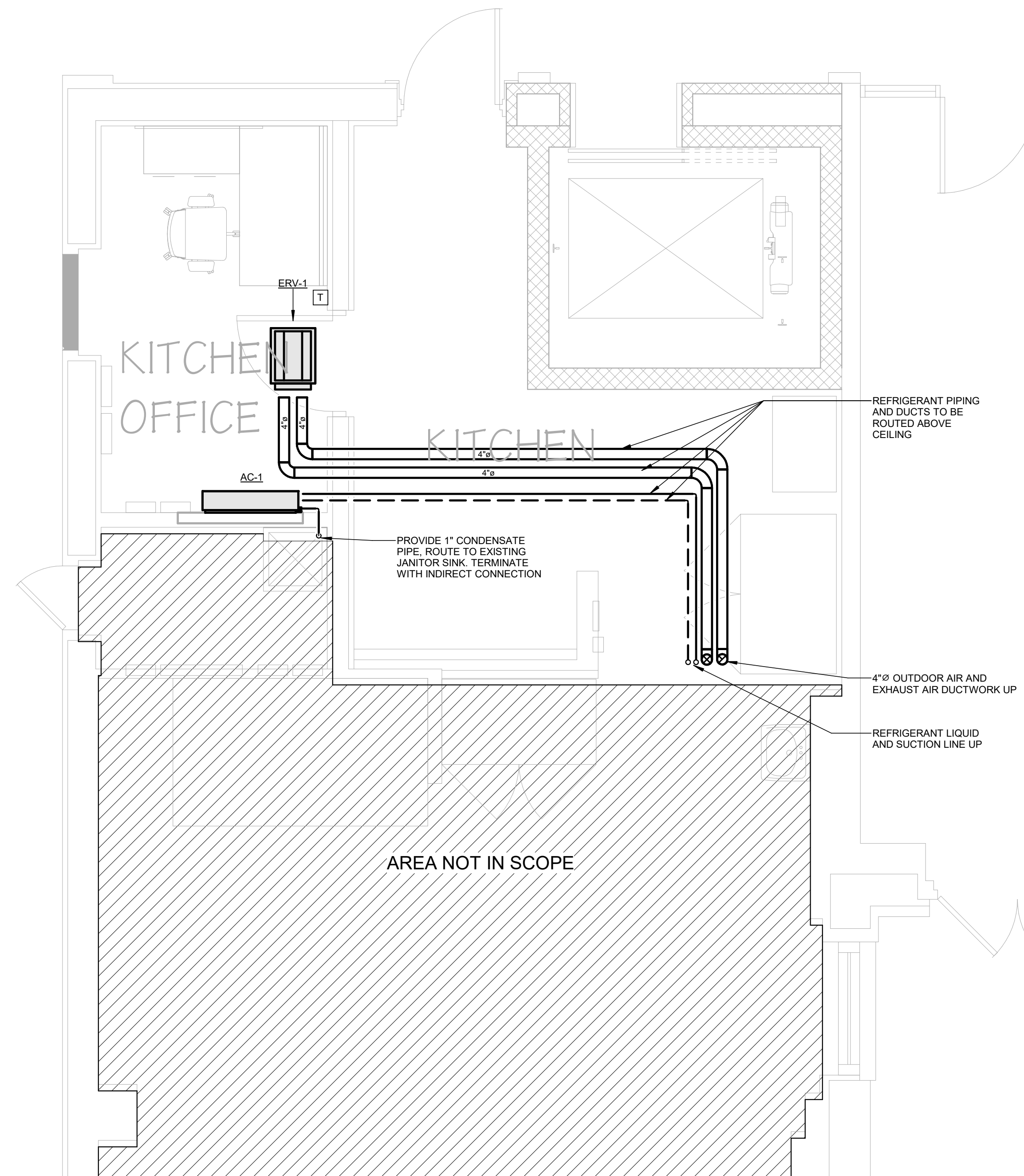
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DRAWING NO.

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DATE:
7/17/2024

JOB NUMBER:
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GREENWICH, CONNECTICUT 06830

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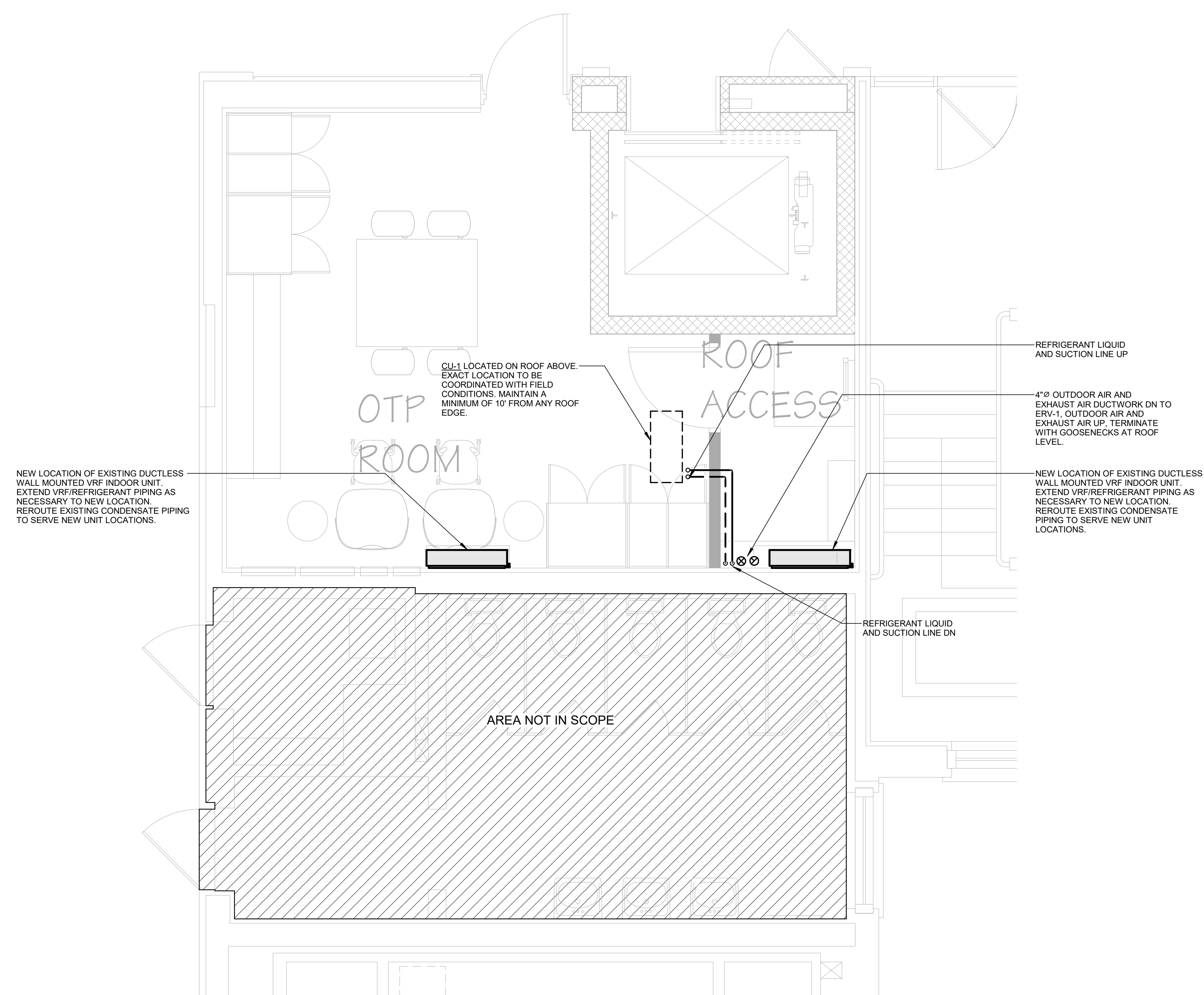
MECHANICAL
FLOOR PLAN

SCALE: 3/8" = 1'-0"	DRAWN BY: TPG	REVIEWED BY: AJS
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M1.02

DATE:	JOB NUMBER:
7/17/2024	23015



1 MECHANICAL SECOND FLOOR PARTIAL PLAN - ELEVATOR
3/8" = 1'-0"



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CORRECTIONS

COMMENTS



REVISIONS
DATE DESCRIPTION

DATE DESCRIPTION

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PHASED RENOVATIONS
GREENWICH PUBLIC SCHOOLS
108 EAST ELM STREET
GREENWICH, CONNECTICUT 06830

DRAWING TITLE

MECHANICAL
SPECIFICATIONS

SCALE
NTS

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TPG

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AJS

DRAWING NO.

DATE
7/17/2024

JOB NUMBER
23015

23.00.00 - GENERAL

A. THESE SPECIFICATIONS ARE APPLICABLE TO ALL PLUMBING, MECHANICAL, AND ELECTRICAL DRAWINGS UNLESS NOTED OTHERWISE. REPAIR OR REPLACE DEFECTIVE ELECTRICAL, PLUMBING DRAWINGS FOR NOTES, DIMENSIONS, ETC., AND COORDINATE WITH OTHER TRADES INVOLVED. THE WORK REQUIREMENTS DESCRIBED IN THIS SPECIFICATION SECTION "COMMON MECHANICAL/ELECTRICAL REQUIREMENTS" FORM COMPLEMENTARY REQUIREMENTS TO THE SCOPE OF WORK CONTAINED WITHIN DIVISION 23.

B. DESCRIPTION:

- THIS PROJECT COMPRISES ALTERATIONS AND RENOVATIONS TO THE EXISTING BUILDING. THE EXISTING BUILDING IS CURRENTLY OCCUPIED AND THE PROJECT SHALL PROCEED IN A MANNER THAT MINIMIZES ANY INCONVENIENCE TO THE BUILDING OCCUPANTS.
- SCOPE OF WORK CONSISTS OF INSTALLATION OF MATERIALS TO BE FURNISHED UNDER THE CONTRACT DOCUMENTS AND WITHOUT LIMITING ANOTHERITY THEREOF CONSISTS OF FURNISHING LABOR, MATERIALS, EQUIPMENT, HOISTING, TRANSPORTATION, RECEIVING, STAGING, APPURTENANCES, AND SERVICES NECESSARY AND/OR INCIDENTAL TO PROPERLY COMPLETE ALL WORK AS SHOWN ON THE DRAWINGS AND DESCRIBED HEREIN.
- DEFINITIONS: THE FOLLOWING DEFINITIONS APPLY TO THIS CONTRACT
- FURNISH: THE TERM "FURNISH" MEANS TO "SUPPLY AND DELIVER TO THE PROJECT SITE, READY FOR UNLOADING, UNPACKING, ASSEMBLY, INSTALLATION, AND SIMILAR OPERATIONS"
- INSTALL: THE TERM "INSTALL" IS USED TO DESCRIBE OPERATIONS AT PROJECT SITE INCLUDING THE ACTUAL UNLOADING, UNPACKING, ASSEMBLY, ERECTION, PLACING, AND JOINING, APPLYING, WORKING TO DIMENSION, FINISHING, CURING, PROTECTING, CLEANING, AND SIMILAR OPERATIONS"
- PROVIDE: THE TERM "PROVIDE" MEANS TO FURNISH AND INSTALL, COMPLETE AND READY FOR THE INTENDED USE."
- REMOVE: THE TERM "REMOVE" MEANS TO DISCONNECT FROM ITS PRESENT POSITION, REMOVE FROM THE PREMISES AND TO DISPOSE OF IN A LEGAL MANNER."
- SUBSTITUTIONS: "SUBSTITUTIONS" ARE REQUESTS FOR CHANGES IN PRODUCTS, MATERIALS AND/OR METHODS OF CONSTRUCTION AS PROPOSED BY THE CONTRACTOR AFTER AWARD OF THE CONTRACT."

D. DRAWINGS

- DRAWINGS ARE DIAGRAMMATIC. THE FINAL PLACEMENT OF EQUIPMENT OR DEVICES IN THE FIELD MAY NOT DIRECTLY CORRESPOND TO THAT WHICH IS SHOWN ON THE DRAWINGS. THOUGH SOME OFFSETS & TRANSITIONS MAY BE SHOWN IN SHEET METAL TO HELP INDICATE THE PHYSICAL RELATIONSHIP BETWEEN THEM, IT IS NOT THE INTENT OF THE DRAWINGS TO SHOW ALL PIPING & SHEET METAL OFFSETS & TRANSITIONS REQUIRED. THE CONTRACTOR SHALL FULLY COORDINATE THE WORK AND PROVIDE ALL MATERIALS, EQUIPMENT AND LABOR NECESSARY TO COMPLETE THE WORK OUTLINED ON THESE CONTRACT DOCUMENTS. IF A CONFLICT IN POSITIONING OCCURS THE CONTRACTOR IS TO NOTIFY THE ENGINEER IMMEDIATELY TO ASCERTAIN WHAT THE INTENT WAS BY THE DESIGN PROFESSIONAL.
- CODES AND STANDARDS: WORK SHALL CONFORM TO THE CURRENT EDITIONS OF THE FOLLOWING:
 - SHEET METAL SMACNA STANDARDS
 - INTERNATIONAL MECHANICAL CODE
 - INTERNATIONAL ENERGY CONSERVATION CODE
 - INTERNATIONAL EXISTING BUILDING CODE
 - ALL OTHER APPLICABLE STATE AND LOCAL CODES AND ORDINANCES, OWNER STANDARDS AND BASE BUILDING SPECIFICATIONS AND STANDARDS.

F. PERMITS AND FEES:

- THE CONTRACTOR SHALL GIVE ALL NECESSARY NOTICES, OBTAIN ALL PERMITS, AND PAY ALL GOVERNMENT AND STATE SALES TAXES AND FEES WHERE APPLICABLE, AND OTHER COSTS, INCLUDING UTILITY CONNECTIONS IN CONNECTION WITH THE EXISTING CONDITION OF THE WORK. FILE ALL NECESSARY DRAWINGS, PREPARE ALL DOCUMENTS AND OBTAIN ALL NECESSARY APPROVALS OF ALL GOVERNMENTAL AND STATE DEPARTMENTS HAVING JURISDICTION, OBTAIN ALL REQUIRED CERTIFICATES OF INSPECTION FOR HIS WORK, AND DELIVER A COPY TO THE OWNER AND ENGINEER BEFORE REQUEST FOR ACCEPTANCE AND FINAL PAYMENT FOR THE WORK.

G. EXISTING SYSTEMS AND EQUIPMENT

- EXISTING TO BE REUSED/RELOCATED EQUIPMENT: REPORT ANY EXISTING EQUIPMENT DEFICIENCIES TO THE OWNER AND THE ARCHITECT AND/OR ENGINEER.
- CONNECT WORK TO VARIOUS EXISTING SYSTEMS AS INDICATED ON THE DRAWINGS. WORK SHALL BE COMPATIBLE WITH THE EXISTING SYSTEM CONDITIONS. ALL WORK SHALL BE COORDINATED WITH ALL TRADES INVOLVED AS WELL AS WITH EXISTING SYSTEMS, THE STRUCTURE, AND OTHER OBSTRUCTIONS.
- PROVIDE THE FOLLOWING SERVICES ON ALL EXISTING HVAC EQUIPMENT INDICATED TO REMAIN:
 - CLEAN CONDENSATE PAN AND TRAP
 - CALIBRATE CONTROLS
 - FILTER CHANGES
 - VERIFY FAN ROTATION AND OPERATION
 - BALANCING
 - VERIFY PITCH OF CONDENSATE DRAIN PIPES AND DRAIN PAN
 - VERIFY EQUIPMENT CONTROL OPERATION
 - LUBRICATION OF FANS, MOTORS, ETC.
 - CLEAN HEATING/COOLING COILS

H. SURVEY AND MEASUREMENTS

- THIS PROJECT INVOLVES CONSTRUCTION INSIDE AN EXISTING STRUCTURE. CONTRACTORS, BY SUBMITTING A BID, SHALL BE COMPLETELY FAMILIAR WITH THE EXISTING CONDITION OF THE BUILDING AS IT INFLUENCES THE WORK DESCRIBED. NO COMPENSATION WILL BE GRANTED FOR ADDITIONAL WORK CAUSED BY INADEQUACY WITH SITE CONDITIONS THAT ARE VISIBLE OR READILY IDENTIFIED BY EXPERIENCED OBSERVERS.
- DO NOT SCALE DRAWINGS. SCALE INDICATED ON DRAWINGS IS FOR ESTABLISHING REFERENCE POINTS ONLY. ACTUAL FIELD CONDITIONS SHALL GOVERN ALL DIMENSIONS.
- PRIOR TO ORDERING ANY MATERIALS AND EQUIPMENT, THOROUGHLY REVIEW THE SITE CONDITIONS TO DETERMINE IF THE EXISTING CONDITIONS ARE SUITABLE TO INSTALL THE COMPONENTS. ORDER EQUIPMENT BROKEN DOWN AS NECESSARY TO ALLOW FOR PROPER RIGGING THROUGH THE PROJECT AREA. PROVIDE ALL NECESSARY ALTERATIONS TO THE STRUCTURE OF THE BUILDING AS NECESSARY TO RIG THE EQUIPMENT IN PLACE.
- CONTRACTORS SHALL VERIFY LAYOUT AND BE RESPONSIBLE FOR ALL MEASUREMENTS OF ALL EXISTING CONDITIONS BEFORE COMMENCING WORK AND SHALL NOTIFY ARCHITECT AND/OR ENGINEER IF A CONDITION EXISTS THAT PREVENTS THE CONTRACTOR FROM ACCOMPLISHING THE INTENT OF THE DRAWINGS.

I. PRE-DEMOL TESTING AND BALANCING

- PRIOR TO ANY DEMOLITION OR NEW WORK, TESTING AND BALANCING CONTRACTOR SHALL TAKE AIRFLOW AND STATIC PRESSURE READINGS AT ALL LOCATIONS WHERE NEW SYSTEMS ARE TO CONNECT TO EXISTING, AND ELSEWHERE AS NOTED ON PLANS, SUBMIT TO ARCHITECT AND ENGINEER PRIOR TO STARTING NEW WORK.
- SUBMITTALS AND SHOP DRAWINGS
 - SUBMIT FOR REVIEW, ELECTRONIC SHOP DRAWINGS IN SEARCHABLE PDF FORMAT FOR THE FOLLOWING:
 - SUBMITTAL DATA FOR ALL MATERIAL AND EQUIPMENT. CLEARLY IDENTIFY DEFINITIONS OF THE SUBMITTED PRODUCTS FROM THE DESIGN.
 - DUCTWORK AND PIPING SHOP DRAWINGS: DRAWN TO ACCURATE SCALE OF 1/4"=1'-0". HIGHLIGHT, ENIRCLE OR OTHERWISE INDICATE DEVIATIONS FROM THE CONTRACT DOCUMENTS. DO NOT REPRODUCE CONTRACT DOCUMENTS OR COPY STANDARD INFORMATION AS THE BASIS OF SHOP DRAWINGS. STANDARD INFORMATION PREPARED WITHOUT SPECIFIC REFERENCE TO THE PROJECT IS NOT CONSIDERED SHOP DRAWINGS.
 - CONTROLS & SHOP DRAWINGS: INCLUDE EQUIPMENT AND SYSTEM CONTROL, SCHEMATICS, SEQUENCES OF OPERATIONS, LOGIC DIAGRAMS AND SYSTEM COMPONENTS INCLUDING DETAILS OF TIE-IN TO EXISTING BUILDING CONTROL MANAGEMENT SYSTEM.
 - DO NOT USE SHOP DRAWINGS WITHOUT AN APPROPRIATE FINAL STAMP INDICATING ACTION TAKEN IN CONNECTION WITH CONSTRUCTION.
 - DO NOT ORDER ANY MATERIALS OR EQUIPMENT PRIOR TO RECEIVING FINAL APPROVED SUBMITTALS.
 - SCHEDULE AT LEAST TEN WORKING DAYS EXCLUSIVE OF TRANSMITTAL TIME, FOR SUBMITTAL REVIEW.

K. AS-BUILT DRAWINGS

- MAINTAIN ONE SET OF PRINTS ON THE SITE AND NOTE ALL CHANGES OR DEVIATIONS FROM THE ORIGINAL DESIGN THEREON. AT THE COMPLETION OF THE PROJECT, INCORPORATE ALL CHANGES INTO RECORD AS-BUILT DRAWINGS IN ELECTRONIC FORMAT AND SUBMIT FOR APPROVAL.

L. OPERATION AND MAINTENANCE

- UPON COMPLETION OF ALL WORK AND TESTS, THE CONTRACTOR SHALL INSTRUCT THE OWNER OR THE OWNERS REPRESENTATIVE IN THE OPERATION, ADJUSTMENT AND MAINTENANCE OF ALL EQUIPMENT FURNISHED. THE CONTRACTOR SHALL GIVE AT LEAST SEVEN (7) DAYS NOTICE TO THE OWNER AND THE ENGINEER IN ADVANCE OF THIS PERIOD.
- THE CONTRACTOR SHALL PREPARE THREE (3) COPIES OF A COMPLETE OPERATION AND MAINTENANCE MANUAL, BOUND IN BOOKLET FORM. ORGANIZE OPERATING AND MAINTENANCE DATA INTO SUITABLE SETS OF MANAGEMENT SIZE. BIND PROPERTY INDEXED DATA IN INDIVIDUAL, HEAVY-DUTY 3-RING BINDERS, WITH POKET FOLDERS FOR FOLDED SHEET INFORMATION AND DESIGNATION PARTS WITH IDENTIFICATION TABS. MARK APPROPRIATE IDENTIFICATION ON FRONT AND SPINE OF EACH BINDER.
- OPERATION AND MAINTENANCE MANUAL SHALL INCLUDE THE FOLLOWING:
 - MANUFACTURERS PRINTED OPERATING AND MAINTENANCE PROCEDURES.
 - MAINTENANCE PROCEDURES FOR ROUTINE PREVENTATIVE MAINTENANCE AND TROUBLESHOOTING.
 - COPIES OF WARRANTIES.
 - APPROVED SHOP DRAWINGS AND PRODUCT DATA.
 - BALANCE REPORTS.
 - INCLUDE IN THE MANUAL, A TABULATED EQUIPMENT SCHEDULE FOR ALL EQUIPMENT. SCHEDULE SHALL INCLUDE PERTINENT DATA SUCH AS: MAKE, MODEL, NUMBER, SERIAL, NUMBER, VOLTAGE, NORMAL OPERATING CURRENT, BELT SIZE, FILTER QUALITIES AND SIZES, BEARING NUMBER, ETC. SCHEDULE SHALL INCLUDE MAINTENANCE TO BE DONE AND FREQUENCY.
- MAINTENANCE AND INSTRUCTION MANUALS SHALL BE SUBMITTED TO THE OWNER AT THE SAME TIME AS THE SEVEN (7) DAY NOTICE IS GIVEN PRIOR TO THE INSTRUCTION PERIOD.

M. CLEANING

- ALL WORK AREAS SHALL BE LEFT AS CLEAN AS NEW. CLEAN INTERNALS OF ALL DUCTWORK AND AIR HANDLING UNITS AND REPLACE FILTERS AFTERWARDS.
- DUCTWORK: DUCTS SHALL BE THOROUGHLY CLEANED SO THAT NO DIRT OR DUST SHALL BE DISCHARGED FROM DIFFUSERS, REGISTERS, OR GRILLES, WHEN SYSTEM IS OPERATED.
- PIPING: AFTER CONDENSATE PIPING HAS BEEN PRESSURE TESTED AND APPROVED FOR TIGHTNESS, CLEAN AND FLUSH PIPING.
- EQUIPMENT: AFTER COMPLETION OF PROJECT, CLEAN THE EXTERIOR SURFACE OF EQUIPMENT INCLUDED IN THIS SECTION, INCLUDING REMOVAL OF CONCRETE RESIDUE.
- WORK AREA: AFTER COMPLETION OF PROJECT, REMOVE ALL CONSTRUCTION DEBRIS, TEMPORARY FACILITIES AND EQUIPMENT FROM WORK AREA. CLEAN WORK AREA TO PERMIT OCCUPATION.

N. GUARANTEE

- GUARANTEE REQUIREMENTS ARE APPLICABLE TO ALL PLUMBING, MECHANICAL AND ELECTRICAL DRAWINGS UNLESS NOTED OTHERWISE. REPAIR OR REPLACE DEFECTIVE MATERIALS, EQUIPMENT, WORKMANSHIP AND INSTALLATION THAT DEVELOP WITHIN THIS OTHER TRADES INVOLVED, PROMPT AND TO OWNERS SATISFACTION AND CORRECT DAMAGES CAUSED BY MAKING NECESSARY REPAIRS AND REPLACEMENTS UNDER GUARANTEE WITHIN CONTRACT PERIOD.
- MEANS AND METHODS ALL TRADES
 - INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.
 - DO NOT BURN WASTE MATERIALS. DO NOT BURY DEBRIS OR EXCESS MATERIALS ON OWNERS PROPERTY. DO NOT DISCHARGE VOLATILE, HARMFUL OR DANGEROUS MATERIALS INTO DRAINAGE SYSTEMS. REMOVE AND DISPOSE OF ALL WASTE MATERIALS, PACKAGING MATERIAL, SKIDS ETC. FROM THE SITE AND DISPOSE OF IN A LAWFUL MANNER IN ACCORDANCE WITH MUNICIPAL, STATE AND FEDERAL REGULATIONS.
 - MATERIALS AND EQUIPMENT SHALL BE UL LISTED WHERE STANDARD HAS BEEN ESTABLISHED.
 - CAREFULLY INSPECT ALL BUILDING ELEMENTS PRIOR TO CUTTING OR DRILLING INTO WALL, FLOORS OR CEILINGS. PATCH AND PAINT SURFACES DISTURBED BY WORK UNDER THIS CONTRACT AS REQUIRED TO RESTORE THEM TO THEIR ORIGINAL CONDITION.
 - SCAFFOLDING, RIGGING, HOISTING: THE CONTRACTOR SHALL FURNISH ALL SCAFFOLDING, RIGGING, HOISTING AND SERVICES NECESSARY FOR ERECTION AND DELIVERY INTO THE PREMISES, ALL EQUIPMENT AND APPARATUS FURNISHED UNDER THIS DIVISION. REMOVE SAME FROM PREMISES WHEN NO LONGER REQUIRED.
 - EXCAVATION AND BACKFILLING: IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE SIZES, DEPTHS, FILL AND BEDDING REQUIREMENTS AND ANY OTHER EXCAVATION WORK REQUIRED UNDER THESE SPECIFICATIONS.
 - WATERPROOFING: WHERE ANY WORK PIERCES WATERPROOFING, INCLUDING WATERPROOF CONCRETE, ROOFS, EXTERIOR WALL AND FLOORS IN WET AREAS, THE METHOD OF INSTALLATION SHALL BE REVIEWED BY THE ENGINEER BEFORE WORK IS DONE. THE CONTRACTOR SHALL FURNISH ALL NECESSARY SLEEVES, CAULKING AND FLASHING REQUIRED TO MAKE OVERLAYS ABSOLUTELY WATERTIGHT.
 - PROVIDE FIRESTOPPING AROUND ALL FIRE PROTECTION, PLUMBING, MECHANICAL AND ELECTRICAL PENETRATIONS THROUGH FIRE RATED PARTITIONS. PROVIDE ASBESTOS FREE FIRESTOPPING SYSTEM CAPABLE OF MAINTAINING AN EFFECTIVE BARRIER AGAINST FLAME AND GASES. SYSTEM SHALL BE UL LISTED AND COMPLY WITH ASTM E 814.
 - PROVIDE ACCESS PANELS IN WALLS, FLOORS AND GYPSUM WALL BOARD CEILINGS TO ALLOW ACCESS TO: DAMPERS, HEATERS, VALVES, VARIABLE AIR VOLUME BOXES, FAN BOXES AND OTHER APPARATUS AND EQUIPMENT REQUIRING PERIODIC SERVICE AND INSPECTION. NOT ALL ACCESS PANELS ARE INDICATED ON THE PLANS. REVIEW ARCHITECTURAL AND MECHANICAL PLANS TO DETERMINE THE LOCATION AND QUANTITY OF ACCESS PANELS REQUIRED. COORDINATE TYPE AND LOCATION WITH ARCHITECTURAL PLANS.

- PERFORM TESTING AND BALANCING PROCEDURES ON EACH SYSTEM IDENTIFIED, IN ACCORDANCE WITH THE DETAILED PROCEDURES OUTLINED IN EITHER NEBB "PROCEDURAL STANDARDS FOR TESTING, ADJUSTING, AND BALANCING OF ENVIRONMENTAL SYSTEMS" OR ASMC "ANALYTICAL STANDARDS FOR TOTAL SYSTEM BALANCE." THE TAB AGENCY SHALL TEST, DUCTWORK BALANCE, AND BALANCING REQUIREMENTS SHALL COMPLY WITH ASTM E 814.
- ALL AIR HANDLING EQUIPMENT
- ALL SUPPLY AIR SYSTEMS
- ALL RETURN AIR SYSTEMS
- ALL EXHAUST AIR SYSTEMS
- VERIFY OPERATION OF ALL TEMPERATURE CONTROL SYSTEMS
- TEST SYSTEM FOR PROPER SOUND AND VIBRATION LEVELS
- SUBMIT TESTING, ADJUSTING, AND BALANCING REPORTS BEARING THE SEAL AND SIGNATURE OF THE TAB PROFESSIONAL ENGINEER. PREPARE A REPORT OF RECOMMENDATIONS FOR CORRECTING UNSATISFACTORY MECHANICAL PERFORMANCE WHEN A SYSTEM CANNOT BE SUCCESSFULLY BALANCED.
- START UP ALL SYSTEMS, PRESSURE TEST DUCTWORK AND PIPING, AND BALANCE SYSTEMS INCLUDING, BUT NOT LIMITED TO, ALL NEW AND EXISTING REGISTERS, GRILLES, DIFFUSERS, TERMINAL UNITS, FANS, ETC. WITHIN THE AREA OF WORK TO PERFORMANCE DATA SHOWN ON PLANS, SCHEDULES, AND AS SPECIFIED.
- DO NOT COVER OR CONCEAL WORK BEFORE TESTING AND INSPECTION AND OBTAINING APPROVAL.
- LEAKS, DAMAGES AND DEFECTS DISCOVERED OR RESULTING FROM STARTUP, TESTING, AND BALANCING SHALL BE REPAIRED OR REPLACED TO LIKE-NEW CONDITION WITH ACCEPTABLE MATERIALS. TEST SHALL BE CONTINUED UNTIL SYSTEM OPERATES WITHOUT ADJUSTMENT OR REPAIR.
- REPORT ON REPORTING FORMS, SUBMITTED TO ARCHITECT FOR APPROVAL, IN ADVANCE.
- SUBMIT PROCEDURES, RECORDING FORMS, AND TEST EQUIPMENT FOR REVIEW PRIOR TO BALANCING, AS DESCRIBED IN SPECIFICATIONS. SUBMIT ELECTRONIC COPY OF TESTING AND BALANCING REPORTS TO ARCHITECT FOR APPROVAL.
- FURNISH ALL TEST MEDIUMS AND DISPOSE OF ALL TEST MEDIUMS AT AN APPROVED OFF-SITE LOCATION AFTER TESTING IS COMPLETE.
- NOTE REQUIREMENT ABOVE FOR CFM AND STATIC PRESSURE READINGS PRIOR TO DEMOLITION.
- THE BALANCING CONTRACTOR SHALL BE RESPONSIBLE FOR FINAL DIRECTIONAL ADJUSTMENT OF ALL LINEAR DIFFUSERS AS INDICATED ON PLANS. IF NO DIRECTIONAL FLOW IS INDICATED, INTERIOR LINEAR DIFFUSERS SHALL BE DIRECTED HORIZONTALLY AND PERIMETER LINEAR DIFFUSER SHALL BE DIRECTED VERTICALLY. IF PERIMETER LINEAR DIFFUSERS HAVE MULTIPLE SLOTS THE PERIMETER SLOTS SHALL BE DIRECTED VERTICALLY, AND THE INTERIOR SLOT DIRECTED HORIZONTALLY TOWARDS THE INTERIOR SPACE.

23.05.05 - DEMOLITION

- REFER TO DRAWINGS FOR GENERAL DESCRIPTION OF AREAS REQUIRING DEMOLITION.
- ANY DEMOLITION SHALL BE COORDINATED WITH OWNER, ARCHITECT, G.C. AND ENGINEER
- REFER TO GENERAL CONTRACTOR'S CONSTRUCTION MANAGEMENT INSTRUCTIONS FOR EXISTING EQUIPMENT AND MATERIALS THAT SHALL REMAIN THE PROPERTY OF THE OWNER.
- WHERE IT IS NOTED THAT ITEMS OF VALUE ARE NOT TO BE RETURNED TO THE OWNER, THE ITEMS SHALL BECOME THE PROPERTY OF THE CONTRACTOR. STORAGE OR SALE OF ITEMS ON THE PROJECT SITE IS PROHIBITED. ITEMS SHALL BE REMOVED FROM SITE AND LEGALLY DISPOSED OF.
- PROTECTION: ENSURE THE SAFE PASSAGE OF PERSONS IN AND AROUND THE BUILDINGS/DURING DEMOLITION. PREVENT INJURY TO PERSONS AND DAMAGE TO PROPERTY. PROVIDE ADEQUATE SHORING AND BRACING TO PREVENT COLLAPSE. IMMEDIATELY REPAIR DAMAGE TO THE CONDITION BEFORE BEING DAMAGED TO THE SATISFACTION OF THE ARCHITECT AND OWNER. TAKE EFFECTIVE MEASURES TO PREVENT WINDLOWN DUST.
- UTILITIES:
 - MAINTAIN UTILITIES EXCEPT THOSE REQUIRING REMOVAL OR RELOCATION. KEEP UTILITIES IN SERVICE AND PROTECT FROM DAMAGE. DO NOT INTERRUPT UTILITIES SERVING THE AREAS WITHOUT FIRST OBTAINING PERMISSION FROM THE UTILITY COMPANY AND THE OWNER.
 - COORDINATE ALL INTERRUPTIONS OF SERVICES AND LIMITATIONS OF ACCESS WITH THE OWNER NO LESS THAN 5 DAYS PRIOR TO THE INTERRUPTION.
 - PROVIDE TEMPORARY SERVICES AS REQUIRED. SHUTDOWN OF EXISTING SYSTEMS FOR CONNECTION OF NEW WORK SHALL BE COORDINATED IN ADVANCE WITH THE CONSTRUCTION MANAGER AND BUILDING OWNER.
 - DISCONNECT, DEMOLISH AND REMOVE HVAC SYSTEMS, EQUIPMENT, AND COMPONENTS INDICATED TO BE REMOVED. PIPING TO BE REMOVED. REMOVE PORTION OF PIPING INDICATED TO BE REMOVED AND CAP REMAINING PIPING WITH SAME OR COMPATIBLE PIPING MATERIAL.
 - PIPING TO BE ABANDONED IN PLACE: DRAIN PIPING AND CAP PIPING WITH SAME OR COMPATIBLE PIPING MATERIAL.
 - DUCTS TO BE REMOVED: REMOVE PORTION OF DUCTS INDICATED TO BE REMOVED AND CAP REMAINING DUCTS WITH SAME OR COMPATIBLE DUCTWORK MATERIAL.
 - DUCTS TO BE ABANDONED IN PLACE: CAP DUCTS WITH SAME OR COMPATIBLE DUCTWORK MATERIAL.
 - EQUIPMENT TO BE REMOVED: DISCONNECT AND CAP SERVICES AND REMOVE EQUIPMENT.
 - EQUIPMENT TO BE REMOVED AND REINSTALLED: DISCONNECT AND CAP SERVICES AND REMOVE, CLEAN AND STORE EQUIPMENT; WHEN APPROPRIATE, REINSTALL, RECONNECT, AND MAKE EQUIPMENT OPERATIONAL.
 - EQUIPMENT TO BE REMOVED AND SALVAGED: DISCONNECT AND CAP SERVICES AND REMOVE EQUIPMENT AND DELIVER TO OWNER.
 - IF PIPE, INSULATION, OR EQUIPMENT TO REMAIN IS DAMAGED IN APPEARANCE OR IS UNSERVICEABLE, REMOVE DAMAGED OR UNSERVICEABLE PORTIONS AND REPLACE WITH NEW PRODUCTS OF EQUAL CAPACITY AND QUALITY.

23.05.13 - HVAC INSULATION

- GENERAL REQUIREMENTS
 - INSULATION SHALL BE CERTAIN-TEED, KNAUF, MANVILLE, OR OWENS CORNING. MATERIALS SHALL MEET REQUIREMENTS OF ADHESIVE AND SEALANT COUNCIL STANDARDS AND SMACNA. INSTALL INSULATION, MASTICS, ADHESIVES, COATINGS, COVERS, WEATHER PROTECTION AND OTHER WORK IN STRICT ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS. ASTM E-84 FIRE HAZARD RATINGS SHALL BE 25 FLAME SPREAD, 50 SMOKE DEVELOPED.
 - INSULATION AND VAPOR BARRIER SHALL BE CONTINUOUS AROUND ENTIRE PERIMETER OF DUCTS. DUCTS SUPPORTED BY METAL STRAPS SHALL HAVE INSULATION ENCOMPASSING STRAPS, WHERE STRAPS PENETRATE AT TOP OF DUCT TIGHTLY SEAL AROUND STRAP WITH INSULATING TAPE. DUCTS SUPPORTED BY TRAPEZIE TYPE HANGERS UNDER DUCTS SHALL HAVE 1/2" DENSITY RIGID INSULATION PROVIDED BETWEEN DUCT AND HANGER. INSULATION SHALL BE SAME THICKNESS AND VAPOR BARRIER AS SPECIFIED FOR SPECIFIC DUCT TYPE. RIGID INSULATION SECTION SHALL BE FULL WIDTH OF DUCT AND MINIMUM 12" LONG. TAPE AND SEAL ALL SEAMS WHERE RIGID INSULATION MEETS OTHER INSULATION.
 - FITTINGS, VALVES AND FLANGES SHALL BE INSULATED WITH SAME MATERIAL AND TO SAME THICKNESS AS ADJOINING PIPE INSULATION, WITH PRESENT SECTIONS.
 - FOR STRAINERS AND OTHER VALVES OR FITTINGS WHICH NEED MAINTENANCE, PROVIDE PREFORMED REMOVABLE INSULATION SECTION.
- PRODUCTS AND APPLICATIONS
 - REFRIGERANT LINE AND CONDENSATE DRAIN LINE INSULATION SHALL BE 1 INCH THICK FLEXIBLE ELASTOMERIC, ACCEPTABLE MANUFACTURERS: ARMACELL OR K-FLEX.
 - CONDENSATE DRAIN LINE INSULATION SHALL BE 1 INCH THICK FLEXIBLE ELASTOMERIC, ACCEPTABLE MANUFACTURERS: ARMACELL OR K-FLEX.
 - EQUIPMENT INSULATION SHALL BE MINERAL FIBER BOARD INSULATION WITH FACTORY APPLIED ASJ. PROVIDE 2 INCH THICK FOR HEATING SYSTEM HEAT EXCHANGERS, 1 INCH THICK FOR OTHER EQUIPMENT. INSULATION SHALL BE FORMED OR FABRICATED TO FIT EQUIPMENT.

23.06.17 - SLEEVES AND PENETRATIONS

- GENERAL REQUIREMENTS
 - LAY OUT PENETRATION AND SLEEVE OPENINGS IN ADVANCE. COORDINATE WORK CAREFULLY WITH STRUCTURE AND STRUCTURAL WORK. PROVIDE CAREFUL DRILLING OF EXISTING CONSTRUCTION WHERE REQUIRED. SUBMIT PROPOSED LOCATIONS FOR REVIEW PRIOR TO CORE DRILLING.
 - MAINTAIN FIRE RATING OF WALLS, PARTITIONS, CEILINGS, AND FLOORS AT PENETRATIONS. SEAL PENETRATIONS WITH APPROVED FIRESTOP MATERIALS.
 - SLEEVES FOR INSULATED PIPE AND DUCT IN NON-FIRE RATED CONSTRUCTION SHALL ACCOMMODATE CONTINUOUS INSULATION WITHOUT COMPRESSION.
- PIPE SLEEVES:
 - PROVIDE HOT-DIPPED GALVANIZED SCHEDULE 40 STEEL PIPE SLEEVES FOR PIPES PASSING THROUGH CONCRETE AND MASONRY WALLS AND CONCRETE FLOOR AND ROOF SLABS.
 - PROVIDE 26 GAUGE GALVANIZED STEEL SLEEVES THROUGH PARTITIONS AND NON-FIRE-RATED CONSTRUCTION.
 - PROVIDE MANUJAL GALVANIZED STEEL SEALS CONSISTING OF INTERLOCKING MODULES AT EXTERIOR PIPE PENETRATIONS.
 - PROVIDE ADJUSTABLE ESCUTCHEONS ON EXPOSED PIPING THAT PASSES THROUGH FINISHED FLOORS, WALLS AND CEILINGS. ESCUTCHEONS SHALL BE CHROMIUM-PLATED CAST BRASS, SIZED TO COVER SLEEVE OPENINGS AND TO ACCOMMODATE PIPE AND INSULATION.
- DUCT SLEEVES AND OPENINGS:
 - PROVIDE GALVANIZED STEEL SHEET DUCT SLEEVES FOR ROUND DUCTS 16 INCHES AND SMALLER, PROVIDE PREPARED, FRAMED OPENINGS FOR ROUND DUCTS LARGER THAN 16 INCHES AND FOR SQUARE, RECTANGULAR AND FLAT OVAL DUCTS, EXCEPT AS SPECIFIED OTHERWISE. SLEEVES SHALL MEET SMACNA REQUIREMENTS.
 - PROVIDE GALVANIZED STEEL SHEET DUCT SLEEVES FOR SLEEVES THROUGH FIRE-RATED CONSTRUCTION AND THROUGH SMOKE PARTITIONS. SLEEVE AND SEAL MATERIALS, CONSTRUCTION AND CLEARANCES SHALL MEET REQUIREMENTS OF SMACNA FIRE DAMPER AND HEAT STOP GUIDE FOR AIR HANDLING SYSTEMS, WHERE FIRE DAMPERS ARE REQUIRED. INSTALL SLEEVE AND DAMPER ASSEMBLY IN ACCORDANCE WITH DAMPER LISTING.

23.06.19 - MOTORS, STARTERS AND WIRING

- PROVIDE MOTORS AND CONTROLS, AND FURNISH STARTERS FOR HVAC EQUIPMENT, EXCEPT UNITS SERVED BY MCC PROVIDED UNDER ELECTRICAL SECTION. PROVIDE CONTROL AND OTHER RELATED WIRING INCLUDING MISC INTERNALS. ALL MOTORS SHALL BE TO PREMIUM EFFICIENCY. ALL THREE PHASE MOTORS SHALL BE RATED FOR INVERTER DUTY SERVICE.
- STARTERS THAT REQUIRE INTERLOCKS OR REMOTE CONTROL SHALL BE MAGNETIC WITH HAND-OFF-AUTOMATIC SWITCH (FAST-SLOW-OFF-AUTO FOR TWO SPEED MOTORS) IN COVER. STARTERS SHALL BE BY SINGLE MANUFACTURER. CUTLER-HAMMER, CLARK, ARROW HART OR SQUARE D.

23.06.17 - SLEEVES AND PENETRATIONS

- GENERAL REQUIREMENTS
 - LAY OUT PENETRATION AND SLEEVE OPENINGS IN ADVANCE. COORDINATE WORK CAREFULLY WITH STRUCTURE AND STRUCTURAL WORK. PROVIDE CAREFUL DRILLING OF EXISTING CONSTRUCTION WHERE REQUIRED. SUBMIT PROPOSED LOCATIONS FOR REVIEW PRIOR TO CORE DRILLING.
 - MAINTAIN FIRE RATING OF WALLS, PARTITIONS, CEILINGS, AND FLOORS AT PENETRATIONS. SEAL PENETRATIONS WITH APPROVED FIRESTOP MATERIALS.
 - SLEEVES FOR INSULATED PIPE AND DUCT IN NON-FIRE RATED CONSTRUCTION SHALL ACCOMMODATE CONTINUOUS INSULATION WITHOUT COMPRESSION.
- PIPE SLEEVES:
 - PROVIDE HOT-DIPPED GALVANIZED SCHEDULE 40 STEEL PIPE SLEEVES FOR PIPES PASSING THROUGH CONCRETE AND MASONRY WALLS AND CONCRETE FLOOR AND ROOF SLABS.
 - PROVIDE 26 GAUGE GALVANIZED STEEL SLEEVES THROUGH PARTITIONS AND NON-FIRE-RATED CONSTRUCTION.
 - PROVIDE MANUJAL GALVANIZED STEEL SEALS CONSISTING OF INTERLOCKING MODULES AT EXTERIOR PIPE PENETRATIONS.
 - PROVIDE ADJUSTABLE ESCUTCHEONS ON EXPOSED PIPING THAT PASSES THROUGH FINISHED FLOORS, WALLS AND CEILINGS. ESCUTCHEONS SHALL BE CHROMIUM-PLATED CAST BRASS, SIZED TO COVER SLEEVE OPENINGS AND TO ACCOMMODATE PIPE AND INSULATION.
- DUCT SLEEVES AND OPENINGS:
 - PROVIDE GALVANIZED STEEL SHEET DUCT SLEEVES FOR ROUND DUCTS 16 INCHES AND SMALLER, PROVIDE PREPARED, FRAMED OPENINGS FOR ROUND DUCTS LARGER THAN 16 INCHES AND FOR SQUARE, RECTANGULAR AND FLAT OVAL DUCTS, EXCEPT AS SPECIFIED OTHERWISE. SLEEVES SHALL MEET SMACNA REQUIREMENTS.
 - PROVIDE GALVANIZED STEEL SHEET DUCT SLEEVES FOR SLEEVES THROUGH FIRE-RATED CONSTRUCTION AND THROUGH SMOKE PARTITIONS. SLEEVE AND SEAL MATERIALS, CONSTRUCTION AND CLEARANCES SHALL MEET REQUIREMENTS OF SMACNA FIRE DAMPER AND HEAT STOP GUIDE FOR AIR HANDLING SYSTEMS, WHERE FIRE DAMPERS ARE REQUIRED. INSTALL SLEEVE AND DAMPER ASSEMBLY IN ACCORDANCE WITH DAMPER LISTING.

23.06.25 - HANGERS AND SUPPORTS

- PROVIDE PIPE STANDS, SUPPORTS, HANGERS AND OTHER SUPPORTING APPLIANCES AS NECESSARY TO SUPPORT WORK REQUIRED BY CONTRACT DOCUMENTS. SPACING OF HANGERS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S AND MECHANICAL CODES. STRUCTURAL STEEL SUPPORTS, HANGERS, ETC. SHALL BE ANGLE IRON, STEEL CHANNEL, OR HEAVY WELDED STEEL. HANGERS SHALL HAVE NUTTED CLAMPS, INSERTS, ETC. ALL SUPPORTS, HANGERS, BRACKETS, ETC. SHALL BE AS APPROVED BY THE ENGINEER.
- ALL HANGERS SHALL BE GALVANIZED.
- ATTACH HANGERS AND SUPPORTS DIRECTLY onto THE STRUCTURE BY FIRST REMOVING EXISTING FIRE PROOFING AND AFTER SECURING THE ATTACHMENT, REPAIRING THE FIRE PROOFING TO ITS ORIGINAL CONDITION, CONTINUOUSLY OVER THE ATTACHMENT.
- FOR EXPANSION BOLT SHELSHEDS USE RED HEAD, 1/4" OR 3/8" WELT-JET DRILLING OR STEEL SHIELD, LOAD RATED. DO NOT USE DRILLED ANCHORS IN POST TENSION SLABS WITHOUT APPROVAL OF OWNER. DO NOT CUT REINFORCING STEEL WITH DRILLED INSERTS.

- SUPPORT ALL GALVANIZED DUCTWORK WITH GALVANIZED HANGERS AND MOUNTS AS REQUIRED BY SMACNA (8 FT SPACING). DO NOT SUPPORT RISERS FROM SLEEVES IN SLABS.
- VIBRATION ISOLATION AND SEISMIC CONTROLS FOR HVAC
 - PROVIDE VIBRATION ISOLATION FOR EACH PIECE OF ROTATING OR RECIPROCATING HVAC EQUIPMENT SHOWN ON THE DRAWINGS. ALL ISOLATION COMPONENTS SHALL BE SUPPLIED BY A SINGLE MANUFACTURER. MASON INDUSTRIES, KINETICS OR AMBER BOOT. TYPES OF ISOLATORS, REQUIRED DEFLECTIONS, AND INSTALLATION PRACTICES SHALL BE IN STRICT ACCORDANCE WITH THE RECOMMENDATIONS OF THE VIBRATION ISOLATION MANUFACTURER.
 - PROVIDE SEISMIC RESTRAINTS AS REQUIRED BY CODE. FOR EACH SEISMIC RESTRAINT, PROVIDE CERTIFIED CALCULATIONS TO VERIFY ADEQUACY TO MEET THE FOLLOWING DESIGN REQUIREMENTS: ABILITY TO ACCOMMODATE RELATIVE SEISMIC DISPLACEMENTS OF SUPPORTED ITEM BETWEEN POINTS OF SUPPORT; ABILITY TO ACCOMMODATE THE REQUIRED SEISMIC FORCES. FOR EACH RESPECTIVE SET OF ANCHOR BOLTS PROVIDE CALCULATIONS TO VERIFY ADEQUACY TO MEET COMBINED SHEAR AND TENSION FORCES. FOR EACH WELDBENT BETWEEN STRUCTURE AND ITEM SUBJECT TO SEISMIC FORCE, PROVIDE CALCULATIONS TO VERIFY ADEQUACY. CALCULATIONS SHALL BE STAMPED BY A PROFESSIONAL ENGINEER WHO IS REGISTERED IN THE STATE WHERE THE WORK IS BEING PERFORMED AND HAS SPECIFIC EXPERIENCE IN SEISMIC CALCULATIONS. RESTRAINTS SHALL MAINTAIN THE RESTRAINED ITEM IN A CAPTIVE POSITION WITHOUT SHORT CIRCUITING THE VIBRATION ISOLATION.

23.05.53 - PIPE AND DUCT IDENTIFICATION

- DUCTWORK AND PIPING SHALL BE LABELED WITH PREPRINTED SELF-ADHESIVE, PREMIUM GRADE, COLOR-CODED, WITH LETTERING INDICATING SERVICE, AND SHOWING FLOW DIRECTION.
- VALVES SHALL BE TAGGED WITH STAMPED OR ENGRAVED BRASS VALVE TAGS. INSTALL TAGS ON VALVES AND CONTROL DEVICES IN PIPING SYSTEMS. EXCEPT CHECK VALVES, VALVES WITHIN FACTORY-FABRICATED EQUIPMENT UNITS, SHUTOFF VALVES, FAUCETS, CONVENIENCE AND LAWN-WATERING HOSE CONNECTIONS, AND HVAC TERMINAL DEVICES AND SIMILAR ROUGH-IN CONNECTIONS OF ENCLOSE FIXTURES AND UNITS. LIST TAGGED VALVES IN A VALVE SCHEDULE.
- MACHINERY SUCH AS RYTUS, FANS, ETC. SHALL BE LABELED WITH PLASTIC LABELS WITH ENGRAVED EQUIPMENT NUMBER CORRESPONDING TO DRAWING SCHEDULE NUMBERS.
- TESTING ADJUSTING AND BALANCING
 - PROVIDE QUALIFIED PERSONNEL, EQUIPMENT, APPARATUS AND SERVICES FOR START-UP, TESTING AND BALANCING OF MECHANICAL SYSTEMS. THE TAB AGENCY SHALL BE CERTIFIED BY NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB) OR THE ASSOCIATED AIR BALANCE COUNCIL OF AMERICA (AABC) FOR TESTING AND BALANCING. THE TAB AGENCY SHALL BE CERTIFIED BY THE TAB AGENCY SHALL HAVE AT LEAST ONE PROFESSIONAL ENGINEER REGISTERED IN THE STATE IN WHICH THE SERVICES ARE TO BE PERFORMED AND CERTIFIED BY NEBB OR AABC AS A TEST AND BALANCE ENGINEER.
 - PRIOR TO TESTING, ADJUSTING, AND BALANCING, THE MECHANICAL CONTRACTOR SHALL VERIFY THAT THE SYSTEMS HAVE BEEN INSTALLED AND ARE OPERATING AS SPECIFIED. APPROVED POSITIVE AND NEGATIVE PRESSURE TESTS SHALL BE PERFORMED ON EACH SYSTEM AND/OR COMPONENT TO BE TESTED SHALL BE MADE AVAILABLE AT THE JOB SITE DURING THE ENTIRE TAB EFFORT. THE OWNER SHALL BE NOTIFIED IN WRITING OF ALL EQUIPMENT, COMPONENTS, OR BALANCING DEVICES, THAT ARE DAMAGED, INCORRECTLY INSTALLED, OR MISSING, AS WELL AS ANY DESIGN DEFICIENCIES THAT WILL PREVENT PROPER TESTING, ADJUSTING, AND BALANCING. TESTING, ADJUSTING, AND BALANCING SHALL NOT COMMENCE UNTIL APPROVED BY THE OWNER.
- PERFORM TESTING AND BALANCING PROCEDURES ON EACH SYSTEM IDENTIFIED, IN ACCORDANCE WITH THE DETAILED PROCEDURES OUTLINED IN EITHER NEBB "PROCEDURAL STANDARDS FOR TESTING, ADJUSTING, AND BALANCING OF ENVIRONMENTAL SYSTEMS" OR AABC "ANALYTICAL STANDARDS FOR TOTAL SYSTEM BALANCE." THE TAB AGENCY SHALL TEST, DUCTWORK BALANCE, AND BALANCING REQUIREMENTS SHALL COMPLY WITH ASTM E 814.

- ALL AIR HANDLING EQUIPMENT
- ALL SUPPLY AIR SYSTEMS
- ALL RETURN AIR SYSTEMS
- ALL EXHAUST AIR SYSTEMS
- VERIFY OPERATION OF ALL TEMPERATURE CONTROL SYSTEMS
- TEST SYSTEM FOR PROPER SOUND AND VIBRATION LEVELS
- SUBMIT TESTING, ADJUSTING, AND BALANCING REPORTS BEARING THE SEAL AND SIGNATURE OF THE TAB PROFESSIONAL ENGINEER. PREPARE A REPORT OF RECOMMENDATIONS FOR CORRECTING UNSATISFACTORY MECHANICAL PERFORMANCE WHEN A SYSTEM CANNOT BE SUCCESSFULLY BALANCED.
- START UP ALL SYSTEMS, PRESSURE TEST DUCTWORK AND PIPING, AND BALANCE SYSTEMS INCLUDING, BUT NOT LIMITED TO, ALL NEW AND EXISTING REGISTERS, GRILLES, DIFFUSERS, TERMINAL UNITS, FANS, ETC. WITHIN THE AREA OF WORK TO PERFORMANCE DATA SHOWN ON PLANS, SCHEDULES, AND AS SPECIFIED.
- DO NOT COVER OR CONCEAL WORK BEFORE TESTING AND INSPECTION AND OBTAINING APPROVAL.
- LEAKS, DAMAGES AND DEFECTS DISCOVERED OR RESULTING FROM STARTUP, TESTING, AND BALANCING SHALL BE REPAIRED OR REPLACED TO LIKE-NEW CONDITION WITH ACCEPTABLE MATERIALS. TEST SHALL BE CONTINUED UNTIL SYSTEM OPERATES WITHOUT ADJUSTMENT OR REPAIR.
- REPORT ON REPORTING FORMS, SUBMITTED TO ARCHITECT FOR APPROVAL, IN ADVANCE.
- SUBMIT PROCEDURES, RECORDING FORMS, AND TEST EQUIPMENT FOR REVIEW PRIOR TO BALANCING, AS DESCRIBED IN SPECIFICATIONS. SUBMIT ELECTRONIC COPY OF TESTING AND BALANCING REPORTS TO ARCHITECT FOR APPROVAL.
- FURNISH ALL TEST MEDIUMS AND DISPOSE OF ALL TEST MEDIUMS AT AN APPROVED OFF-SITE LOCATION AFTER TESTING IS COMPLETE.
- NOTE REQUIREMENT ABOVE FOR CFM AND STATIC PRESSURE READINGS PRIOR TO DEMOLITION.
- THE BALANCING CONTRACTOR SHALL BE RESPONSIBLE FOR FINAL DIRECTIONAL ADJUSTMENT OF ALL LINEAR DIFFUSERS AS INDICATED ON PLANS. IF NO DIRECTIONAL FLOW IS INDICATED, INTERIOR LINEAR DIFFUSERS SHALL BE DIRECTED HORIZONTALLY AND PERIMETER LINEAR DIFFUSER SHALL BE DIRECTED VERTICALLY. IF PERIMETER LINEAR DIFFUSERS HAVE MULTIPLE SLOTS THE PERIMETER SLOTS SHALL BE DIRECTED VERTICALLY, AND THE INTERIOR SLOT DIRECTED HORIZONTALLY TOWARDS THE INTERIOR SPACE.

23.07.13 - HVAC INSULATION

- GENERAL REQUIREMENTS
 - INSULATION SHALL BE CERTAIN-TEED, KNAUF, MANVILLE, OR OWENS CORNING. MATERIALS SHALL MEET REQUIREMENTS OF ADHESIVE AND SEALANT COUNCIL STANDARDS AND SMACNA. INSTALL INSULATION, MASTICS, ADHESIVES, COATINGS, COVERS, WEATHER PROTECTION AND OTHER WORK IN STRICT ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS. ASTM E-84 FIRE HAZARD RATINGS SHALL BE 25 FLAME SPREAD, 50 SMOKE DEVELOPED.
 - INSULATION AND VAPOR BARRIER SHALL BE CONTINUOUS AROUND ENTIRE PERIMETER OF DUCTS. DUCTS SUPPORTED BY METAL STRAPS SHALL HAVE INSULATION ENCOMPASSING STRAPS, WHERE STRAPS PENETRATE AT TOP OF DUCT TIGHTLY SEAL AROUND STRAP WITH INSULATING TAPE. DUCTS SUPPORTED BY TRAPEZIE TYPE HANGERS UNDER DUCTS SHALL HAVE 1/2" DENSITY RIGID INSULATION PROVIDED BETWEEN DUCT AND HANGER. INSULATION SHALL BE SAME THICKNESS AND VAPOR BARRIER AS SPECIFIED FOR SPECIFIC DUCT TYPE. RIGID INSULATION SECTION SHALL BE FULL WIDTH OF DUCT AND MINIMUM 12" LONG. TAPE AND SEAL ALL SEAMS WHERE RIGID INSULATION MEETS OTHER INSULATION.
 - FITTINGS, VALVES AND FLANGES SHALL BE INSULATED WITH SAME MATERIAL AND TO SAME THICKNESS AS ADJOINING PIPE INSULATION, WITH PRESENT SECTIONS.
 - FOR STRAINERS AND OTHER VALVES OR FITTINGS WHICH NEED MAINTENANCE, PROVIDE PREFORMED REMOVABLE INSULATION SECTION.
- PRODUCTS AND APPLICATIONS
 - REFRIGERANT LINE AND CONDENSATE DRAIN LINE INSULATION SHALL BE 1 INCH THICK FLEXIBLE ELASTOMERIC, ACCEPTABLE MANUFACTURERS: ARMACELL OR K-FLEX.
 - CONDENSATE DRAIN LINE INSULATION SHALL BE 1 INCH THICK FLEXIBLE ELASTOMERIC, ACCEPTABLE MANUFACTURERS: ARMACELL OR K-FLEX.
 - EQUIPMENT INSULATION SHALL BE MINERAL FIBER BOARD INSULATION WITH FACTORY APPLIED ASJ. PROVIDE 2 INCH THICK FOR HEATING SYSTEM HEAT EXCHANGERS, 1 INCH THICK FOR OTHER EQUIPMENT. INSULATION SHALL BE FORMED OR FABRICATED TO FIT EQUIPMENT.

23.08.00 - COMMISSIONING OF HVAC

- SCOPE OF HVAC TESTING SHALL INCLUDE ENTIRE HVAC INSTALLATION, FROM CENTRAL EQUIPMENT FOR HEAT GENERATION AND REFRIGERATION THROUGH DISTRIBUTION SYSTEMS TO EACH CONDITIONED SPACE. TESTING SHALL INCLUDE MEASURING CAPACITIES AND EFFECTIVENESS OF OPERATIONAL AND CONTROL FUNCTIONS.
- TEST ALL OPERATING MODES, INTERLOCKS, CONTROL RESPONSES, AND RESPONSES TO ABNORMAL OR EMERGENCY CONDITIONS, AND VERIFY PROPER RESPONSE OF BUILDING AUTOMATION SYSTEM CONTROLLERS AND SENSORS.
- THE CXA ALONG WITH THE HVAC CONTRACTOR, TESTING AND BALANCING CONTRACTOR, AND CONTROLS CONTRACTOR SHALL PREPARE DETAILED TESTING PLANS, PROCEDURES, AND CHECKLISTS FOR HVAC SYSTEMS, SUBSYSTEMS, AND EQUIPMENT.
- PERFORM COMMISSIONING TESTS AT THE DIRECTION OF THE CXA. PROVIDE TECHNICIANS, INSTRUMENTATION, AND TOOLS REQUIRED TO PERFORM COMMISSIONING TESTS. PROVIDE INFORMATION REQUESTED BY THE CXA FOR FINAL COMMISSIONING DOCUMENTS.

23.08.00 - COMMISSIONING OF HVAC

- SCOPE OF HVAC TESTING SHALL INCLUDE ENTIRE HVAC INSTALLATION, FROM CENTRAL EQUIPMENT FOR HEAT GENERATION AND REFRIGERATION THROUGH DISTRIBUTION SYSTEMS TO EACH CONDITIONED SPACE. TESTING SHALL INCLUDE MEASURING CAPACITIES AND EFFECTIVENESS OF OPERATIONAL AND CONTROL FUNCTIONS.
- TEST ALL OPERATING MODES, INTERLOCKS, CONTROL RESPONSES, AND RESPONSES TO ABNORMAL OR EMERGENCY CONDITIONS, AND VERIFY PROPER RESPONSE OF BUILDING AUTOMATION SYSTEM CONTROLLERS AND SENSORS.
- THE CXA ALONG WITH THE HVAC CONTRACTOR, TESTING AND BALANCING CONTRACTOR, AND CONTROLS CONTRACTOR SHALL PREPARE DETAILED TESTING PLANS, PROCEDURES, AND CHECKLISTS FOR HVAC SYSTEMS, SUBSYSTEMS, AND EQUIPMENT.
- PER

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CERTIFICATION

[illegible]

DRAWING TITLE

SCALE: 1/8" = 1'-0"	DRAWN BY: MS	REVIEWED BY: JCC
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DRAWING NO.

DATE:	JOB NUMBER:
7/17/2024	23015

KEYNOTES - PLUMBING	
Key Value	Keynote Text
PD4	REMOVE EXISTING DOMESTIC WATER PIPING BACK TO NEAREST PIPING MAIN AND CAP.
PD5	REMOVE EXISTING SECTION OF SANITARY PIPING SERVING WATER CLOSET AND LAV BACK TO EXISTING SANITARY MAIN AND CAP. CONTRACTOR TO VERIFY EXISTING LOCATION OF PIPING IN FIELD.
PD6	DISCONNECT AND REMOVE EXISTING SECTION OF STORM PIPING FOR RELOCATION/RE-ROUTING TO ACCOMMODATE NEW ELEVATOR SHAFT AND PIT. CONTRACTOR TO VERIFY EXACT LOCATION OF PIPING IN FIELD.

CERTIFICATION:

[illegible]

DRAWING TITLE:
PLUMBING
DEMOLITION
FIRST FLOOR
PLAN

DRAWING NO.

DATE:	JOB NUMBER:
7/17/2024	23015

CERTIFICATION:



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DRAWING TITLE:
PLUMBING
DEMOLITION
FIRST FLOOR
PLAN

DRAWING NO.

DATE:	JOB NUMBER:
7/17/2024	23015

CERTIFICATION:



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DRAWING TITLE:
PLUMBING
DEMOLITION
FIRST FLOOR
PLAN

DRAWING NO.

DATE:	JOB NUMBER:
7/17/2024	23015

CERTIFICATION:

[illegible]

JULIAN CURTISS SCHOOL
PHASED RENOVATIONS
GREENWICH PUBLIC SCHOOLS
108 EAST ELM STREET
GREENWICH, CONNECTICUT 06830

DRAWING TITLE:

PLUMBING
BASEMENT PLAN

SCALE: 1/8" = 1'-0"	DRAWN BY: MS	REVIEWED BY: JCC
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P1.00

DATE:	JOB NUMBER:
7/17/2024	23015

KEYNOTES - PLUMBING	
Key Value	Keynote Text
P1	PROVIDE 1/2" CW, 1/2" HW TO SUPPLY FIRELINE. CONNECT TO EXISTING DOMESTIC WATER MAINS IN BASEMENT. CONTRACTOR TO VERIFY LOCATION IN FIELD.
P2	PROVIDE SAN TO SERVE NEW FIRELINE. CONNECT TO EXISTING SANITARY BELOW GRADE IN BASEMENT. CONTRACTOR TO VERIFY LOCATION IN FIELD.
P4	PROVIDE NEW UNDERGROUND SAN AND CONNECT TO EXISTING. CONTRACTOR TO VERIFY IN THE FIELD THAT NEW UNDERGROUND SAN SHALL NOT INTERFERE WITH EXISTING UNDERGROUND CONDITIONS IN NEW LOCATION.
P5	PROVIDE NEW STORM AND CONNECT TO EXISTING.

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CONSULTANT



CES

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[illegible]

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GREENWICH PUBLIC SCHOOLS
108 EAST ELM STREET
GREENWICH, CONNECTICUT 06830

DRAWING TITLE:

PLUMBING FIRST
FLOOR PLAN

SCALE: 1/8" = 1'-0"	DRAWN BY: MS	REVIEWED BY: JCC
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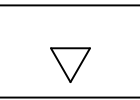
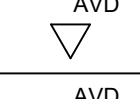
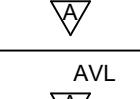
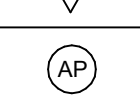
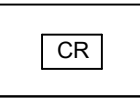
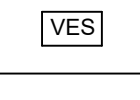
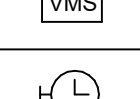
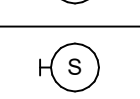
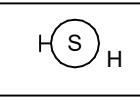
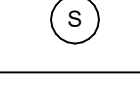
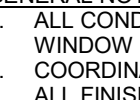
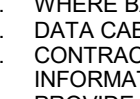
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DATE:	JOB NUMBER:
7/17/2024	23015

KEYNOTES - PLUMBING	
Key Value	Keynote Text
P3	PROVIDE 2" V TO SERVE NEW FIXTURES. CONNECT TO EXISTING VENT PIPING.
P6	RE-INSTALL EXISTING WATER CLOSET IN EXISTING LOCATION. CONNECT TO EXISTING CW, SAN, AND VENT PIPING.

1 PLUMBING FIRST FLOOR - NEW
1/8" = 1'-0"

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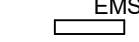
TECHNOLOGY DEVICE SCHEDULE				
SYMBOL	DESCRIPTION	CONDUIT BACKBOX	CABLING	NOTES
	DATA OUTLET	2-GANG BOX @ 18" AFF WITH 1-GANG MUD RING AND 1-1/4" C. STUBBED ABOVE ACCESSIBLE CEILING	(2) CAT6A CABLES TO DATA PATCH PANEL	SUBSCRIPT "a" = 6" ABOVE COUNTER
	DATA FOR AV WALL BOX	MOUNT IN AV WALL BOX	REFER TO AV DETAILS FOR CABLING AND CONNECTORS.	
	IN-WALL STORAGE BOX FOR FLATS/SCREEN DISPLAY	IN-WALL STORAGE BOX EQUAL TO LEGRAND EFSB4 WITH (1) 3/4" C. AND (1) 2" C. STUBBED ABOVE ACCESSIBLE CEILING	REFER TO AV DETAILS FOR CABLING AND CONNECTORS.	COORDINATE EXACT LOCATION OF BACKBOX WITH OWNER PRIOR TO ROUGH-IN. SUCH THAT BOX IS CONCEALED BEHIND DISPLAY.
	LOW AUDIO/VISUAL CONNECTIONS	3-GANG HIGH CAPACITY BOX WITH LOW VOLTAGE DIVIDER EQUAL TO HUBBELL HBL986 @ 18" AFF WITH 2" C. STUBBED ABOVE ACCESSIBLE CEILING.	REFER TO AV DETAILS FOR CABLING AND CONNECTORS.	
	OUTLET FOR WIRELESS ACCESS POINT (CEILING)	2-GANG BACKBOX FLUSHED INTO CEILING. WHEN MOUNTED IN ACT CEILING PROVIDE TILE BRIDGE FOR SUPPORT. IN AREAS WITHOUT CEILING, BOX SHALL BE SURFACE MOUNTED TO STRUCTURE.	(2) CAT 6 CABLES TO WIRELESS ACCESS PATCH PANEL	TERMINATE AT TWO-PORT SURFACE BOX WITHIN BACKBOX. EQUAL TO SIEMON MX-SM2
	CARD READER	COMBATIBLE SINGLE GANG BOX WITH MUD RING @ 42" AFF WITH 3/4" C. STUBBED ABOVE AN ACCESSIBLE CEILING.	REFER TO SECURITY DETAILS FOR WIRING.	ADDITIONAL DEVICES AND INFRASTRUCTURE REQUIRED AT DOOR. REFER TO SECURITY DETAILS FOR ADDITIONAL REQUIREMENTS.
	VIDEO INTERCOM DOOR STATION	MANUFACTURER RECOMMENDED BACKBOX @ 42" AFF WITH 3/4" C. STUBBED ABOVE AN ACCESSIBLE CEILING.	REFER TO INTERCOM DETAILS FOR WIRING.	REFER TO SECURITY SYSTEM SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
	VIDEO INTERCOM MASTER STATION	MANUFACTURER RECOMMENDED BACKBOX OR DESK STAND WITH 3/4" C. STUBBED ABOVE AN ACCESSIBLE CEILING.	REFER TO INTERCOM DETAILS FOR WIRING.	REFER TO SECURITY SYSTEM SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
	ANALOG WIRELESS CLOCK	SIMPLEX CLOCK-HANGER STYLE RECEPTACLE AS SPECIFIED ON ELECTRICAL DRAWINGS. - MOUNT AT 96" AFF UNLESS OTHERWISE NOTED.	N/A - WIRELESS CLOCK.	REFER TO CLOCK SYSTEM RISER DIAGRAM FOR ADDITIONAL SPECIFICATIONS. *16 OR 12"x16 OR 12" DIAMETER CLOCK. *WG= CLOCK WITH WIREGUARD ACCESSORY.
	PUBLIC ADDRESS SYSTEM SPEAKER WALL MOUNTED	SPECIALTY BACKBOX PURCHASED WITH SPEAKER. PROVIDE WITH 3/4" C. STUBBED ABOVE ACCESSIBLE CEILING. - MOUNT AT 96" AFF UNLESS OTHERWISE NOTED.	REFER TO PUBLIC ADDRESS SYSTEM RISER DIAGRAM FOR DIAGRAM FOR CABLING.	REFER TO PUBLIC ADDRESS SYSTEM RISER DIAGRAM FOR ADDITIONAL SPECIFICATIONS.
	PUBLIC ADDRESS SYSTEM HORN WALL MOUNTED	SINGLE GANG BACKBOX FLUSHED INTO WALL WITH 3/4" C. STUBBED ABOVE ACCESSIBLE CEILING. - MOUNT AT 96" AFF UNLESS OTHERWISE NOTED.	REFER TO PUBLIC ADDRESS SYSTEM RISER DIAGRAM FOR DIAGRAM FOR CABLING.	REFER TO PUBLIC ADDRESS SYSTEM RISER DIAGRAM FOR ADDITIONAL SPECIFICATIONS.
	PUBLIC ADDRESS SYSTEM SPEAKER CEILING MOUNTED	SPECIALTY BACKBOX PURCHASED WITH SPEAKER. WHEN MOUNTED IN ACT CEILING PROVIDE TILE BRIDGE FOR SUPPORT. IN AREAS WITHOUT CEILING, BOX SHALL BE SURFACE MOUNTED TO STRUCTURE.	REFER TO PUBLIC ADDRESS SYSTEM RISER DIAGRAM FOR DIAGRAM FOR CABLING.	REFER TO PUBLIC ADDRESS SYSTEM RISER DIAGRAM FOR ADDITIONAL SPECIFICATIONS.
GENERAL NOTES: 1. ALL CONDUITS SHALL STUB UP TO NEAREST ACCESSIBLE CEILING, UNLESS NOTED OTHERWISE ON PLANS. PROVIDE BUSHINGS FOR ALL CONDUITS. WHERE DEVICES ARE LOCATED BELOW A WINDOW OR STOREFRONT STRUCTURE, CONDUITS SHALL RUN HORIZONTAL TO ACCESSIBLE WALL BEFORE STUBBING UP. 2. COORDINATE EXACT LOCATION OF DEVICES WITH ARCHITECTURAL ELEVATIONS PRIOR TO ROUGH-IN. 3. ALL FINISHES, COLORS AND COVER MATERIALS SHALL BE SELECTED BY ARCHITECT. 4. WHERE BACKBOXES ARE LOCATED IN A FIRE RATED WALL, PROVIDE FIRE RATED PUTTY AROUND BOX. EQUAL TO 3M BARNER MPF-4. 5. DATA CABLING SHALL BE ROUTED TO PATCH PANELS IN I.T. ROOMS INDICATED ON FLOOR PLANS. INDICATED AT SPECIFIC PATCH PANELS INDICATED IN I.T. RACK ELEVATIONS. 6. CONTRACTOR SHALL LABEL EACH DEVICE TERMINATION POINT AND CORRESPONDING PATCH PANEL. PORT WITH THE SAME, UNIQUE LABEL. REFER TO SPECIFICATIONS FOR MORE INFORMATION. ALL LABELS SHALL BE FINISHED WITH AND APPROVED BY OWNERS' I.T. STAFF PRIOR TO INSTALLATION. 7. PROVIDE ALL NECESSARY CONNECTORS, ADAPTERS, KEYSTONES, ATTACHMENTS AND OTHER ACCESSORIES REQUIRED FOR A COMPLETE AND OPERATIONAL SYSTEM. 8. TERMINATE ALL STRUCTURED CABLING CABLES IN RJ45 CONNECTORS UNLESS OTHERWISE NOTED.				

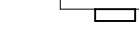
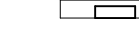
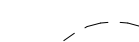
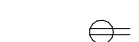
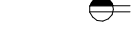
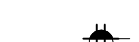
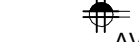
ELECTRICAL GENERAL NOTES
1. BRANCH CIRCUITS AND FEEDER CIRCUITS SHALL BE CONCEALED IN WALLS AND ABOVE CEILINGS WHERE POSSIBLE, INCLUDING HOMERUNS TO PANELBOARDS. BRANCH CIRCUITS AND FEEDERS SHALL NOT BE ROUTED IN OR UNDER SLAB UNLESS SPECIFICALLY INDICATED ON ELECTRICAL FLOOR PLANS OR DETAILS. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS. 2. BRANCH CIRCUITS SHALL BE 2#12,#12G,.34" C. TO NEW 20A/1P CIRCUIT BREAKER IN PANEL INDICATED UNLESS NOTED OTHERWISE. 3. 120V, 1-PHASE, 20A BRANCH CIRCUITS EXCEEDING 150' IN LENGTH SHALL BE 2#10,#10G,.34" C. UNLESS NOTED OTHERWISE. 4. DEVICES SHALL BE LABELED WITH SOURCE PANEL AND CIRCUIT NUMBER(S). 5. REFER TO ARCHITECT'S REFLECTED CEILING PLAN FOR EXACT LOCATION OF CEILING MOUNTED ELECTRICAL DEVICES. REFER TO ARCHITECTURAL ELEVATIONS FOR EXACT LOCATION OF WALL MOUNTED ELECTRICAL DEVICES. 6. PROVIDE FIRE STOPPING AND SMOKE BARRIER SEALING OF PENETRATIONS THROUGH FIRE WALLS OR SMOKE BARRIERS AS REQUIRED. REFER TO ARCHITECTURAL FLOOR PLANS AND CODE SHEETS FOR WALLS. 7. COORDINATE LOCATIONS OF ELECTRICAL DEVICES AND CONTROLS WITH RESPECT TO LOCATIONS OF CASEWORK AND EQUIPMENT PRIOR TO ROUGH-IN. 8. WHEN DEVICES ARE SHOWN ON PLANS OFFSET FROM ONE ANOTHER, DEVICES SHALL BE MOUNTED IN LINE, CENTERED ON WALL. 9. SHARED NEUTRAL WIRING IS NOT ACCEPTABLE, UNLESS NOTED OTHERWISE ON DRAWINGS. PROVIDE A DEDICATED NEUTRAL WIRE FOR EACH CIRCUIT, WHERE APPLICABLE. 10. DRAWINGS ARE DIAGRAMS ONLY. DO NOT SCALE ELECTRICAL DRAWINGS. FIELD CONDITIONS AND ARCHITECTURAL ELEVATIONS SHALL GOVERN EXACT LOCATION AND MOUNTING HEIGHTS OF ELECTRICAL DEVICES AND RACEWAYS. 11. FINISHES AND COLOR OF ELECTRICAL WIRING DEVICES, EXPOSED RACEWAY, LIGHT FIXTURES, AND OTHER ELECTRICAL DEVICES SHALL BE DETERMINED BY THE ARCHITECT. 12. ELECTRICAL WORK SHALL BE SUPPORTED FROM THE BUILDING STRUCTURE (OTHER THAN ROOF DECK). 13. THE ELECTRICAL CONTRACTOR SHALL PERFORM CORES REQUIRED FOR ELECTRICAL WORK. 14. BUILDING WIRE AND CABLE NOT IN RACEWAY SHALL BE PLENUM RATED. 15. PROVIDE SURFACE MOUNTED RACEWAY FOR NEW DEVICES LOCATED ON EXISTING TO REMAIN CMU OR MASONRY WALLS, UNLESS OTHERWISE NOTED. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS REGARDING SURFACE MOUNTED RACEWAY APPLICATIONS AND WIRING METHODS.

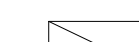
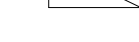
ELECTRICAL POWER NOTES
1. REFER TO DRAWING E0.00 FOR MOTOR/ EQUIPMENT CIRCUIT SCHEDULE. 2. RECEPTACLES LOCATED WITHIN 6' FROM WATER SOURCES SHALL BE GFI TYPE. 3. ELECTRICAL CONTRACTOR SHALL PROVIDE (1) 2" CONDUIT SLEEVE INTO EACH ROOM SHOWN WITH COMMUNICATIONS DEVICES(S). LOCATE ABOVE CEILING WHERE POSSIBLE. 4. 15A AND 20A, 120V AND 250V NON-LOCKING TYPE RECEPTACLES MOUNTED BELOW 5'-6" AFF SHALL BE LISTED TAMPER-RESISTANT TYPE IN ACCORDANCE WITH NEC 408.12.

ELECTRICAL LIGHTING NOTES
1. REFER TO DRAWING E0.00 FOR LIGHTING FIXTURE SCHEDULE. 2. EXIT SIGNS AND EMERGENCY BATTERY UNITS SHALL BE WIRED TO LINE SIDE OF LOCAL LIGHTING BRANCH CIRCUIT, AHEAD OF ALL SWITCHING DEVICES. 3. REFER TO DRAWINGS E0.00 FOR TYPICAL LIGHTING CONTROL WIRING SCHEMATICS.

ELECTRICAL TECHNOLOGY NOTES
1. COORDINATE POWER REQUIREMENTS TO ALL CONTROLLERS AND POWER SUPPLIES WITH THE SYSTEM PROVIDER AND THE ELECTRICAL SERIES DRAWINGS. 2. COORDINATE POWER REQUIREMENTS, RECOMMENDED WIRE SIZES AND EXACT POINTS OF CONNECTION FOR ELECTRIC LOCKING HARDWARE PROVIDED BY DIVISION 18 CONTRACTOR PRIOR TO INSTALLATION. COORDINATE WITH DOOR HARDWARE SCHEDULES AND SPECIFICATIONS. 3. REFER TO ARCHITECT'S REFLECTED CEILING PLAN FOR EXACT LOCATIONS OF CEILING MOUNTED DEVICES. COORDINATE ALL WALL MOUNTED DEVICE LOCATIONS WITH THE ARCHITECT PRIOR TO ROUGH-IN. 4. REFER TO DETAILS ON DRAWING E0.00 FOR ACCESS CONTROLLED DOOR REQUIREMENTS. 5. PRIOR TO ROUGH-IN, COORDINATE ALL TELECOMMUNICATIONS DEVICE BACKBOX LOCATIONS WITH OWNER-PROVIDED PROJECTION AND VISUAL DISPLAY EQUIPMENT. 6. DEVICES SHOWN ON THESE DRAWINGS SHALL BE COORDINATED WITH DIVISION 28 SPECIFICATIONS FOR PROVISIONS OF RELATED INFRASTRUCTURE INCLUDING BUT NOT LIMITED TO: HANGERS, SUPPORTS, CONDUITS, BACKBOXES AND OTHER RACEWAYS. 7. INSTALLATION OF TELECOMMUNICATIONS CONDUITS, RACEWAY AND BENDS SHALL MEET TIA RECOMMENDED INSTALLATION METHODS AND GUIDELINES. CONDUIT BENDS SHALL BE PROVIDED WITH SMOOTH SWEEPS AND BEND RADII TO MEET MANUFACTURER RECOMMENDED TOLERANCES FOR EACH CABLE THAT WITH BE ROUTED WITHIN. 8. A MINIMUM OF 30X10 FEET OF SLACK SHALL BE PROVIDED FOR EACH HORIZONTAL CABLE DROP AT WORK AREA OUTLETS, COILED AND SECURED ABOVE ACCESSIBLE CEILING. IN AREAS WITHOUT AN ACCESSIBLE CEILING, PROVIDE CABLING COILED TIGHT TO STRUCTURE ABOVE. 9. PROVIDE CALIBRATION, OPTIMIZATION, PROGRAMMING AND FINAL ADJUSTMENTS FOR SECURITY DEVICES SPECIFIED HEREIN. 10. EXPOSED TELECOMMUNICATIONS AND SECURITY CABLING SHALL BE ROUTED IN CONDUIT, ADHERING TO DIVISION 28 SPECIFICATIONS.

FIRE ALARM LEGEND	
SYMBOL	DESCRIPTION
EQUIPMENT	
	EMERGENCY 2-WAY COMMUNICATION SYSTEM AREA CALL STATION. REFER TO 2-WAY COMMUNICATION SYSTEM WIRING DIAGRAM FOR ADDITIONAL INFORMATION.
	EMERGENCY 2-WAY COMMUNICATION SYSTEM MASTER STATION. REFER TO 2-WAY COMMUNICATION SYSTEM WIRING DIAGRAM FOR ADDITIONAL INFORMATION.
	FIRE ALARM REMOTE ANNUNCIATOR PANEL.
INITIATING DEVICES	
	CEILING MOUNTED SMOKE DETECTOR
	CEILING MOUNTED SMOKE DETECTOR WIRED TO ELEVATOR RECALL SYSTEM
NOTIFICATION	
	WALL MOUNTED STROBE ONLY UNIT WITH A MULTI-CANDELA STROBE. MOUNT AT 6'-8" AFF. WG= PROVIDE WITH WIREGUARD. *XX=CANDELA RATING
	WALL MOUNTED STROBE ONLY UNIT WITH A MULTI-CANDELA STROBE. MOUNT AT 6'-8" AFF. WG= PROVIDE WITH WIREGUARD. *XX=CANDELA RATING
INTERFACE MODULES	
	FIRE ALARM CONTROL MODULE

ELECTRICAL SYMBOLS	
SYMBOL	DESCRIPTION
	SURFACE MOUNTED PANELBOARD
	RECESSED PANELBOARD
	DISCONNECT SWITCH
	FUSED DISCONNECT SWITCH
	MOTOR (REFER TO MOTOR CIRCUIT SCHEDULE FOR POWER REQUIREMENTS)
	BRANCH CIRCUIT WIRING, CONCEALED IN WALLS OR CEILINGS
	HOMERUN TO PANELBOARD
	SWITCHED BRANCH CIRCUIT WIRING
	JUNCTION BOX
	DUPLEX WALL MOUNTED RECEPTACLE, 18" AFF UNLESS OTHERWISE NOTED
	DUPLEX WALL MOUNTED RECEPTACLE, HALF SWITCHED
	DOUBLE DUPLEX WALL MOUNTED RECEPTACLE, HALF SWITCHED
	DOUBLE DUPLEX WALL MOUNTED RECEPTACLE, MOUNT IN SAME BOX AS ADJACENT AUDIO VIDEO DEVICE SHOWN ON PLANS
	DOUBLE DUPLEX WALL MOUNTED RECEPTACLE, MOUNT IN SAME BOX AS ADJACENT AUDIO VIDEO DEVICE SHOWN ON PLANS
	DOUBLE DUPLEX WALL MOUNTED RECEPTACLE, 18" AFF UNLESS OTHERWISE NOTED
	RECEPTACLE, MOUNT 6" ABOVE COUNTER OR CASEWORK
	RECEPTACLE WITH GROUND FAULT CIRCUIT INTERRUPTION
	EMERGENCY CALL TOGGLE SWITCH
	EMERGENCY CALL FOR AID COMBINATION BUZZER / LIGHT. REFER TO CALL-FOR-AID WIRING SCHEMATIC FOR MORE INFORMATION.
	JUNCTION BOX FOR PLUMBING FIXTURE TRANSFORMER. REFER TO PLUMBING FIXTURE WIRING DETAIL FOR ADDITIONAL INFORMATION.
	PLUG LOAD CONTROLLER FOR AUTOMATIC RECEPTACLE SHUTOFF. TIED INTO LIGHTING CONTROL SYSTEM. REFER TO LIGHTING CONTROL DETAILS FOR ADDITIONAL INFORMATION. CONTROLLED RECEPTACLES ARE INDICATED WITH SWITCHED WIRING ON PLANS.
	PUSH PLATE FOR ADA DOOR OPENER
	PUSH BUTTON FOR DOOR RELEASE

LIGHTING SYMBOLS	
SYMBOL	DESCRIPTION
	RECESSED LIGHTING FIXTURE
	RECESSED EMERGENCY LIGHTING FIXTURE
	RECESSED DOWNLIGHT FIXTURE
	RECESSED DOWNLIGHT EMERGENCY FIXTURE
	WALL MOUNTED LIGHTING FIXTURE
	WALL MOUNTED EMERGENCY LIGHTING FIXTURE
	CEILING MOUNTED EXIT SIGN
	POWER PACK FOR NORMAL POWER LOW VOLTAGE CONTROLS. REFER TO LIGHTING CONTROL DETAILS FOR ADDITIONAL INFORMATION.

LIGHTING FIXTURE TAGS	
	UPPER CASE LETTER = FIXTURE TYPE, REFER TO LIGHTING FIXTURE SCHEDULE LOWER CASE LETTER = SWITCH CONTROL
NOTES: 1. FIXTURE CONTROL DESIGNATION REFERS TO ZONE/SWITCH/RELAY CONTROL OF FIXTURES CONTROLLED BY COMMON: A. SWITCH FOR LIGHTING IN ROOM, CORRIDOR, OPEN AREA. B. ZONE RELAY IN LOCAL LIGHTING CONTROL PANEL OR LIGHTING CONTROL RELAY PANEL. C. ALL CONTROL DEVICES (SWITCHES, CONTROL PANELS, OCCUPANCY/VACANCY SENSORS, ETC) WITH CONTROL DESIGNATIONS REFERS TO COMMON CONTROL OF THE SAME ZONE/SWITCH/RELAY CONTROL. 2. WHERE CONTROL DESIGNATION IS NOT SHOWN, ALL FIXTURES IN ASSOCIATED ROOM OR SPACE SHALL BE CONTROLLED SIMULTANEOUSLY VIA THE CONTROL DEVICES INDICATED ON PLANS. 3. WHERE EMERGENCY AND NORMAL FIXTURES ARE CONTROLLED FROM THE SAME ZONE/SWITCH/CONTROL RELAY, UL 924 EMERGENCY BYPASS RELAYS SHOWN WITH SAME CONTROL DESIGNATION BYPASS THAT ZONE/SWITCH/CONTROL RELAY. REFER TO EMERGENCY LIGHTING CIRCUIT SCHEMATICS FOR ADDITIONAL WIRING INFORMATION. 4. UNSWITCHED LIGHTING BRANCH CIRCUIT WIRING IS SHOWN TO A SINGLE FIXTURE IN EACH COMMON CONTROL ZONE. UNLESS OTHERWISE INDICATED, PROVIDE 2#12,#12G,.34" C FOR SWITCHED WIRING TO ALL COMMON CONTROL FIXTURES. 5. PROVIDE LOW VOLTAGE DIMMING CONTROL WIRING AS INDICATED IN LIGHTING CONTROL DETAIL FOR DIMMABLE LIGHT FIXTURES IN COMMON CONTROL ZONES/SWITCHES/RELAY CONTROL. 6. REFER TO LIGHTING CONTROL DETAILS FOR ADDITIONAL WIRING AND CONTROL INFORMATION. 7. REFER TO LIGHTING CONTROL RELAY PANEL SCHEDULES WHERE APPLICABLE FOR ADDITIONAL CONTROL INFORMATION.	

LIGHTING SWITCH AND SENSOR TAGS	
	WALL MOUNTED SWITCH SWITCH CONTROL GROUP SWITCH TYPE: BLANK - LINE VOLTAGE SINGLE POLE TOGGLE SWITCH LV - LOW VOLTAGE MOMENTARY PUSHBUTTON FOR USE WITH CEILING SENSORS. REFER TO LIGHTING CONTROL DETAILS FOR ADDITIONAL INFORMATION. LVD - LOW VOLTAGE DIMMER FOR USE WITH CEILING SENSORS. REFER TO LIGHTING CONTROL DETAILS FOR ADDITIONAL INFORMATION. CEILING MOUNTED OCCUPANCY SENSOR (OS), VACANCY SENSOR (VS) SWITCH CONTROL GROUP SENSOR TYPE: BLANK - DUAL SENSOR
NOTES: 1. FIXTURE(S) SHALL BE CONTROLLED BY SWITCH OR RELAY LOCATED IN THE ROOM UNLESS OTHERWISE NOTED ON PLAN. 2. REFER TO LIGHTING CONTROL DETAILS FOR ADDITIONAL INFORMATION ON WIRING AND SWITCHING. 3. WALL MOUNTED SWITCHES SHALL BE MOUNTED AT 42" AFF UNLESS OTHERWISE NOTED. COORDINATE WITH ARCHITECT. 4. SET ALL OCCUPANCY TYPE SENSORS TO AUTO-ON, AUTO-OFF MODE. SET ALL VACANCY TYPE SENSORS TO MANUAL-ON, AUTO-OFF MODE. 5. REFER TO CONTROL SCHEME NOTES AND CONTROL SCHEDULE FOR ADDITIONAL INFORMATION. 6. REFER TO SYMBOL LIST FOR ADDITIONAL LIGHTING CONTROL DEVICES. 7. WHERE SWITCHES ARE NOT TAGGED WITH CONTROL LETTER ON PLANS, ALL FIXTURES IN ASSOCIATED ROOM SHALL BE CONTROLLED SIMULTANEOUSLY VIA CONTROLS SPECIFIED.	

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CERTIFICATION

CONSULTANT:

[illegible]

JULIAN CURTISS SCHOOL
PHASED RENOVATIONS
GREENWICH PUBLIC SCHOOLS
108 EAST ELM STREET
GREENWICH, CONNECTICUT 06830

DRAWING TO

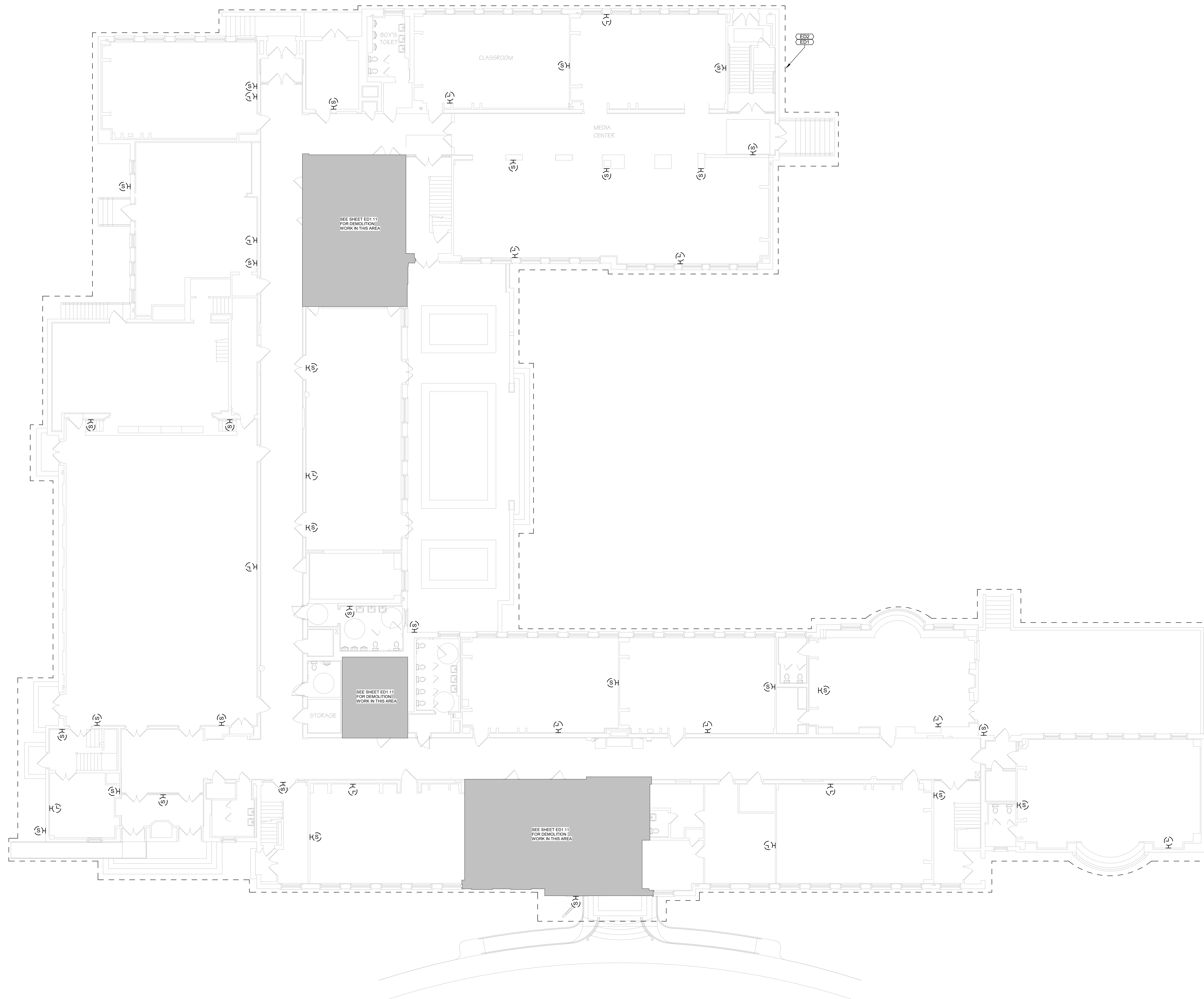
ELECTRICAL
DEMOLITION
FLOOR PLAN

SCALE: 1" = 10'-0"	DRAWN BY: RNM	REVIEWED BY: VCM
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ED1.01

DATE:	JOB NUMBER:
7/17/2024	23015

KEYNOTES - ELECTRICAL DEMOLITION	
Key Value	Keynote Text
ED1	REMOVE THE EXISTING PUBLIC ADDRESS SYSTEM IN ITS ENTIRETY. REMOVAL SHALL INCLUDE DEVICES, CALL-BACK STATIONS, BOXES, MOUNTING BRACKETS, HEADEND EQUIPMENT, WIRING, AND RACEWAYS BACK TO POINT OF ORIGIN.
ED2	REMOVE EXISTING CLOCKS IN ALL AREAS OF THE BUILDING.



1 ELECTRICAL DEMOLITION OVERALL FIRST FLOOR
1" = 10'-0"

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CERTIFICATION:

CONSULTANT:



REVISIONS:

[illegible]

DRAWING TITLE:

ELECTRICAL
DEMOLITION
FLOOR PLAN

SCALE: 1/4" = 1'-0"	DRAWN BY: RNM	REVIEWED BY: VCM
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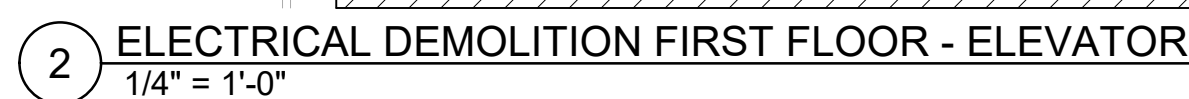
DRAWING NO.

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ED1.10

DATE:	JOB NUMBER:
7/17/2024	23015

KEYNOTES - ELECTRICAL DEMOLITION	
Key Value	Keynote Text
ED1	REMOVE THE EXISTING PUBLIC ADDRESS SYSTEM IN ITS ENTIRETY. REMOVAL SHALL INCLUDE DEVICES, CALL-BACK STATIONS, BOXES, MOUNTING BRACKETS, HEADEND EQUIPMENT, WIRING, AND RACEWAYS BACK TO POINT OF ORIGIN.
ED2	REMOVE EXISTING CLOCKS IN ALL AREAS OF THE BUILDING.



KEYNOTES - ELECTRICAL DEMOLITION	
Key Value	Keynote Text
E01	REMOVE THE EXISTING PUBLIC ADDRESS SYSTEM (P.A.S) ENTIRELY. REMOVAL SHALL INCLUDE DEVICES, CALL BACK STATIONS, BOXES, MOUNTING BRACKETS, HEADEND EQUIPMENT, WIRING, AND RACEWAYS BACK TO POINT OF ORIGIN.
E03	UNLESS OTHERWISE NOTED, THE EXISTING ELECTRICAL SYSTEM IS EXISTING TO REMAIN (ETR) WITHIN THIS BOUNDARY IN ITS ENTIRETY, INCLUDED BUT NOT LIMITED TO ALL LIGHTING FIXTURES, LIGHTING CONTROLS, POWERDATA RECEPTABLES, AND ELECTRICAL CONNECTIONS TO EQUIPMENT. BRANCH CIRCUITS AND OVERCURRENT DEVICES (O.C.D.) SHALL BE REMOVED AS SHOWN IN THE SOURCE. POWER AND LIGHTING CIRCUIT DIRECTORY, EXISTING DEVICES MARKED EXISTING TO REMAIN (ETR) AND DEVICES OUTSIDE THE EXISTING DEMOLITION BOUNDARY SHALL HAVE A "D" MARKED ON THE DEVICE. ALL ELECTRICAL DEMOLITIONS NOTED ON SHEET E06. FIRE ALARM DEVICES TAGGED TO BE REUSED SHALL BE PROTECTED AND STORED FOR FUTURE USE.

DATE: 7/17/2024	JOB NUMBER: 23015
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KEY PLAN

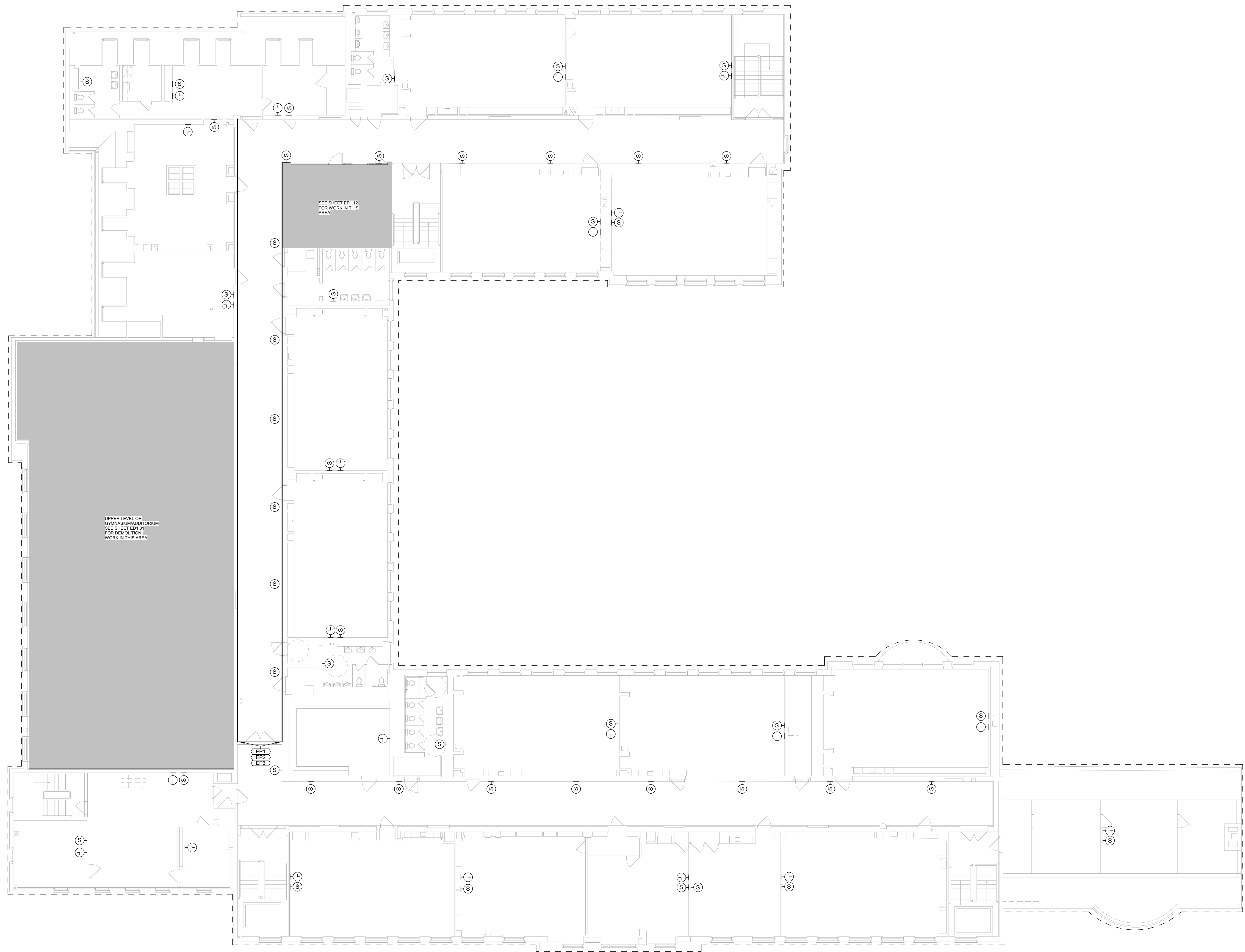
SCALE: 1/64" = 1'-0"



DATE:	JOB NUMBER:
7/17/2024	23015

1 ELECTRICAL POWER OVERALL FIRST FLOOR
1" = 10'-0"

KEYNOTES - ELECTRICAL POWER	
Key Value	Keynote Text
EP1	WIREDMOLD RUN IS SINGLE RUN EXCEPT ONLY. TYPICAL FOR ALL CORRIDORS. PROVIDE RUNS ON BOTH SIDES OF CORRIDOR IF A SINGLE RUN REFERENCE ONLY.
EP2	PROVIDE WIREMOLD 2400-SERIES ACROSS TYPICAL CORRIDORS TO SUPPORT HIGH DENSITY CABLEING RUNS. ALL WIREMOLD TIGHT TO CEILING. PROVIDE ALL COMPATIBLE ELBOWS, JOIN SECTIONS AND ADAPTER FOR COMPLETE INSTALLATION.
EP3	PROVIDE WIREMOLD 1700 FOR AREAS WITH LOWER CABLE DENSITY RUNS (I.E. OFFICES AND CLASSROOMS). COORDINATE INSTALLATION WITH EXISTING ELECTRICAL SYSTEMS, PROVIDE ALL COMPATIBLE ELBOWS, JOIN SECTIONS AND ADAPTER FOR COMPLETE INSTALLATION. FINISHES TO BE SELECTED BY ARCHITECT.



JULIAN CURTISS SCHOOL
PHASED RENOVATIONS
GREENWICH PUBLIC SCHOOLS
108 EAST ELM STREET
GREENWICH, CONNECTICUT 06830

DRAWING TITLE: ELECTRICAL OVERALL FLOOR PLAN		
SCALE: 1" = 10'-0"	DRAWN BY: RNM	REVIEWED BY: VCM
DRAWING NO. EP1.02		
DATE: 7/17/2024	JOB NUMBER: 23015	

JULIAN CURTISS SCHOOL
PHASED RENOVATIONS
GREENWICH PUBLIC SCHOOLS
108 EAST ELM STREET
GREENWICH, CONNECTICUT 06830

DRAWING TITLE:

ELECTRICAL
POWER FLOOR
PLAN

SCALE: 1/4" = 1'-0"	DRAWN BY: RNM	REVIEWED BY: VCM
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DRAWING NO.

EP1.10

DATE:	JOB NUMBER:
7/17/2024	23015

1 ELECTRICAL POWER BASEMENT - NORHTEAST SIDE
1/4" = 1'-0"

2 ELECTRICAL POWER BASEMENT - NEW
1/4" = 1'-0"

KEYNOTES - ELECTRICAL POWER	
Key Value	Keynote Text
EP6	EXISTING TO REMAIN (ETR) SMOKE DETECTOR. SMOKE DETECTOR SHALL BE REPROGRAMMED FOR ELEVATOR RECALL OPERATION.
EP7	SPECIALTY SWITCH PER ELEVATOR DISCONNECT SWITCH DETAIL. MAKE ALL FINAL CONNECTIONS TO ELEVATOR CONTROLLER FROM SWITCH. REFER TO DETAIL 3/E5.01 FOR ADDITIONAL INFORMATION.

DATE:	JOB NUMBER:
7/17/2024	23015



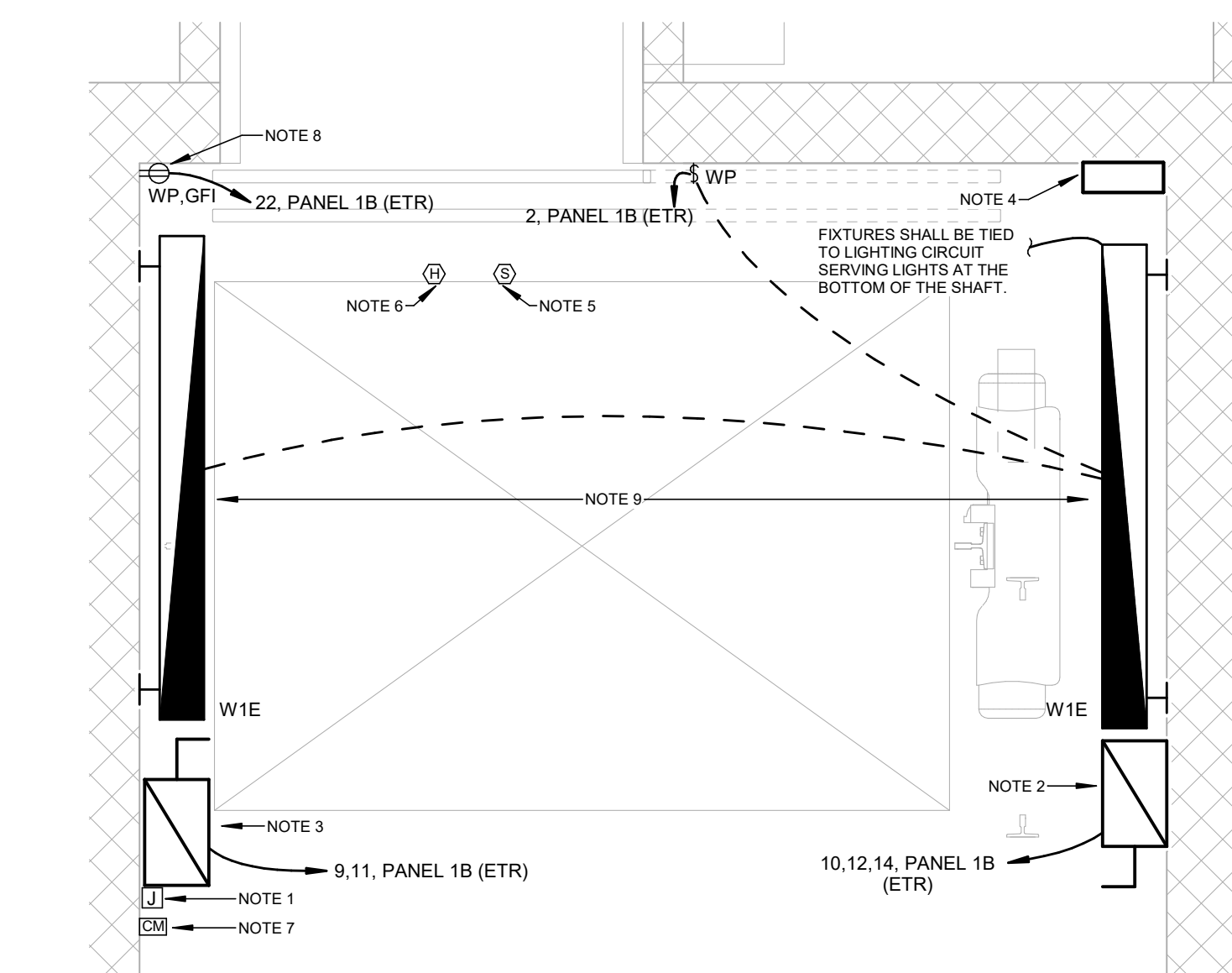
KEY
PLAN

SCALE: 1/64" =
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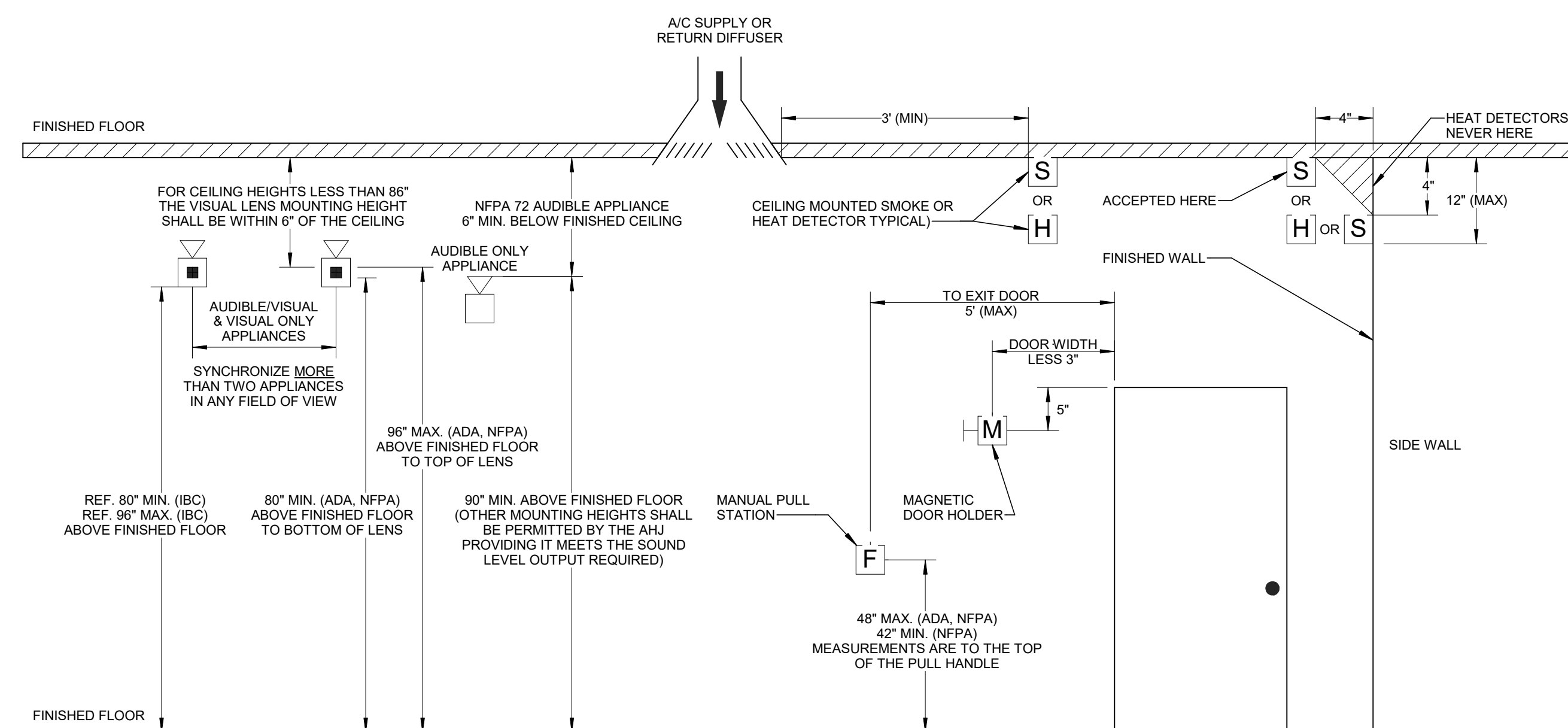
JULIAN CURTISS SCHOOL
PHASED RENOVATIONS
GREENWICH PUBLIC SCHOOLS
108 EAST ELM STREET
GREENWICH, CONNECTICUT 06830



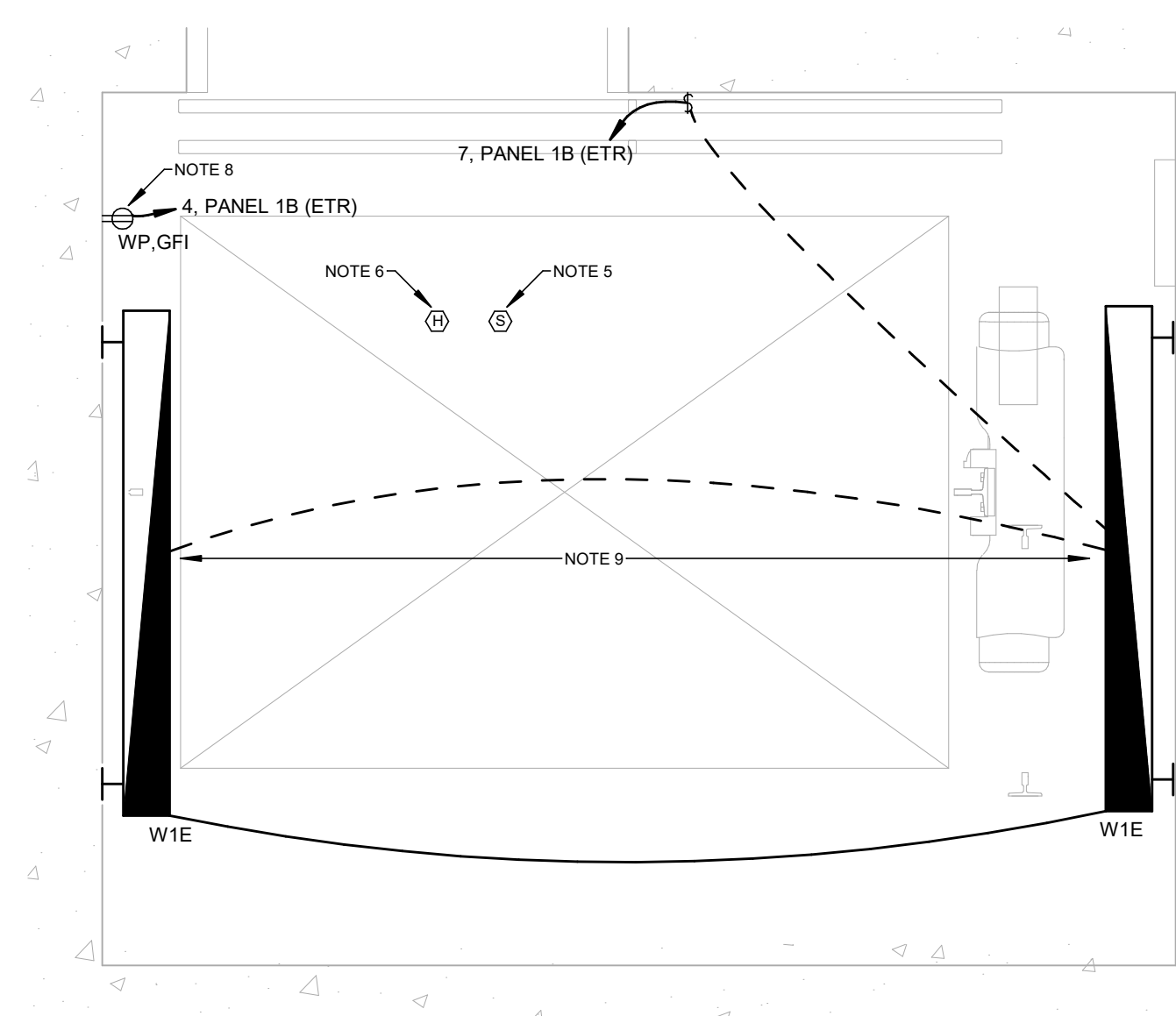
1 ELEVATOR - TOP OF SHAFT - PART PLAN
3/4" = 1'-0"

MACHINE ROOMLESS ELEVATOR NOTES:

1. PROVIDE WITH 3/4"C. WITH (2) POTS PHONE LINES TO LOCAL I.T. ROOM FOR ELEVATOR COMMUNICATIONS. PROVIDE FINAL CONNECTIONS TO ELEVATOR CONTROLLER. COORDINATE EXACT POINT OF CONNECTION WITH ELEVATOR CONTRACTOR.
2. ELEVATOR MAIN POWER FEED. PROVIDE WIRING AND 3#8+1#10G, 1"C. PROVIDE POWER FROM SPECIALTY SHUNT TRIP ELEVATOR DISCONNECT SWITCH IN ROOM SPECIFIED ON PLANS TO A SECOND DISCONNECT SWITCH LOCATED IN ELEVATOR SHAFT - IN A LOCATION APPROVED BY BOTH AHJ AND ELEVATOR INSTALLER. THE DISCONNECT SWITCH WITHIN SHAFT SHALL BE THE SAME AMPERAGE AS THE SPECIALTY SHUNT-TRIP DISCONNECT SWITCH, AND NON-FUSED. PROVIDE FINAL CONNECTIONS FROM THE DISCONNECT SWITCH TO THE ELEVATOR CONTROLLER. EXACT LOCATION SHALL BE COORDINATED WITH ELEVATOR INSTALLER.
3. ELEVATOR CAB LIGHTING CIRCUIT. PROVIDE 2#12+1#12G, 3/4"C. FROM INDICATED CIRCUIT TO A 30A/2P DISCONNECT SWITCH, FUSED AT 20A LOCATED IN THE ELEVATOR SHAFT - IN A LOCATION APPROVED BY THE ELEVATOR CONTROLLER, EXACT LOCATION SHALL BE COORDINATED WITH THE ELEVATOR INSTALLER.
4. ELEVATOR CONTROLLER LOCATED AT THE TOP OF SHAFT. CONTROLLER PROVIDED WITH CONDUIT ENTRY PROVISIONS, COMMUNICATIONS AND CODE REQUIRED TERMINATIONS WITH ELEVATOR INSTALLER.
5. SMOKE DETECTOR TO COMMUNICATE WITH ELEVATOR RECALL FUNCTIONALITY - PER FIRE ALARM RISER DIAGRAM.
6. HEAT DETECTED (COMBINATION FIXED TEMPERATURE/RATE OF RISE STYLE), TO COMMUNICATE WITH ELEVATOR SHUNT-TRIP DISCONNECT SWITCH - PER FIRE ALARM RISER DIAGRAM.
7. FIRE ALARM CONTROL MODULES TO COMMUNICATE WITH ELEVATOR CONTROLLER. PROVIDE QUANTITY AS REQUIRED BY ELEVATOR MANUFACTURER. PROVIDE FINAL CONNECTIONS TO CONTROLLER.
8. PROVIDE WEATHERPROOF, GFCI-TYPE DUPLEX RECEPTACLE. COORDINATE LOCATION WITH ELEVATOR INSTALLER.
9. PROVIDE LIGHT FIXTURES AS SPECIFIED PER LIGHTING FIXTURE SCHEDULE. INSTALL LIGHT FIXTURES IN ELEVATOR PIT AND TOP OF SHAFT AT LOCATIONS COORDINATED WITH THE ELEVATOR INSTALLER AND INSPECTOR. AS REQUIRED TO FINAL INSTALLATION OF THESE LIGHT FIXTURES TO ENSURE REQUIRED ILLUMINATION LEVELS ARE BEING ACHIEVED. COORDINATE LIGHT FIXTURE LOCATION WITH THE ELEVATOR EQUIPMENT AND ALL ASSOCIATED APPURTENANCES.



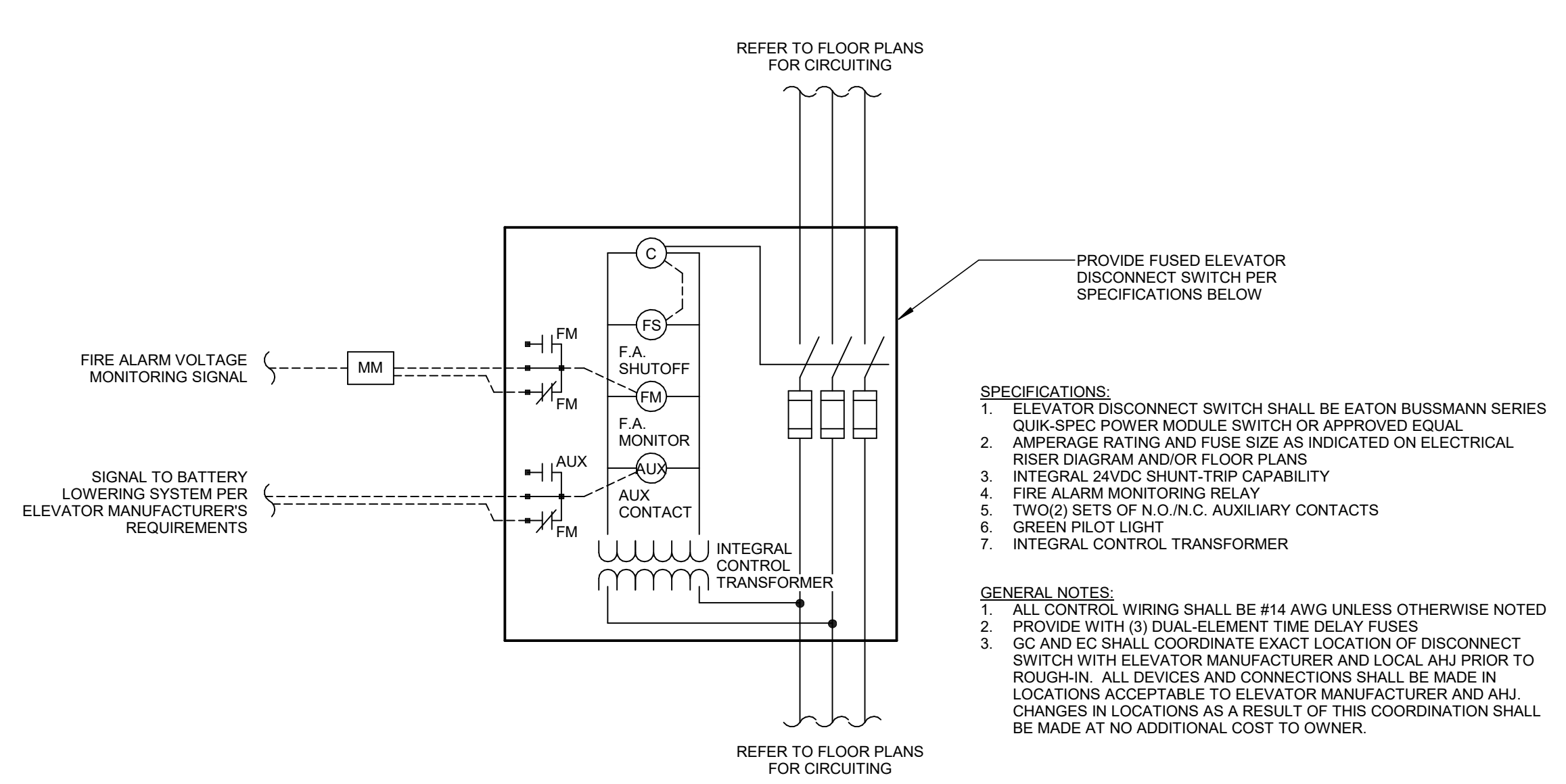
4 FIRE ALARM DEVICE MOUNTING HEIGHT REFERENCE DETAIL
N.T.S.



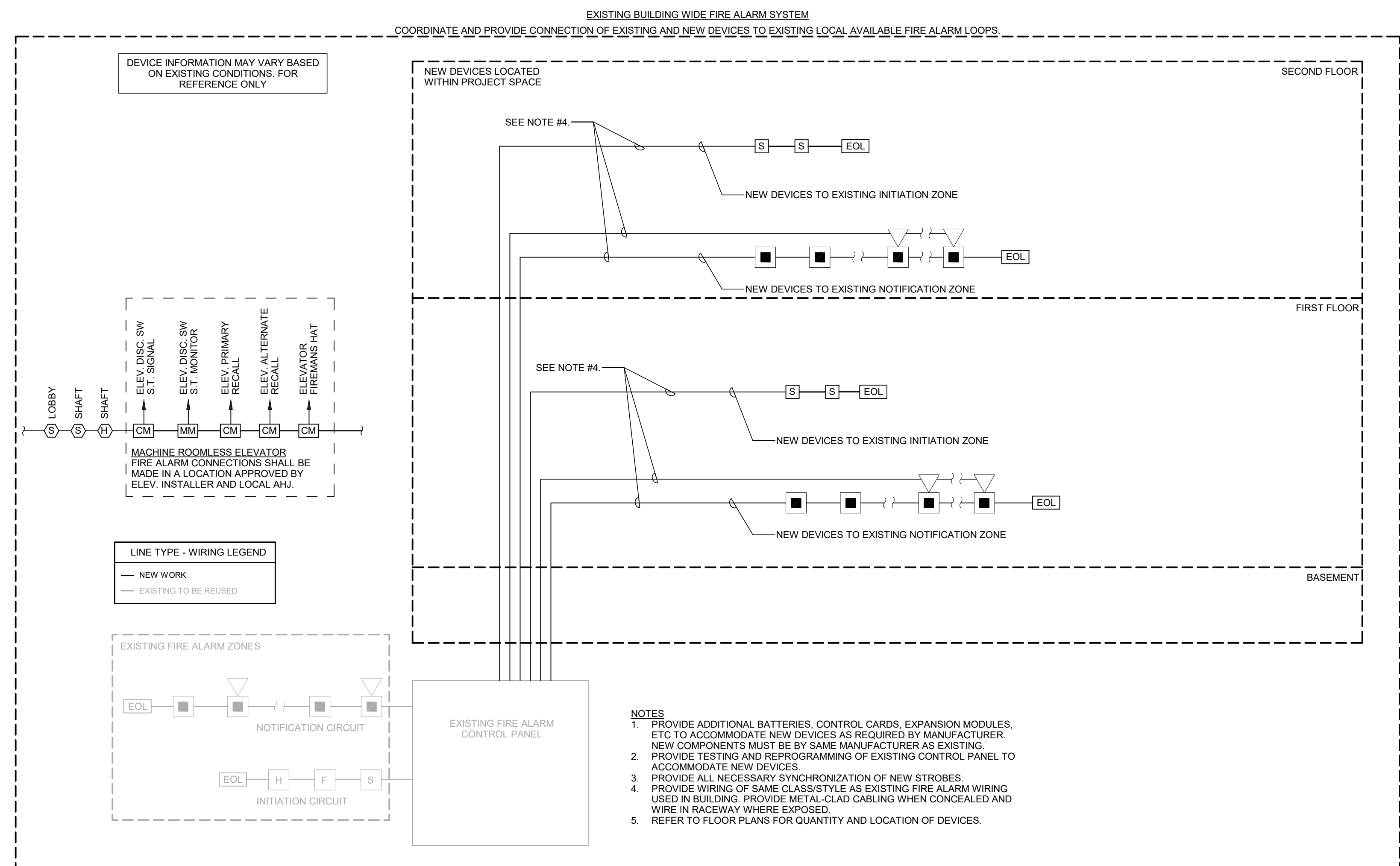
2 ELEVATOR PIT - BASEMENT LEVEL - PART PLAN
3/4" = 1'-0"

ELEVATOR PIT NOTES:

1. REFER TO FIRE ALARM RISER AND SPECS FOR HEAT AND SMOKE DETECTOR REQUIREMENTS.
2. COORDINATE LOCATION OF ALL DEVICES WITH ELEVATOR VENDOR.
3. MOUNT HEAT DETECTORS NEXT TO SMOKE DETECTORS.
4. SMOKE DETECTORS ARE REQUIRED TO BE INSTALLED NEXT TO THE SHUNT TRIP HEAT DETECTOR SO THE RECALL WILL TRIGGER BEFORE POWER TO THE ELEVATOR IS LOST.
5. TYPE "W1E" FIXTURES IN THE ELEVATOR PITs SHALL BE PROVIDED WITH EMERGENCY BATTERY PACK, OPTION "EM7."



3 ELEVATOR DISCONNECT SWITCH DETAIL
N.T.S.



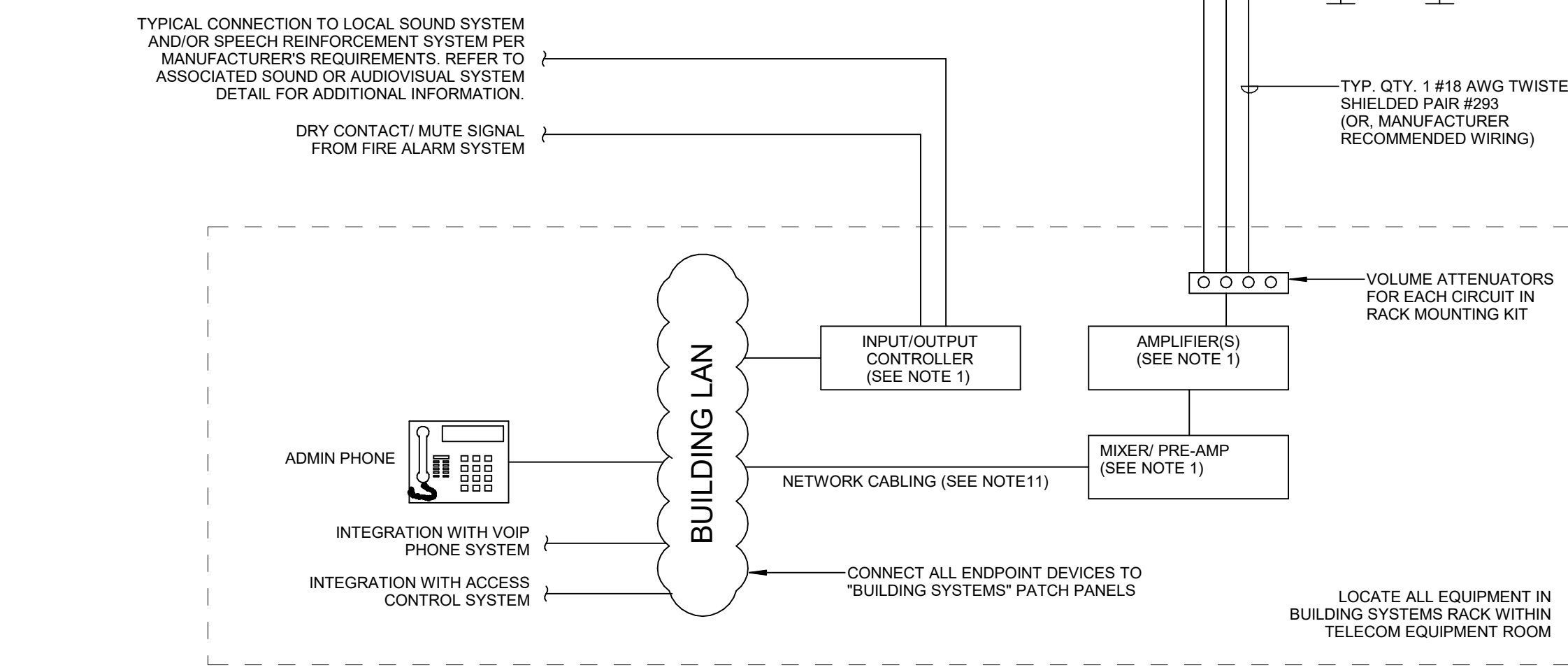
5 FIRE ALARM RISER - CONNECT TO EXISTING
N.T.S.

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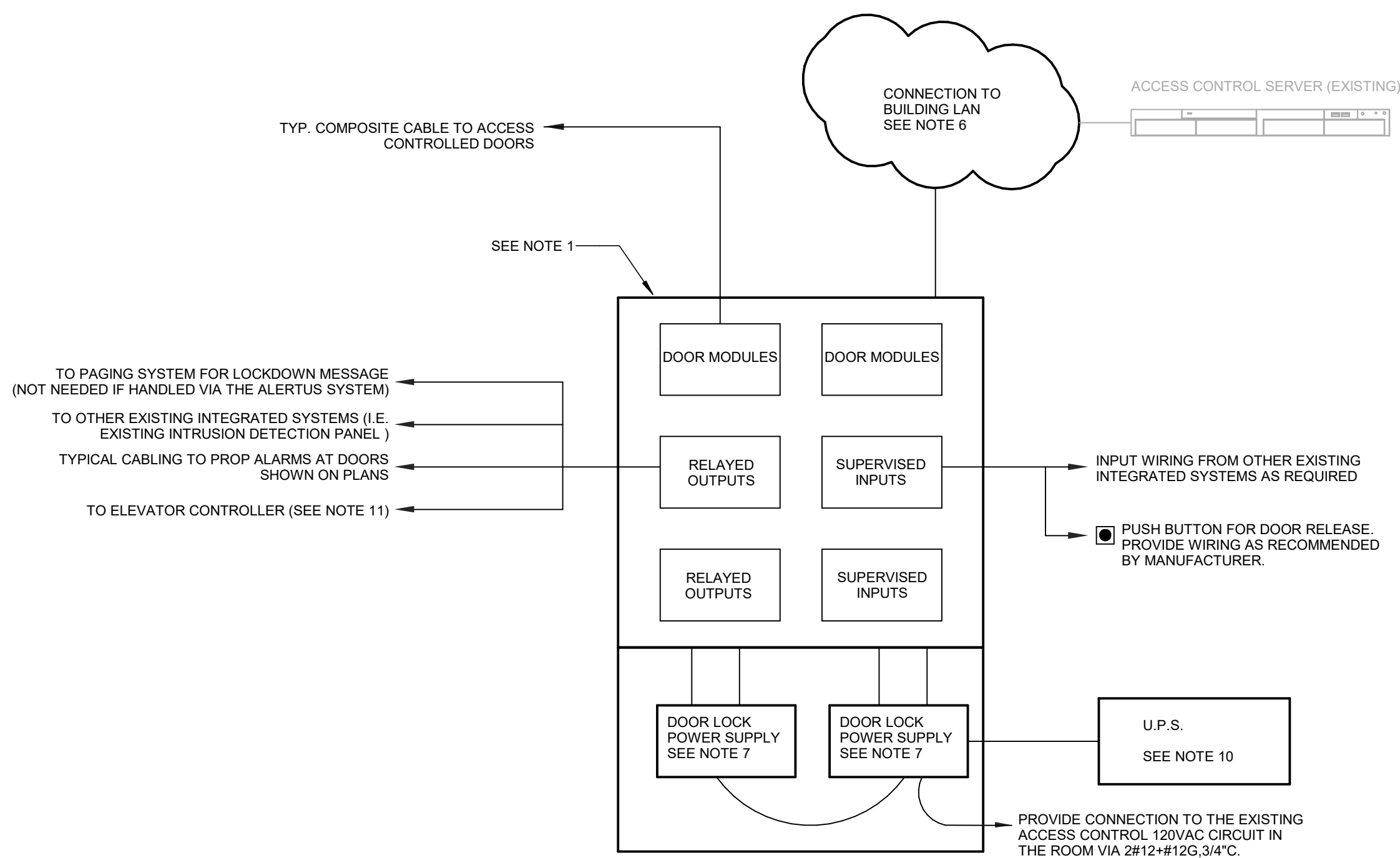
JULIAN CURTISS SCHOOL
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DATE	JOB NUMBER
7/17/2024	23015

- NOTES:
1. PROVIDE REQUIRED QUANTITY OF AMPLIFIERS, BRIDGES, I/O CONTROLLERS, AND POWER SUPPLIES TO SUPPORT ALL SPEAKERS CONNECTED TO SYSTEM. BASIS OF DESIGN: **BOGEN E7000**
 2. PROVIDE PROGRAMMING, LICENSING, AND SETUP OF **NYQUIST E7000** APPLICATION SOFTWARE.
 3. PROVIDE WITH A BOGEN E7000 ADMIN TELEPHONE - **NO-T1100**, OR APPROVED SIMILAR.
 4. PROVIDE SPEAKER TYPES AS FOLLOWS:
 - A. INTERIOR WALL MOUNTED: **WBS87725V**
 - B. INTERIOR CEILING MOUNTED: **CS02X2VRU**
 - C. EXTERIOR HORN: **AH15A** (INCLUDE 24VDC POWER SUPPLIES)
 5. PROVIDE THE FOLLOWING ZONING CONFIGURATION:
 - A. ZONE 1: CORRIDORS & CLASSROOMS
 - B. ZONE 2: LIBRARY
 - C. ZONE 3: GYM
 - D. ZONE 4: CAFETERIA
 - E. ZONE 5: EXTERIOR
 - F. ZONE 6: OFFICES AND ADMINISTRATIVE AREAS
 6. ALL WIRE NUMBERS SPECIFIED ARE WEST PENN UNLESS OTHERWISE NOTED. WIRING INDICATED ON THE RISER DIAGRAM IS DIAGRAMMATIC ONLY AND IS NOT INTENDED TO INDICATE ROUTING OR QUANTITIES OF WIRES REQUIRED. PROVIDE ALL WIRING AND INTERCONNECTION FOR A COMPLETE SYSTEM PER MANUFACTURER'S REQUIREMENTS.
 7. REFER TO FLOOR PLANS FOR QUANTITIES AND LOCATIONS OF DEVICES.
 8. PROVIDE QUANTITY OF POWER SUPPLIES AND CABLING REQUIRED FOR A COMPLETE, AMPLIFIED PAGING SYSTEM. ALL POWER SUPPLIES SHALL BE LOCATED IN THE HEAD-END RACK.
 9. REFER TO SPECIFICATIONS FOR TYPES OF SPEAKERS TO BE INSTALLED IN SPECIFIC AREAS OF THE BUILDING.
 10. PROVIDE CONNECTIONS TO OWNER-PROVIDED VOIP PHONE SYSTEM TO ALLOW FOR PAGING VIA THE PHONE HANDSETS THROUGHOUT THE BUILDING.
 11. PROVIDE CONNECTION TO EXISTING LOCAL SYSTEMS IN THE BUILDING.
 12. DURING FIRE ALARM, ALL P.A. SYSTEM SPEAKERS SHALL BE MUTED.
 13. PROVIDE REQUIRED NETWORK CONNECTIONS TO SUPPORT ALL PA SYSTEM EQUIPMENT VIA CAT6 CABLING TO EXISTING TELECOMMUNICATION EQUIPMENT LOCATED IN THE MDF. COORDINATE CONNECTION TO THE EXISTING NETWORK EQUIPMENT WITH THE OWNER'S IT REPRESENTATIVE.
 14. ALL SPEAKER CABLING SHALL BE ROUTED VIA WIREMOLD.
 15. SPEAKERS LOCATED IN THE GYM SHALL BE PROVIDED WITH A COMPATIBLE WIREGUARD.

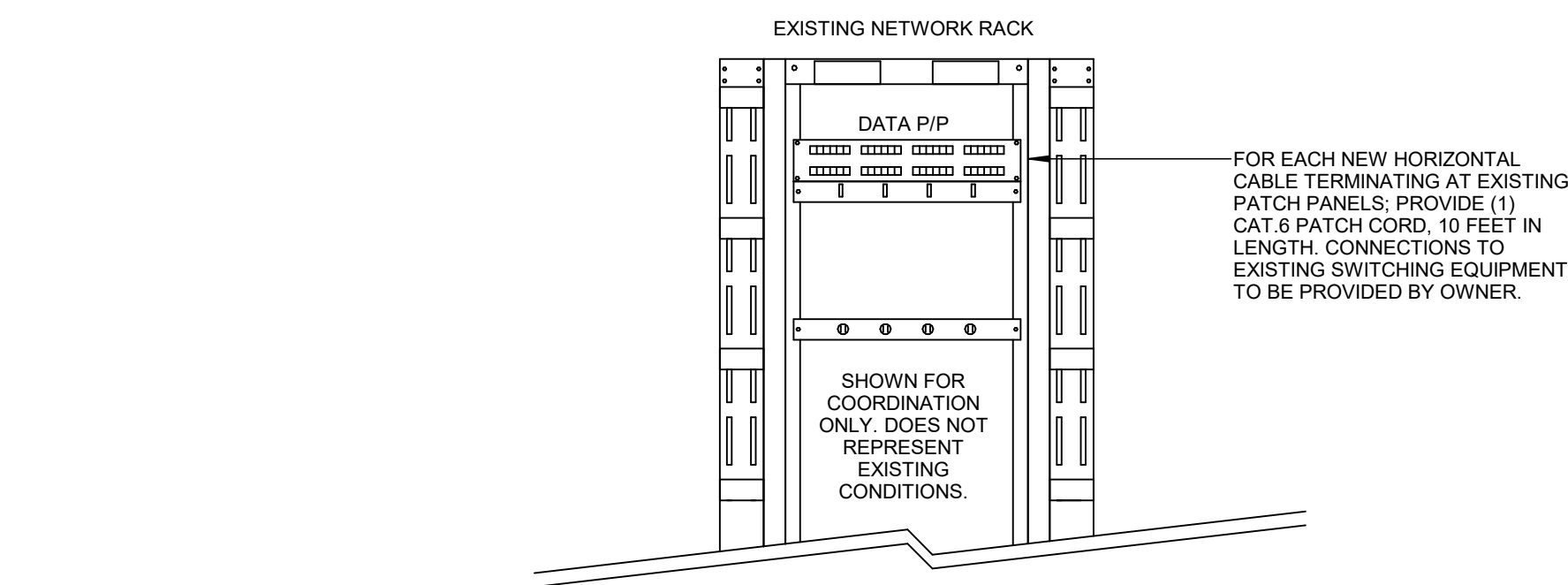


1 PUBLIC ADDRESS SYSTEM RISER DIAGRAM
NTS

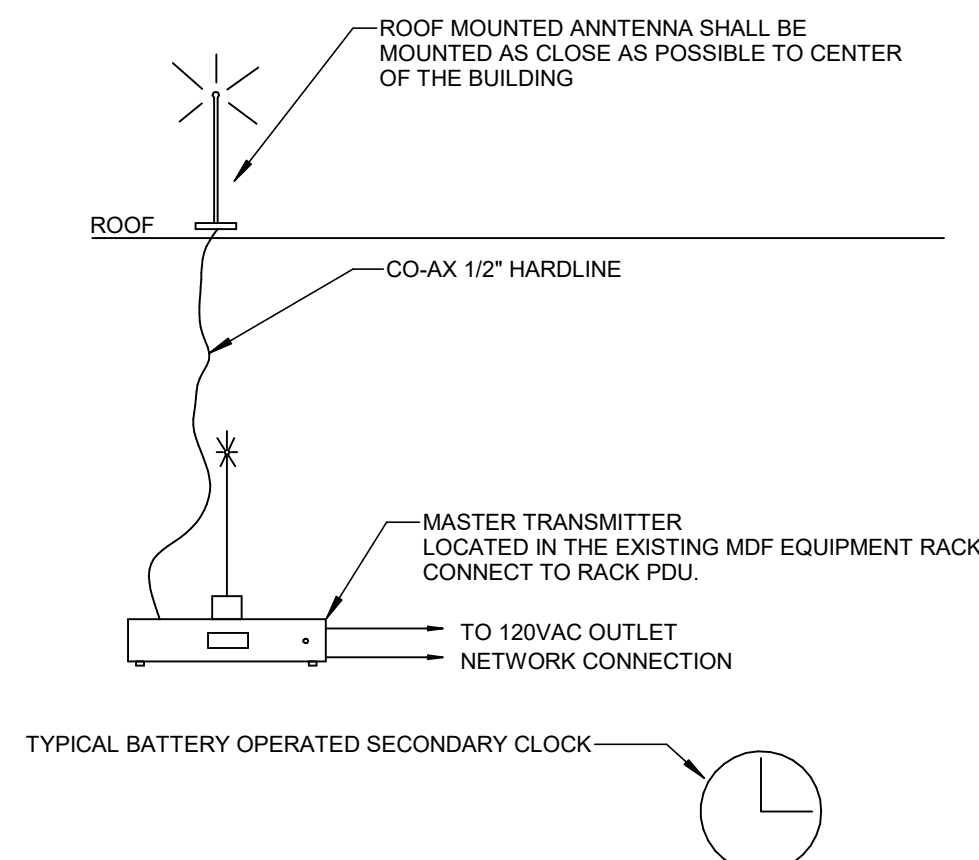


- NOTES:
1. TYPICAL ACCESS CONTROLLER IN NEMA 1 LOCKABLE ENCLOSURE SIZED FOR I/O OR CARD READER MODULES AS REQUIRED.
 2. BASIS OF DESIGN: **DSX ACCESS SYSTEMS**
 3. GENERAL REQUIREMENTS: EXPAND EXISTING ACCESS CONTROL SYSTEM IN THE BUILDING TO SUPPORT THE NEW DOORS IN THE PROJECT, INCLUDING CARD READER ACCESS TO THE ELEVATOR, AND PROGRAMMING. PROVIDE ADDITIONAL LICENSING TO SUPPORT THE NEW DOORS AND EQUIPMENT.
 4. TYPICAL ACCESS CONTROL EQUIPMENT AND ENCLOSURES SHOWN FOR CLARITY. PROVIDE QUANTITY OF ACCESS CONTROL MODULES AS REQUIRED BY MANUFACTURER SYSTEM ARCHITECTURE, INCLUDING COMPATIBLE ACCESS CONTROL EQUIPMENT AND DOOR POWER SUPPLIES.
 5. COORDINATE ALL PROGRAMMING AND TIMED LOCKING/UNLOCKING SCHEDULE WITH OWNER'S IT STAFF. DEVICES SHOWN ARE TYPICAL FOR THE DEVICES PROVIDED IN THE PROJECT. SEE FLOOR PLANS FOR LOCATIONS AND QUANTITIES.
 7. REFER TO SPECIFICATIONS FOR ADDITIONAL EQUIPMENT INFORMATION. PROVIDE EQUIPMENT WITH MODEL NUMBERS AS FOLLOWS (OTHER MANUFACTURER CONFIGURATIONS ARE ACCEPTABLE):
 - A. **DSX-1040P (P-DOOR PACKAGE)**, WHICH SHALL INCLUDE:
 - a. (4)1042 CONTROLLERS
 - b. (1)1040-CDM COMMUNICATION DISTRIBUTION MODULE 1040
 - c. (1)DSX-LAN COMMUNICATION INTERFACE
 - d. (1)DSX-PDP INTEGRATED POWER SUPPLY ENCLOSURE
 - e. (1)DSX-1040 POWER DISTRIBUTION PANEL
 - PROVIDE WITH A COMPATIBLE LOCK POWER SUPPLY MODULE, INCLUDING CABINET AND BATTERIES, SIZED APPROPRIATELY TO SUPPORT THE QUANTITY OF NEW DOORS.
 8. PROVIDE INTERCONNECTION TO BUILDING NETWORK AT EACH ACCESS CONTROLLER LOCATION.
 9. INCORPORATE EXISTING BUILDING LOCKDOWN SEQUENCE IF EXISTING IN THE BUILDING AND TIED TO THE ACCESS CONTROL SYSTEM. COORDINATE SEQUENCE WITH THE OWNER'S SECURITY REPRESENTATIVE.
 10. 120VAC INPUTS TO ALL ACCESS CONTROLLERS IN I.T. ROOM SHALL BE DASH CHANNELLED TOGETHER AND POWERED VIA DEDICATED UNINTERRUPTIBLE POWER SUPPLY MOUNTED ON WALL ADJACENT TO NODES. UPS SHALL BE TRIPP-LITE "SMART" SERIES OR EQUAL WITH EXPANDABLE BATTERY SYSTEM, AND SHALL BE PROVIDED WITH BATTERY BACKUP CAPABLE OF POWERING ALL NETWORK NODES IN ROOM FOR FOUR(4) HOURS. CONTRACTOR IS RESPONSIBLE FOR SUBMITTING BATTERY LOAD CALCULATIONS TO ENGINEER FOR APPROVAL.
 11. DRY CONTACT OUTPUTS FROM THE ACCESS CONTROL SYSTEM TO THE ELEVATOR CONTROLLER REQUIRED FOR ELEVATOR FLOOR CARD READER APPLICATION. UPON VALID CARD READER SIGNAL, THE ELEVATOR CONTROLLER SHALL ENABLE THE ELEVATOR FLOOR CALL BUTTON. COORDINATE INTERFACE AND PROGRAMMING WITH THE ELEVATOR INSTALLER.

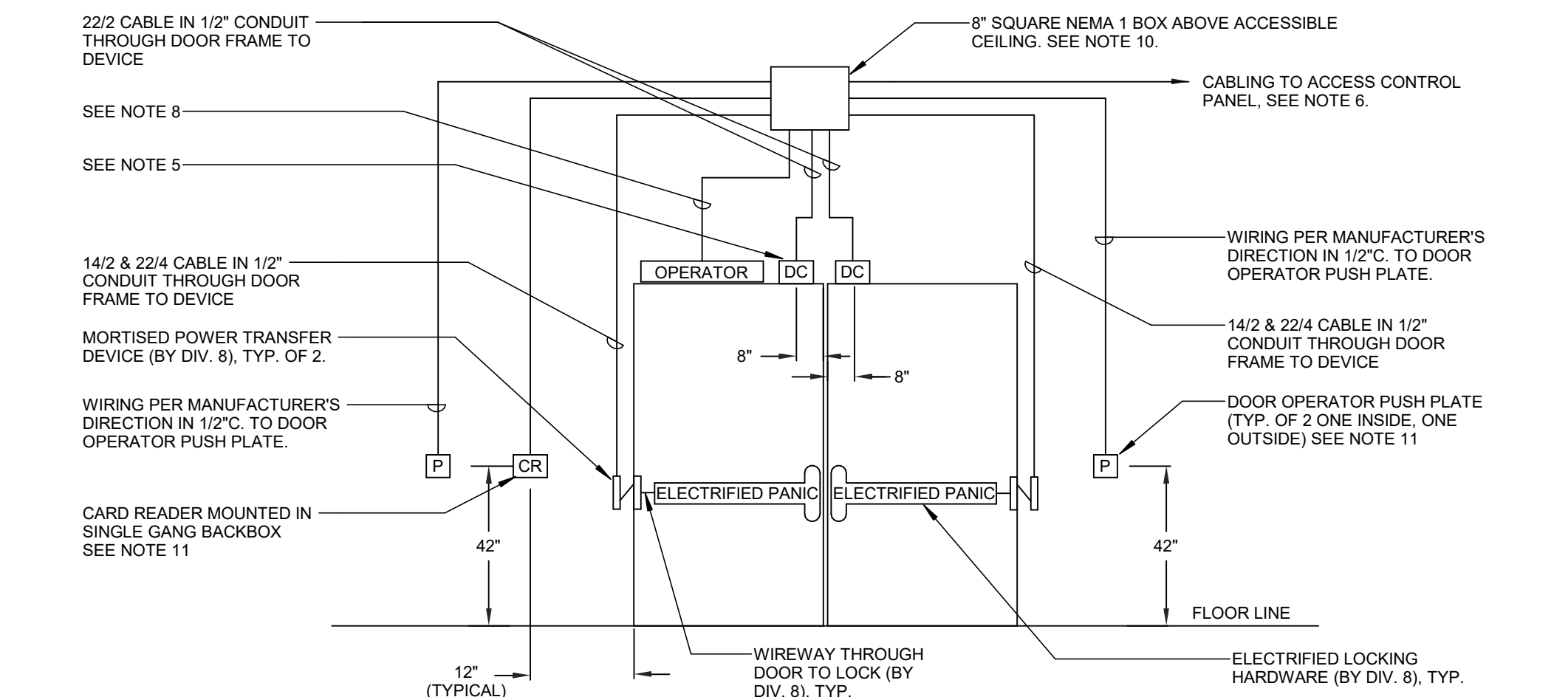
4 ACCESS CONTROL PANEL DETAIL
NTS



3 CONNECTIONS TO EXISTING IT RACK
NTS

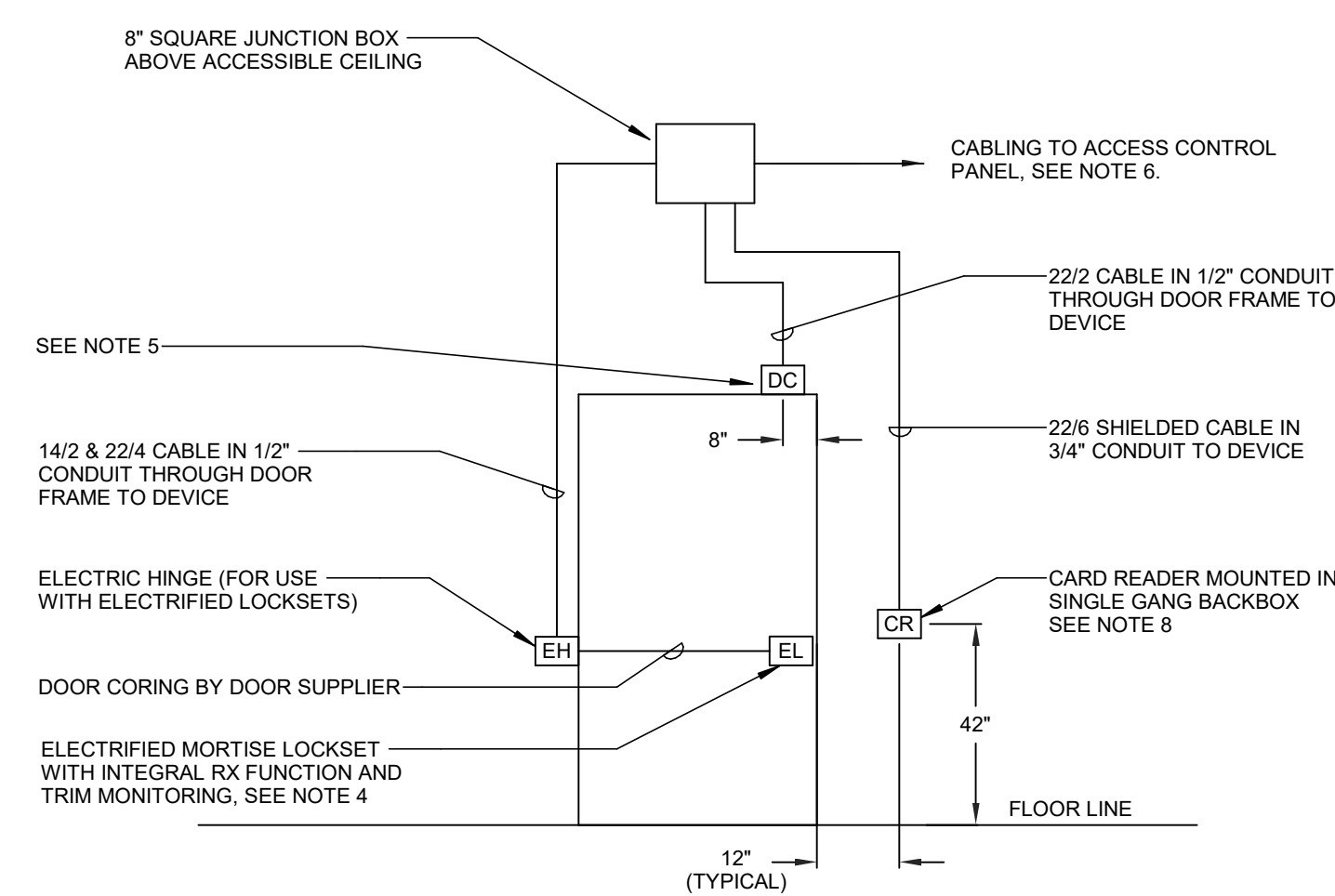


2 WIRELESS CLOCK SYSTEM DETAIL
NTS



- NOTES:
1. TYPICAL DOUBLE DOOR SHOWN WITH ELECTRIFIED PANIC HARDWARE CONTROLLING EACH LEAF. SEE DRAWINGS AND SPECIFICATIONS FOR DOOR/FRAME DETAILS AND HARDWARE SETS.
 2. COORDINATE ELECTRICAL HARDWARE REQUIREMENTS WITH HARDWARE SUPPLIER.
 3. COORDINATE WIRING THROUGH FRAMES WITH DOOR AND FRAME INSTALLATION.
 4. REQUEST TO EXIT (REX) DEVICE INTEGRAL TO HARDWARE. ELECTRIC HINGE/POWER TRANSFER DEVICE AND WIRING HARNESSES PROVIDED WITH HARDWARE. COORDINATE CONNECTIONS WITH HARDWARE INSTALLATION.
 5. RECESSED MAGNETIC CONTACTS, COORDINATE WITH FRAME INSTALLATION. PROVIDE DPDT DOOR CONTACTS FOR CONNECTION TO ACCESS CONTROL SYSTEM AND INTRUSION ALARM SYSTEM WITH SEPARATE SIGNALS. WIRING TO INTRUSION SYSTEM SHALL BE AS SPECIFIED ON INTRUSION RISER, NOT SHOWN IN THIS DETAIL.
 6. WIRING TO ACCESS CONTROL PANEL ABOVE ACCESSIBLE CEILINGS MAY BE INSTALLED SUPPORTED BY J-HOOKS. ALL EXPOSED WIRING DOWN TO ACCESS CONTROL PANELS SHALL BE INSTALLED IN CONDUIT. ALL WIRING SHALL BE PLENUM RATED.
 7. COORDINATE WIRING THROUGH HOLLOW FRAMES AND STOREFRONT CHANNELS WITH THE FRAME/STOREFRONT INSTALLATION. WHERE CALLED FOR TO WIRE DEVICES "THROUGH THE FRAME IN CONDUIT", LOOSE WIRING IN THE FRAME CHANNELS IS ACCEPTABLE.
 8. WIRING PER MANUFACTURERS DIRECTION TO DOOR OPERATOR FOR PUSH PLATES, ELECTRIC LATCH RELEASE. PROVIDE 120VAC POWER TO DOOR OPENER VIA CIRCUIT INDICATED ON FLOOR PLANS. WHERE NOT INDICATED, PROVIDE POWER VIA LOCAL 120VAC UNSWITCHED RECEPTACLE CIRCUIT.
 9. SEE MANUFACTURERS JOB SPECIFIC WIRING DIAGRAMS FOR ADDITIONAL INFORMATION.
 10. PROVIDE SEPARATE RELAY OUTPUTS FROM ACCESS CONTROL SYSTEM PANEL TO:
 - A. CONTROL EACH ELECTRIFIED PANIC HARDWARE TRIM SEPARATELY. DURING OPERATIONAL HOURS AUTOMATICALLY UNLOCK EACH LEAF. AFTER HOURS DOOR OPERATOR LEAF ONLY UNLOCKS ON VALID CARD READ.
 - B. CONTROL/ENABLE EXTERIOR DOOR OPERATOR PUSH PLATE ON VALID CARD READ. DURING OPERATIONAL HOURS PUSH PLATE IS ALWAYS ACTIVE. AFTER HOURS PUSH PLATE IN ACTIVE/ENABLED ON VALID CARD READ.
 11. COORDINATE EXACT LOCATION OF CARD READER AND PUSH PLATES WITH FIELD CONDITIONS AND ARCHITECTURAL ELEVATIONS PRIOR TO INSTALLATION.

6 TYPICAL DOUBLE DOOR CARD ACCESS/DOOR OPERATOR WIRING REQUIREMENTS
NTS



- NOTES:
1. TYPICAL SINGLE DOOR SHOWN. SEE DRAWINGS AND SPECIFICATIONS FOR DOOR/FRAME DETAILS AND HARDWARE SETS.
 2. COORDINATE ELECTRICAL HARDWARE REQUIREMENTS WITH HARDWARE SUPPLIER.
 3. COORDINATE WIRING THROUGH FRAMES WITH DOOR AND FRAME INSTALLATION.
 4. REQUEST TO EXIT (REX) DEVICE INTEGRAL TO HARDWARE. ELECTRIC HINGE/POWER TRANSFER DEVICE AND WIRING HARNESSES PROVIDED WITH HARDWARE. COORDINATE CONNECTIONS WITH HARDWARE INSTALLATION.
 5. RECESSED MAGNETIC CONTACTS, COORDINATE WITH FRAME INSTALLATION. PROVIDE DPDT DOOR CONTACTS FOR CONNECTION TO ACCESS CONTROL SYSTEM AND INTRUSION ALARM SYSTEM WITH SEPARATE SIGNALS. WIRING TO INTRUSION SYSTEM SHALL BE AS SPECIFIED ON INTRUSION RISER, NOT SHOWN IN THIS DETAIL.
 6. WIRING TO ACCESS CONTROL PANEL ABOVE ACCESSIBLE CEILINGS MAY BE INSTALLED SUPPORTED BY J-HOOKS. ALL EXPOSED WIRING DOWN TO ACCESS CONTROL PANELS SHALL BE INSTALLED IN CONDUIT. ALL WIRING SHALL BE PLENUM RATED.
 7. COORDINATE WIRING THROUGH HOLLOW FRAMES AND STOREFRONT CHANNELS WITH THE FRAME/STOREFRONT INSTALLATION. WHERE CALLED FOR TO WIRE DEVICES "THROUGH THE FRAME IN CONDUIT", LOOSE WIRING IN THE FRAME CHANNELS IS ACCEPTABLE.
 8. COORDINATE EXACT LOCATION OF CARD READER WITH FIELD CONDITIONS AND ARCHITECTURAL ELEVATIONS PRIOR TO INSTALLATION.

5 TYPICAL SINGLE DOOR CARD ACCESS WIRING REQUIREMENTS
NTS

NOTES:

1. ALL FIXTURES IN THE SCHEDULE SHALL BE CONSIDERED BASES OF DESIGN. EQUAL FIXTURE SUBSTITUTIONS ARE ACCEPTABLE FOR ALL FIXTURES IN THE LIGHTING FIXTURE SCHEDULE, UNLESS INDICATED OTHERWISE. EQUAL FIXTURE APPROVAL SHALL BE AS JUDGED BY THE ENGINEER AND THE ARCHITECT. IN ADDITION TO THE REQUIREMENTS LISTED IN THE LIGHTING FIXTURE SCHEDULE AND IN THE SPECIFICATIONS, THE FOLLOWING BASES OF DESIGN SHALL APPLY:

A. BE THE SAME GENERAL SIZE, STYLE AND SHAPE. INCLUDING, BUT NOT LIMITED TO, CONSTRUCTION AND SHADING.

B. BE OF EQUAL QUALITY CONSTRUCTION AND FINISH.

C. BE SUPPLIED WITH ALL REQUIRED ACCESSORIES TO MATCH THE SPECIFIED BASES OF DESIGN FIXTURE.

D. PROVIDE THE SAME DISTRIBUTION, EFFICACY AND SOURCE LUMEN OUTPUT.

E. BE THE SAME BASES OF DESIGN FIXTURE, INCLUDING DUL, DALI AND ENERGY STAR QUALIFICATIONS.

2. ALL FIXTURES SHALL BE UL LISTED.

3. ALL BASES OF DESIGN SHALL INCLUDE: HOOKS, HANGERS, BRACKETS, RAILS, YOKES, CANOPIES, STEMS, CHAINS, ROOF JOINERS, ETC. SHALL BE FURNISHED AND INSTALLED.

4. REFER TO ARCHITECTURAL DRAWINGS FOR SPECIFIC DETAILS, ARRANGEMENT, MOUNTING HEIGHTS, SUSPENSION LENGTHS, CEILING CONSTRUCTION, ETC. ALL COLORS AND FINISHES SHALL BE SELECTED BY ARCHITECT.

5. ALL FIXTURES SHALL BE SUPPORTED AS REQUIRED BY THE APPLICABLE BUILDING CODE. FIXTURES SHALL BE SUPPORTED FROM THE BUILDING STRUCTURE AND SHALL BE INDEPENDENT OF DUCTS, PIPES, CEILINGS AND THEIR SUPPORTING MEMBERS. FIXTURES SHALL BE SUPPORTED WITH A MINIMUM OF 2 SUPPORTS.

6. ALL LIGHTING FIXTURES AND EXIT SIGNS AHEAD OF SWITCHES SHALL BE INSTALLED AT A MINIMUM OF 8" ABOVE THE SWITCH.

7. MINIMUM MOUNTING HEIGHT OF FIXTURES IN MECHANICAL AND ELECTRICAL SPACES IS 8'-0" AFF. COORDINATE MOUNTING HEIGHT IN FIELD WITH EQUIPMENT IN ROOM SUCH THAT THERE IS NOT OBSTACLE TO VIEW OF EQUIPMENT.

8. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

9. ALL EXIT SIGNS SHALL BE SHOWN AS WALL MOUNTED ABOVE A DOOR. PROVIDE NECESSARY 6" BOWTIE MOUNTING HEIGHT. MOUNTING HEIGHT OF THE SIGN IS NO MORE THAN 3" ABOVE THE DOOR FRAME, UNLESS INDICATED OTHERWISE ON PLANS.

GENERAL NOTES	REFERENCE REMARKS
1. DISCONNECT SWITCHES SHALL BE HEAVY-DUTY TYPE AND SHALL BE LOCATED AT EQUIPMENT LOCATION UNLESS OTHERWISE NOTED.	1. REFER TO FLOOR PLANS FOR CIRCUITING.
2. ABBREVIATIONS:	
* MAN: MANUAL STARTER (VOLTAGE SWITCH WITH THERMAL OVERLOADS)	
* FVWR: COMBINATION FULL VOLTAGE NON-REVERSING STARTER/ DISCONNECT SWITCH	
* VFD: VARIABLE FREQUENCY DRIVE, FURNISHED BY DIV. 23, WIRED BY DIV. 26, PROVIDE POWER WIRING FROM SOURCE PANELEBOARD TO VFD AND FROM VFD TO MOTOR(S). COORDINATE EXACT LOCATION IN FIELD WITH DIV. 23	
* DIV 21: EQUIPMENT FURNISHED BY DIVISION 21 FIRE PROTECTION CONTRACTOR	
* DIV 22: EQUIPMENT FURNISHED BY DIVISION 22 PLUMBING CONTRACTOR	
* DIV 23: EQUIPMENT FURNISHED BY DIVISION 23 HVAC CONTRACTOR	
* SPC: SINGLE POINT CONNECTION (STARTERS INTEGRAL TO EQUIPMENT). COORDINATE EXACT POINT OF CONNECTION IN FIELD.	
3. OVERCURRENT PROTECTION DEVICES (OCPD) SHALL BE MOLDED CASE CIRCUIT BREAKERS UNLESS NOTED WITH AN "F" FOR FUSE.	
4. DISCONNECT SWITCHES AND STARTERS SHALL BE NEMA 3R RATED WHEN LOCATED OUTSIDE.	
5. REFER TO PANEL SCHEDULES FOR SOURCE PANEL/ CIRCUIT INFORMATION	
6. REFER TO ELECTRICAL AND MECHANICAL PLANS FOR EXACT LOCATIONS OF EQUIPMENT.	
7. STARTERS SHALL BE SQUARE D CLASS 8536 OR APPROVED EQUAL.	

[illegible]

Circuit Description		A		B		C		Circuit Description		
CKT		Tripp	Poles				Poles	Tripp		
1	EXISTING LOAD	20 A	1	0.50	0.50			1	20 A EXISTING LOAD	
3	EXISTING LOAD	20 A	1			0.50	0.50	1	20 A EXISTING LOAD	
5	RCPT - PRINTER	20 A	1				0.18	0.72	1	20 A RCPT - MAIN ENTRANCE OFFICE
7	EXISTING LOAD	20 A	1	0.50	0.50			1	20 A EXISTING LOAD	
9	EXISTING LOAD	20 A	1			0.54	0.54	1	20 A EXISTING LOAD	
11	EXISTING LOAD	20 A	1				0.50	0.50	1	20 A EXISTING LOAD
13	EXISTING LOAD	20 A	1	0.54	0.54			1	20 A EXISTING LOAD	
15	EXISTING LOAD	20 A	1			0.54	0.54	1	20 A EXISTING LOAD	
17	EXISTING LOAD	20 A	1				0.54	0.54	1	20 A EXISTING LOAD
19	EXISTING LOAD	20 A	1	0.54	0.18			1	20 A EXISTING LOAD	
21	EXISTING LOAD	20 A	1			0.50	0.54	1	20 A EXISTING LOAD	
23	EXISTING LOAD	20 A	1				0.54	0.54	1	20 A EXISTING LOAD
25	EXISTING LOAD	20 A	1	0.54	0.00			1	20 A EXISTING LOAD	
27	EXISTING LOAD	20 A	1			0.50	0.50	1	20 A EXISTING LOAD	
29	EXISTING LOAD	20 A	1				0.50	0.50	1	20 A EXISTING LOAD
31	EXISTING LOAD	20 A	1	0.50	0.50			1	20 A EXISTING LOAD	
33	EXISTING LOAD	20 A	1			0.50	0.79	1	20 A LTG - MAIN ENTRANCE OFFICE	
35	EXISTING LOAD	20 A	1				0.50	1.98	1	20 A RCPT - MAIN ENTRANCE OFFICE
37	RCPT - PRINCIPAL OFFICE	20 A	1	0.90	0.72			1	20 A RCPT - PRINCIPAL OFFICE	
39	DOOR OPERATORS	20 A	1			0.36	0.38	1	20 A MAIN ENTRANCE OFFICE BATHROOM	
41	RCPT - OFFICE CORRIDOR	20 A	1				0.72	0.90	1	20 A RCPT - SECOND FLOOR OFFICE
43	RCPT - PA RAMP IT ROOM	20 A	1	0.18	0.72			1	20 A RCPT - FIRST FLOOR OFFICE	
Phase Load:		7.86 kVA				7.23 kVA		9.16 kVA		
Phase:		66.3 A				60.3 A		77.1 A		
Total Load:		24.25 kVA								

Circuit Type										Phase A										Phase B										Phase C									
CKT	Circuit Description	Trip	Poles	A			B			C			Poles	Trip	Circuit Description	CKT																							
				1	0.50	1.20																																	
1	EXISTING LOAD	20 A	1	0.50	1.20								3	20 A	EXISTING LOAD	2																							
3	EXISTING LOAD	20 A	1			0.50	1.20						--	--		4																							
5	EXISTING LOAD	20 A	1						0.50	1.20			--	--		6																							
7	EXISTING LOAD	20 A	1	0.50	1.14								2	15 A	*ACCU-1	8																							
9	EXISTING LOAD	20 A	1			0.50	1.14						--	--		10																							
11	EXISTING LOAD	20 A	1						0.50	0.00			1	20 A	*EMS	12																							
13	EXISTING LOAD	20 A	3	1.20	0.50								1	20 A	EXISTING LOAD	14																							
15	--	--	--			1.20	0.50						1	20 A	EXISTING LOAD	16																							
17	--	--	--						1.20	0.50			1	20 A	EXISTING LOAD	18																							
19	EXISTING LOAD	20 A	3	1.20	0.50								1	20 A	EXISTING LOAD	20																							
21	--	--	--			1.20	0.50						1	20 A	EXISTING LOAD	22																							
23	--	--	--						1.20	0.50			1	20 A	EXISTING LOAD	24																							
		Phase Load:		6.74 kVA			6.74 kVA			5.60 kVA																													
		Phase...:		57.7 A			57.7 A			46.7 A																													
		Total Load:		19.09 kVA																																			
				63.08																																			

Notes:

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	EXISTING LOAD	20 A	2	2.90	0.09								
3	---	---	---			2.90	0.18						
5	EXISTING LOAD	40 A	1										
7	'LTG - ELEVATOR PIT	20 A	1	0.08	1.08			0.18	1.08	2	15 A	'AC-1	6
9	'LTG - ELEVATOR CAB	20 A	2			1.00	3.88			3	35 A	'ELEVATOR	8
11	---	---	---					1.00	3.88		---	---	10
13	EXISTING LOAD	20 A	1	0.20	3.88						---	---	12
15	EXISTING LOAD	20 A	1			0.20	1.08			2	15 A	'AC-1	2
17	EXISTING LOAD	20 A	1					0.20	1.08				16
19	EXISTING LOAD	20 A	1	0.20	0.20					1	20 A	EXISTING LOAD	18
21	EXISTING LOAD	20 A	1			0.20	0.18			1	20 A	RCPT - ELEVATOR	20
23	EXISTING LOAD	20 A	1					0.20	0.20	1	20 A	EXISTING LOAD	22
25	EXISTING LOAD	20 A	1	0.18	0.18					1	20 A	EXISTING LOAD	24
27	EXISTING LOAD	20 A	1			0.20	0.20			1	20 A	EXISTING LOAD	26
29	EXISTING LOAD	20 A	1					0.18	1.08	2	15 A	'AC-1	28
31	EXISTING LOAD	20 A	2	0.10	1.08						---	---	30
33	---	---	---			0.10	0.50			1	20 A	EXISTING LOAD	32
35	EXISTING LOAD	15 A	1					0.50	0.02	1	15 A	'ERV-1	36
Phase Load:				10.16 kVA		10.62 kVA		9.59 kVA					
Total Load:				85.4 A		89.2 A		79.9 A					
Total Amps:				46.42 A									

SECTION 26.04.00 - GENERAL CONDITIONS FOR ELECTRICAL TRADES	A. DESCRIPTION	1. THIS PROJECT COMPRISES ALTERATIONS AND RENOVATIONS TO THE EXISTING BUILDING. THE EXISTING BUILDING IS CURRENTLY OCCUPIED AND THE PROJECT WILL PROCEED IN A MANNER WHICH WILL MINIMIZE ANY INCONVENIENCE TO THE BUILDING OCCUPANTS.	2. SCOPE OF WORK CONSISTS OF INSTALLATION OF MATERIALS TO BE FURNISHED UNDER THE CONTRACT DOCUMENTS AND WITHOUT LIMITATIONS. THE SCOPE OF WORK CONSISTS OF FURNISHING LABOR, MATERIALS, EQUIPMENT, HOISTING, PLANT, TRANSPORTATION, RIGGING, STAGING, APPURTENANCES, AND SERVICES NECESSARY AND/OR INCIDENTAL TO PROPERLY COMPLETE ALL WORK AS SHOWN ON THE DRAWINGS AND AS DESCRIBED HEREIN.	B. DEFINITIONS:	1. FURNISH: THE TERM "FURNISH" MEANS TO "SUPPLY AND DELIVER TO THE PROJECT SITE, READY FOR UNLOADING, UNPACKING, ASSEMBLY, INSTALLATION, AND SIMILAR OPERATIONS".	2. INSTALL: THE TERM "INSTALL" IS USED TO DESCRIBE OPERATIONS AT PROJECT SITE INCLUDING THE ACTUAL "UNLOADING, UNPACKING, ASSEMBLY, ERECTION, PLACING, ANCHORING, APPLYING, WORKING TO DIMENSION, FINISHING, CURING, PROTECTING, CLEANING, AND SIMILAR OPERATIONS".	3. PROVIDE: THE TERM "PROVIDE" MEANS TO FURNISH AND INSTALL, COMPLETE AND READY FOR THE INTENDED USE.	4. REMOVE: THE TERM REMOVE MEANS TO DISCONNECT FROM ITS PRESENT POSITION, REMOVE FROM THE PREMISES AND TO DISPOSE OF IN A LEGAL MANNER.	5. SUBSTITUTIONS: "SUBSTITUTIONS ARE REQUESTS FOR CHANGES IN PRODUCTS, MATERIALS AND METHODS OF CONSTRUCTION AS PROPOSED BY THE CONTRACTOR AFTER AWARD OF THE CONTRACT".	C. EQUIPMENT EQUIVALENTS AND SUBSTITUTIONS:	1. CERTAIN MANUFACTURERS OF MATERIAL, APPARATUS OR APPLIANCES ARE INDICATED IN THE DRAWINGS AND SPECIFICATIONS FOR THIS PROJECT. THESE ITEMS HAVE BEEN USED AS THE BASIS OF DESIGN, AND AS A CONVENIENCE IN FIXING THE MINIMUM STANDARD OF WORKMANSHIP, FINISH AND DESIGN THAT IS REQUIRED. IF THE CONTRACTOR USES AN "APPROVED EQUAL" ALTERNATIVE TO THE BASIS OF DESIGN, AND IF THE FEATURES OF THAT ALTERNATIVE HAVE AN IMPACT ON OTHER COMPONENTS OF THE PROJECT, THE CONTRACTOR SHALL INCLUDE THE NECESSARY ADJUSTMENTS IN THOSE COMPONENTS, WHETHER FOR ARCHITECTURAL, STRUCTURAL, MECHANICAL, ELECTRICAL, FIRE PROTECTION, OR ANY OTHER ELEMENTS, PLUS ANY ADJUSTMENTS FOR DIFFERENCE IN PERFORMANCE.	2. EQUIPMENT, MATERIAL, OR DEVICES SUBMITTED FOR REVIEW AS AN "EQUIVALENT" SHALL MEET THE FOLLOWING REQUIREMENTS:	A. THE EQUIVALENT SHALL HAVE THE SAME CONSTRUCTION FEATURES SUCH AS, BUT NOT LIMITED TO:	a. MATERIAL THICKNESS, GAUGE, WEIGHT, DENSITY, ETC.	b. WELDED, RIVETED, BOLTED, ETC., CONSTRUCTION.	c. FINISH, UNDERCOATINGS, CORROSION PROTECTION.	D. THE EQUIVALENT SHALL PERFORM WITH THE SAME OR BETTER OPERATING EFFICIENCY.	E. THE EQUIVALENT SHALL BE LOCALLY REPRESENTED BY THE MANUFACTURER FOR SERVICE, PARTS, AND TECHNICAL INFORMATION.	F. THE EQUIVALENT SHALL BEAR THE SAME LABELS OF PERFORMANCE CERTIFICATION AS IS APPLICABLE TO THE SPECIFIED ITEM, SUCH AS UL OR NEMA LABELS OR DLC QUALIFICATIONS.	D. DRAWINGS:	1. PROVIDE ALL MATERIALS, EQUIPMENT AND LABOR NECESSARY TO COMPLETE THE WORK OUTLINED ON THESE CONTRACT DOCUMENTS. THE CONTRACTOR IS TO NOTE THAT THESE DOCUMENTS ARE DIAGRAMMATIC ONLY AND THAT FINAL PLACEMENT OF EQUIPMENT OR DEVICES IN THE FIELD MAY NOT DIRECTLY CORRESPOND TO THAT WHICH IS SHOWN ON THE DRAWINGS. IF A CONFLICT IN POSITIONING OCCURS THE CONTRACTOR IS TO NOTIFY THE ENGINEER IMMEDIATELY TO ASCERTAIN WHAT THE INTENT WAS BY THE DESIGN PROFESSIONAL.	2. WHERE VARIANCES OCCUR BETWEEN THE DRAWINGS AND SPECIFICATIONS OR WITHIN EITHER OF THE DOCUMENTS, THE ITEM OR ARRANGEMENT OF BETTER QUALITY, HIGHER RATING, OR HIGHER VALUE SHALL BE INCLUDED IN THE CONTRACT PRICE. THE OWNER AND ENGINEER SHALL DECIDE ON THE ITEM AND THE MANNER IN WHICH THE WORK SHALL BE INSTALLED.	E. SURVEY AND MEASUREMENTS:	1. PRIOR TO SUBMITTING BID, VISIT SITE AND IDENTIFY EXISTING CONDITIONS AND DIFFICULTIES THAT WILL AFFECT WORK TO BE PERFORMED. NO COMPENSATION WILL BE GRANTED FOR ADDITIONAL WORK CAUSED BY UNFAMILIARITY WITH SITE CONDITIONS THAT ARE VISIBLE OR READILY IDENTIFIED BY EXPERIENCED OBSERVERS. INCLUDE IN THE BID ALL DEMOLITION WORK REQUIRED TO PREPARE THE SITE FOR CONSTRUCTION.	2. DO NOT SCALE DRAWINGS. SCALE INDICATED ON DRAWINGS IS FOR ESTABLISHING REFERENCE POINTS ONLY. ACTUAL FIELD MEASUREMENTS SHALL BE USED TO DETERMINE THE LOCATION OF ALL DIMENSIONS.	3. PRIOR TO ORDERING ANY MATERIALS AND EQUIPMENT, THOROUGHLY REVIEW THE SITE CONDITIONS TO DETERMINE IF ADEQUATE CLEARANCES AND ACCESS IS ALLOWED TO THE COMPONENTS. ORDER EQUIPMENT BROKEN DOWN, AS NECESSARY, TO ALLOW FOR PROPER RIGGING THROUGH THE PROJECT AREA. PROVIDE ALL NECESSARY ALTERATIONS TO THE STRUCTURE OF THE BUILDING NECESSARY TO RIG THE EQUIPMENT IN PLACE.	4. ARRANGE INSTALLATION TO PROVIDE ACCESS TO EQUIPMENT FOR EASY MAINTENANCE AND REPAIR.	F. CODES AND STANDARDS: ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE MOST RECENTLY ADOPTED EDITIONS OF THE FOLLOWING CODES AND STANDARDS, INCLUDING ALL JURISDICTIONAL REVISIONS:	1. STATE BUILDING CODE INCLUDING ALL SUPPLEMENTS.	2. STATE FIRE SAFETY CODE INCLUDING ALL SUPPLEMENTS.	3. STATE FIRE PREVENTION CODE INCLUDING ALL SUPPLEMENTS.	4. THE NATIONAL ELECTRICAL CODE.	5. THE INTERNATIONAL EXISTING BUILDING CODE.	6. THE INTERNATIONAL FIRE CODE.	7. THE INTERNATIONAL MECHANICAL CODE.	8. THE INTERNATIONAL CONSTRUCTION CODE.	9. THE INTERNATIONAL ENERGY CONSERVATION CODE.	10. NFPA 1: FIRE CODE.	11. NFPA 70: NATIONAL ELECTRICAL CODE.	12. NFPA 72: NATIONAL FIRE ALARM AND SIGNALING CODE.	13. NECA 1: STANDARD FOR GOOD WORKMANSHIP IN ELECTRICAL CONSTRUCTION.	14. NETA ATS.	G. PERMITS AND FEES:	1. THE CONTRACTOR SHALL GIVE ALL NECESSARY NOTICES, OBTAIN ALL PERMITS, AND PAY ALL GOVERNMENT AND STATE SALES TAXES AND FEES WHERE APPLICABLE, AND OTHER COSTS, FILE ALL NECESSARY DRAWINGS, PREPARE ALL NECESSARY DOCUMENTS AND OBTAIN ALL NECESSARY APPROVALS OF ALL GOVERNMENTAL AND STATE DEPARTMENTS HAVING JURISDICTION, OBTAIN ALL REQUIRED CERTIFICATES OF INSPECTION FOR HIS WORK, AND DELIVER A COPY TO THE OWNER AND ENGINEER BEFORE REQUEST FOR ACCEPTANCE AND FINAL PAYMENT FOR THE WORK.	H. SHOP DRAWINGS:	1. PROVIDE SHOP DRAWINGS FOR ALL DEVICES SPECIFIED UNDER EQUIPMENT SPECIFICATIONS FOR ALL SYSTEMS INCLUDING FIRE ALARM, SWITCHGEAR, CLOCK, LIGHTING, ETC., OR WHERE CALLED FOR ELSEWHERE IN THE SPECIFICATIONS, OR WHERE SCHEDULED ON THE DRAWINGS, OR WHERE CALLED OUT ON THE DRAWINGS. SHOP DRAWINGS SHALL INCLUDE MANUFACTURERS' NAMES, CATALOG NUMBERS, CUTS, DIAGRAMS, DIMENSIONS, IDENTIFICATION OF PRODUCTS AND MATERIALS INCLUDED, COMPLIANCE WITH SPECIFIED STANDARDS, NOTATION OF COORDINATION REQUIREMENTS, NOTATION OF DIMENSIONS ESTABLISHED BY FIELD MEASUREMENT AND OTHER SUCH DESCRIPTIVE DATA AS MAY BE REQUIRED TO IDENTIFY AND ACCEPT THE EQUIPMENT. A COMPLETE LIST IN EACH CATEGORY (EXAMPLE: ALL FIXTURES) OF ALL SHOP DRAWINGS, CATALOG CUTS, MATERIAL LISTS, ETC., SHALL BE SUBMITTED TO THE ENGINEER AT ONE TIME. NO CONSIDERATION WILL BE GIVEN TO A PARTIAL SHOP DRAWING SUBMITTAL.	2. SHOP DRAWINGS SHALL INCLUDE EQUIPMENT SUBMITTALS, FABRICATION AND INSTALLATION DRAWINGS, SETTING DIAGRAMS, SCHEDULES, PATTERNS, TEMPLATES AND SIMILAR DRAWINGS. INCLUDE THE FOLLOWING INFORMATION:	A. DIMENSIONS.	B. WIRING DIAGRAMS AND RISER DIAGRAMS.	C. CALCULATIONS.	D. IDENTIFICATION OF PRODUCTS AND MATERIALS INCLUDED.	E. COMPLIANCE WITH SPECIFIED STANDARDS AND PERFORMANCE DATA AS INDICATED.	F. NOTATION OF COORDINATION REQUIREMENTS.	G. NOTATION OF DIMENSIONS ESTABLISHED BY FIELD MEASUREMENT.	H. DO NOT USE SHOP DRAWINGS WITHOUT AN APPROPRIATE FINAL STAMP INDICATING ACTION TAKEN IN CONNECTION WITH CONSTRUCTION.	I. DO NOT ORDER ANY MATERIALS OR EQUIPMENT PRIOR TO RECEIVING FINAL APPROVED SHOP DRAWINGS.	J. SHOP DRAWINGS SHALL BE IN PDF/DOC FORMAT. PHOTOCOPIES ARE NOT ACCEPTABLE.	I. COORDINATION DRAWINGS:	1. PREPARE COORDINATION DRAWINGS AT A SCALE TO MATCH THE CONTRACT DOCUMENT FLOOR PLANS, DETAILING MAJOR ELEMENTS, COMPONENTS, AND SYSTEMS OF ELECTRICAL EQUIPMENT AND MATERIALS IN RELATIONSHIP WITH OTHER SYSTEMS, INSTALLATIONS, AND BUILDING COMPONENTS. INDICATE LOCATIONS WHERE SPACE IS LIMITED FOR INSTALLATION AND ACCESS AND WHERE SEQUENCING AND COORDINATION OF INSTALLATIONS ARE OF IMPORTANCE TO THE EFFICIENT FLOW OF THE WORK, INCLUDING (BUT NOT NECESSARILY LIMITED TO) THE FOLLOWING:	A. INDICATE THE PROPOSED LOCATIONS OF LIGHT FIXTURES, PANELBOARDS, CONDUITS, CABINETS, ETC.	B. CLEARANCES FOR INSTALLING AND MAINTAINING INSULATION.	C. CLEARANCES FOR SERVICING AND MAINTAINING EQUIPMENT, INCLUDING NEC REQUIREMENTS AND SPACE FOR EQUIPMENT DISASSEMBLY REQUIRED FOR PERIODIC MAINTENANCE.	D. EQUIPMENT CONNECTIONS AND SUPPORT DETAILS.	E. EXTERIOR WALL AND FOUNDATION PENETRATIONS.	F. FIRE-RATED WALL AND FLOOR PENETRATIONS.	G. SIZES AND LOCATIONS OF REQUIRED CONCRETE PADS AND BASES.	H. INDICATE SCHEDULING, SEQUENCING, MOVEMENT, AND POSITIONING OF LARGE EQUIPMENT INTO THE BUILDING DURING CONSTRUCTION.	I. PREPARE FLOOR PLANS, ELEVATIONS, AND DETAILS TO INDICATE PENETRATIONS IN FLOORS, WALLS, AND CEILINGS AND THEIR RELATIONSHIP TO OTHER PENETRATIONS AND INSTALLATIONS.	J. PREPARE REFLECTED CEILING PLANS TO COORDINATE AND INTEGRATE INSTALLATIONS, AIR OUTLETS AND INLETS, LIGHT FIXTURES, COMMUNICATION SYSTEMS COMPONENTS, SPRINKLERS, AND OTHER CEILING-MOUNTED ITEMS.	J. AS-BUILT DRAWINGS:	1. PREPARE AS-BUILT DRAWINGS TO A SCALE TO MATCH THE CONTRACT DOCUMENT FLOOR PLANS, DETAILING THE ACTUAL INSTALLATION OF MAJOR ELEMENTS, COMPONENTS, AND SYSTEMS OF MECHANICAL EQUIPMENT AND MATERIALS. WHERE SHOP DRAWINGS ARE USED, RECORD A CROSS-REFERENCE AT THE CORRESPONDING LOCATION ON THE AS-BUILT DRAWINGS. GIVE PARTICULAR ATTENTION TO CONCEALED ELEMENTS THAT WOULD BE DIFFICULT TO MEASURE AND RECORD AT A LATER DATE.	2. MARK NEW INFORMATION THAT IS IMPORTANT TO THE OWNER, BUT WAS NOT SHOWN ON CONTRACT DRAWINGS OR SHOP DRAWINGS.	3. NOTE RELATED CHANGE ORDER NUMBERS WHERE APPLICABLE.	4. FINAL RECORD DOCUMENTS SHALL BE PREPARED IN THE LATEST AUTOCAD VERSION AND DIGITAL MEDIA FOR ALL DRAWINGS AND A CLEAN SET OF REPRODUCIBLE PAPER COPIES SHALL BE TURNED OVER TO THE OWNER AT THE COMPLETION OF THE WORK.	K. OPERATIONS AND MAINTENANCE MANUALS	1. THE CONTRACTOR SHALL PREPARE (1) PDF COPY AND (3) HARD COPIES OF A COMPLETE MAINTENANCE AND OPERATING INSTRUCTIONS MANUAL, BOUND IN BOOKLET FORM.	A. ACQUIRE OPERATING AND MAINTENANCE DATA INTO SUITABLE SETS OF MANAGEABLE SIZE, BIND PROPERLY INDEXED DATA IN INDIVIDUAL HEAVY-DUTY, 3-RING, VINYL-COVERED BINDERS, WITH POCKET FOLDERS FOR FOLDED SHEET INFORMATION. MARK APPROPRIATE IDENTIFICATION ON FRONT AND SPINE OF EACH BINDER.	2. MANUAL SHALL INCLUDE THE FOLLOWING:	A. DESCRIPTIONS OF FUNCTION, NORMAL OPERATING CHARACTERISTICS AND LIMITATIONS.	B. PERFORMANCE CURVES, ENGINEERING DATA AND TESTS, AND COMPLETE IDENTIFICATION OF ALL ELECTRICAL AND MECHANICAL EQUIPMENT.	C. MANUFACTURER'S PRINTED OPERATING PROCEDURES TO INCLUDE START-UP, BREAK-IN, AND ROUTINE AND NORMAL OPERATING INSTRUCTIONS; REGULATION, CONTROL, STOPPING, SHUTDOWN, AND EMERGENCY INSTRUCTIONS; AND SUMMER AND WINTER OPERATING INSTRUCTIONS.	D. INSPECTION PROCEDURES FOR ROUTINE PREVENTATIVE MAINTENANCE AND TROUBLESHOOTING; DISASSEMBLY, REPAIR, AND REASSEMBLY; ALIGNING AND ADJUSTING INSTRUCTIONS.	E. SERVICING INSTRUCTIONS AND LUBRICATION CHARTS AND SCHEDULES.	F. EMERGENCY INSTRUCTIONS.	G. SPARE PARTS LIST.	H. COPIES OF WARRANTIES.	I. RECOMMENDED "TURN AROUND" CYCLES.	J. APPROVED SHOP DRAWINGS AND PRODUCT DATA.	L. EQUIPMENT START-UP REPORTS.	L. WARRANTIES	1. ALL EQUIPMENT PROVIDED IN THIS PROJECT SHALL CARRY A MANUFACTURER'S WARRANTY FOR NOT LESS THAN ONE (1) YEAR FROM DATE OF BENEFICIAL USE - UNLESS NOTED OTHERWISE IN THE CONTRACT DOCUMENTS.	M. MISCELLANEOUS REQUIREMENTS:	1. THE CONTRACTOR SHALL COORDINATE ALL INTERRUPTIONS OF SERVICES AND LIMITATIONS OF ACCESS WITH THE OWNER NO LESS THAN (5) DAYS PRIOR TO THE INTERRUPTION.	2. OBTAIN IN-OWNERS NAME WRITTEN EQUIPMENT AND MATERIAL WARRANTIES OFFERED IN MANUFACTURER'S PUBLISHED LITERATURE, AND DATA WITHOUT EXCLUSION OR LIMITATION.	3. GUARANTEE WORK OF THESE CONTRACT DOCUMENTS IN WRITING FOR NOT LESS THAN ONE (1) YEAR FROM DATE OF BENEFICIAL USE. REPAIR OR REPLACE DEFECTIVE MATERIALS, EQUIPMENT, WORKMANSHIP AND INSTALLATION THAT DEVELOP WITHIN THIS PERIOD, PROMPTLY AND TO OWNERS COMPLETE SATISFACTION AND CORRECT DAMAGE CAUSED BY MAKING NECESSARY REPAIRS AND REPLACEMENTS UNDER GUARANTEE WITHIN CONTRACT PRICE.	4. SUBMIT TO THE OWNER AN OFFICIAL CERTIFICATE OF INSURANCE FOR THEIR RECORDS.	N. ELECTRICAL ACCEPTANCE TESTING	1. TESTING SHALL BE PERFORMED ON ELECTRICAL EQUIPMENT AND SYSTEMS TO ASSURE THE EQUIPMENT AND SYSTEMS ARE OPERATIONAL AND WITHIN APPLICABLE STANDARDS AND MANUFACTURING TOLERANCES. TESTING SHOULD VERIFY THAT EQUIPMENT AND SYSTEMS ARE INSTALLED IN ACCORDANCE WITH DESIGN SPECIFICATIONS. ALL TESTING SHALL OCCUR AT THE BUILDING SITE.	2. QUALIFIED TECHNICIANS WHO ARE TRAINED AND REGULARLY EMPLOYED FOR TESTING SERVICES SHALL DO ALL THE TESTING.	3. THE TESTING ORGANIZATION SHALL CONFORM TO THE GENERAL GUIDELINES OF SECTION 5 OF THE LATEST NETA ACCEPTANCE TESTING SPECIFICATIONS. THIS INCLUDES THE FOLLOWING:	A. SAFETY AND PRECAUTIONS.	B. SUITABILITY OF TEST EQUIPMENT.	C. TEST INSTRUMENT CALIBRATION.	D. TEST REPORTS.	E. THE ARCHITECT, ENGINEER AND OWNER AT LEAST SEVEN (7) DAYS IN ADVANCE OF ANY TESTING.	5. INSPECTION AND TESTING OF ALL APPLICABLE ELECTRICAL EQUIPMENT LISTED BELOW SHALL BE DONE IN ACCORDANCE WITH THE LATEST VERSION OF NETA ATS.	A. CABLES.	B. LOW VOLTAGE CIRCUIT BREAKERS.	SECTION 26.05.10 - ELECTRICAL POWER CONDUCTORS AND CABLES	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 CONDUCTORS FOR VOLTAGE DROP.	2. COORDINATE WITH ELECTRICAL EQUIPMENT INSTALLED UNDER OTHER SECTIONS TO PROVIDE PROPER CLEARANCES AND ACCESS FOR THE CONDUCTORS TO BE INSTALLED.	B. PROVIDE SINGLE CONDUCTOR BUILDING WIRE INSTALLED IN SUITABLE RACEWAY UNLESS DEMOLITION WORK REQUIRED TO PREPARE THE SITE FOR CONSTRUCTION.	C. CONDUCTOR SIZES AND AMPACITIES SHOWN ARE BASED ON COPPER.	D. MINIMUM CONDUCTOR SIZES:	1. BRANCH CIRCUITS: 12 AWG.	2. 20A, 120V CIRCUITS LONGER THAN 150 FEET - #10 AWG MINIMUM AND SIZED FOR VOLTAGE DROP.	B. CONTROL CIRCUITS: 14 AWG.	C. CONDUCTORS NO. 10 AND SMALLER SHALL BE SOLID ANNEALED COPPER. EXCEPT THAT CONDUCTORS FOR REMOTE CONTROL, ALARM, AND SIGNAL CIRCUITS, CLASSES 1, 2 AND 3, SHALL BE STRANDED UNLESS SPECIFICALLY INDICATED OTHERWISE.	F. CONDUCTORS NO. 14 AWG AND LARGER DIAMETER SHALL BE STRANDED ANNEALED COPPER. UNLESS SPECIFIED OR INDICATED OTHERWISE, REQUIRE BY NFPA 70, POWER AND LIGHTING SHALL BE 600V OR GREATER, OR IF OTHERWISE SPECIFIED, 2 ANNEALED COPPER OR ALUMINUM AND SIGNAL CIRCUITS SHALL BE TYPE TW, THW, OR TF ANNEALED COPPER, UNDERGROUND.	H. WHERE LIGHTING FIXTURES REQUIRE 90 DEGREES C CONDUCTORS, PROVIDE ONLY CONDUCTORS WITH 90 DEGREE C INSULATION OR BETTER.	I. MAKE ALL SPLICES IN ACCESSIBLE LOCATIONS. MAKE SPLICES IN CONDUCTORS NO. 10 AWG AND SMALLER DIAMETER WITH INSULATED, SPRING WIRE CONNECTORS WITH PLASTIC CAPS. MAKE SPLICES IN CONDUCTORS NO. 14 AWG AND LARGER WITH DIECAST OR ALUMINUM SOLDERLESS PRESS-ON CONNECTORS WITH INSULATING COVERS. MAKE SPLICES IN CONDUCTORS NO. 6 AND LARGER WITH PLASTIC DIECAST OR ALUMINUM SOLDERLESS PRESS-ON CONNECTORS WITH INSULATING COVERS.	J. MAKE WIRE TERMINATIONS USING CRIMPED TERMINALS FOR CONDUCTORS NO. 10 AND SMALLER. MAKE WIRE TERMINATIONS FOR CONDUCTORS NO. 8 AND LARGER USING MECHANICAL OR PRESSURE CONNECTORS. PROVIDE SUITABLE REDUCERS WHERE OVERSIZED CONDUCTORS ARE LARGER THAN THE EQUIPMENT TERMINATION.	K. PHASE IDENTIFICATION: CONDUCTORS SHALL BE IDENTIFIED BY COLOR CODING. THE COLOR OF THE INSULATION ON PHASES A, B, AND C RESPECTIVELY (FOR THREE PHASE) OR PHASES A AND B RESPECTIVELY (FOR SINGLE PHASE) OF DIFFERENT VOLTAGE SYSTEMS SHALL BE AS FOLLOWS:	1. 120/208 VOLT, THREE PHASE, BLACK, RED, AND BLUE.	L. UNLESS OTHERWISE INDICATED, THE WIRING METHOD SHALL CONSIST OF THE INSTALLATION OF INSULATED CONDUCTORS INSTALLED IN ELECTRICAL METALlic AND/OR WIREMESH RACEWAYS.	M. METALLIC-ARMORED TYPE MC CABLES, WHERE ALLOWED, SHALL INCLUDE 600V INSULATION RATING, TYPE THHN/THHW OR THW/THWN-2, OR IF OTHERWISE SPECIFIED, 2 ANNEALED COPPER OR ALUMINUM AND SIGNAL CIRCUITS SHALL BE TYPE TW, THW, OR TF ANNEALED COPPER, UNDERGROUND.	N. PROVIDE INSULATED, GREEN EQUIPMENT GROUNDING CONDUCTOR IN FEEDER AND BRANCH CIRCUITS. INSULATE IN CONDUIT OR RACEWAYS, INCLUDING LIGHTING CIRCUITS. GROUNDING CONDUCTOR SHALL BE SEPARATE FROM ELECTRICAL SYSTEM NEUTRAL CONDUCTOR.	SECTION 26.05.20 - GROUNDING AND BONDING	A. GROUNDING SHALL BE COMPLETED IN ACCORDANCE WITH NFPA 70, GROUND EXPOSED, NON-CURRENT-CARRYING METALLIC PARTS OF ELECTRICAL EQUIPMENT, METALLIC RACEWAY SYSTEMS, GROUNDING CONDUCTOR IN METALLIC AND NONMETALLIC RACEWAYS, AND NEUTRAL CONDUCTOR OF WIRING SYSTEMS, WHERE GROUND FAULT PROTECTION IS OPERATED, ENSURE THAT CONNECTION OF GROUND AND NEUTRAL DOES NOT INTERFERE WITH CORRECT OPERATION OF FAULT PROTECTION.	B. EXISTING WORK: WHERE EXISTING GROUNDING AND BONDING SYSTEM COMPONENTS ARE INDICATED TO BE REUSED, THEY MAY BE REUSED ONLY WHERE THEY ARE FREE FROM CORROSION, INTEGRITY AND CONTINUITY ARE VERIFIED, AND WHERE ACCEPTABLE TO THE AUTHORITY HAVING JURISDICTION.	C. WHERE CONDUCTOR SIZE IS NOT INDICATED, SIZE TO COMPLY WITH NFPA 70.	D. USE INSULATED COPPER CONDUCTORS UNLESS OTHERWISE INDICATED. USE BARE COPPER CONDUCTORS WHERE INSTALLED UNDERGROUND OR ENCASED IN CONCRETE.	E. USE LISTED MECHANICAL CONNECTORS, COMPRESSION CONNECTORS OR EXOTHERMIC WELDED CONNECTIONS FOR ACCESSIBLE CONNECTIONS. USE EXOTHERMIC WELDED CONNECTIONS FOR UNDERGROUND, CONCEALED OR OTHERWISE INACCESSIBLE CONNECTIONS.	F. GROUNDING ELECTRODE SYSTEM: PROVIDE CONNECTION TO REQUIRED AND SUPPLEMENTAL GROUNDING ELECTRODES INDICATED TO FORM GROUNDING ELECTRODE SYSTEM. PROVIDE CONTINUOUS GROUNDING ELECTRODE CONDUCTORS WITHOUT SPLICE OR JOINT. INSTALL GROUNDING ELECTRODE CONDUCTORS IN RACEWAY WHERE EXPOSED OR SUBJECT TO PHYSICAL DAMAGE. BOND GROUNDING ELECTRODE CONDUCTOR TO METALLIC RACEWAY AT EACH END WITH BONDING JUMPER.	SECTION 26.05.20 - HANGERS AND SUPPORTS	A. PROVIDE ALL REQUIRED HANGERS, SUPPORTS, ANCHORS, FASTENERS, FITTINGS, ACCESSORIES AND HARDWARE NECESSARY FOR THE COMPLETE INSTALLATION OF THE ELECTRICAL WORK.	B. HANGERS AND SUPPORTS SHALL MEET ASTM STANDARDS FOR COATINGS, NECA 1 STANDARDS FOR WORKMANSHIP, NFPA 70, AND UL 68 FOR STRUT-TYPE CHANNEL RACEWAY AND FITTINGS.	C. 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.	D. STEEL COMPONENTS: USE CORROSION RESISTANT MATERIALS SUITABLE FOR THE ENVIRONMENT WHERE INSTALLED. USE ZINC-PLATED STEEL FOR INDOOR DRY LOCATIONS. USE GALVANIZED STEEL, STAINLESS STEEL, FIBERGLASS OR APPROVED EQUIVALENT FOR OUTDOOR, DAMP AND WET LOCATION INSTALLATIONS.	E. CONDUIT AND CABLE SUPPORTS:	A. CONDUIT STRAPS: ONE-HOLE OR TWO-HOLE, ZINC PLATED.	B. CONDUIT CLAMPS: BOLTED TYPE.	F. OUTLET BOX SUPPORTS: HANGERS AND BRACKETS SUITABLE FOR BOXES TO BE SUPPORTED.	G. METAL CHANNEL (STRUT) FRAMING SYSTEMS, FACTORY FABRICATED CONTINUOUS SLOTTED METAL CHANNEL AND ASSOCIATED FITTINGS, ACCESSORIES, AND HARDWARE FOR FIELD ASSEMBLY OF SUPPORTS, ALL LOCATIONS: USE 10 GA. GALVANIZED STEEL.	H. HANGER RODS: CONTINUOUS THREADING, ZINC-PLATED STEEL.	I. USE OF POWER-ACTUATED FASTENERS REQUIRES APPROVAL OF ARCHITECT AND STRUCTURAL ENGINEER.	J. UNLESS SPECIFICALLY INDICATED, DO NOT SUPPORT ANY ELECTRICAL COMPONENT FROM THE ROOF DECK.	K. PLASTIC AND LEAD ANCHORS ARE NOT PERMITTED.	SECTION 26.05.33 - RACEWAY AND BOXES	A. PROVIDE A COMPLETE WIRING SYSTEM OF RACEWAYS AND BOXES LOCATED AS INDICATED ON DRAWINGS AND AT LOCATIONS AS REQUIRED FOR SPLICES, TAPS, WIRE PULLING, EQUIPMENT CONNECTIONS, OPERATING AND MAINTENANCE DATA INTO SUITABLE SETS OF MANAGEABLE SIZE, BIND PROPERLY INDEXED DATA IN INDIVIDUAL HEAVY-DUTY, 3-RING, VINYL-COVERED BINDERS, WITH POCKET FOLDERS FOR FOLDED SHEET INFORMATION. MARK APPROPRIATE IDENTIFICATION ON FRONT AND SPINE OF EACH BINDER.	B. STANDARDS: MATERIALS SHALL COMPLY WITH ANSI C80, NEMA AND UL REQUIREMENTS AS INDICATED ON THE DRAWINGS.	C. MINIMUM CONDUIT SIZE: UNLESS OTHERWISE NOTED, INTERIOR - 3/4", EXTERIOR EXPOSED 3/4", EXTERIOR EXPOSED 1" - 1".	D. CONDUIT APPLICATIONS:	A. UNDER SLAB ON GRADE - SCHEDULE 40 PVC CONDUIT WITH RIGID METAL CONDUIT SWEEPS.	B. EXTERIOR IN TRENCH - USE SCHEDULE 40 OR SCHEDULE 80 PVC CONDUIT WITH RIGID METAL CONDUIT SWEEPS.	C. EXTERIOR CONCRETE ENCASED - USE TYPE EB RIGID PVC CONDUIT, TRANSITION TO RIGID METAL WHERE EMERGING FROM UNDERGROUND.	D. EXISTING INSTRUCTIONS: CONDUIT SHALL BE INSTALLED IN CONCRETE ONLY.	E. CONCEALED IN MASONRY WALLS: USE EMT WITH FLUSH MOUNTED MASONRY BOXES.	F. CONCEALED IN HOLLOW STUD WALLS: USE EMT CONDUIT OR MC CABLE (WHERE ALLOWED).	G. SPARE PARTS LIST.	H. INTERIOR DAMP OR WET LOCATIONS: USE RIGID METAL CONDUIT, INTERMEDIATE METAL CONDUIT OR SCHEDULE 40 PVC CONDUIT. PROVIDE CAST METAL OR NONMETALLIC OUTLET, JUNCTION AND PULL BOXES.	I. INSPECT DRY LOCATIONS: USE EMT CONDUIT.	J. EXPOSED FINISHED LOCATIONS: PROVIDE SURFACE MOUNTED RACEWAY AND FITTINGS. UNLESS SPECIFIED ON DRAWINGS, REQUIRES DESIGN TEAM APPROVAL. COORDINATE ALL VERTICAL PLANS OF SURFACE RACEWAY WITH ARCHITECT PRIOR TO INSTALLATION.	K. CONNECTIONS TO LUMINAIRES ABOVE ACCESSIBLE CEILINGS: USE FLEXIBLE METAL CONDUIT, MAXIMUM LENGTH 6 FEET.	L. CONNECTIONS TO VIBRATING EQUIPMENT: DRY LOCATIONS - USE FLEXIBLE METAL CONDUIT OR MC CABLE; DAMP OR WET CORROSIVE LOCATIONS - USE LIQUIDTIGHT FLEXIBLE METAL CONDUIT, MAXIMUM LENGTH 5 FEET.	E. FITTINGS:	1. COMPLY WITH NEMA FB 1 AND UL 514B. STEEL, WITH COMPRESSION FITTINGS IN DAMP OR WET LOCATIONS. SET SCREW TYPE ULTIMATE.	2. RIGID METAL CONDUIT: COMPLY WITH ANSI C80-1 AND UL 6. THREADED STEEL OR MALLEABLE IRON. USE FITTING LISTED AND LABELED AS COMPLYING WITH UL 514B IN HAZARDOUS LOCATIONS.	3. FLEXIBLE METAL CONDUIT: COMPLY WITH NEMA FB 1 AND UL 514B. USE STEEL FITTINGS.	4. LIQUIDTIGHT FLEXIBLE METAL CONDUIT: COMPLY WITH NEMA FB 1 AND UL 514B. USE STEEL FITTINGS.	5. SURFACE METAL RACEWAY: PROVIDE FITTINGS FROM SAME MANUFACTURER AS SURFACE RACEWAY. INCLUDE ALL REQUIRED ELBOWS, COUPLINGS MOUNTING CLIPS, COVERS, END FITTINGS AND DEVICE MOUNTING BRACKETS.	F. BOXES: WHERE A BOX SIZE IS NOT INDICATED, SIZE TO COMPLY WITH NFPA 70, BUT NOT LESS THAN THE FOLLOWING MINIMUM SIZE SPECIFIED:	A. USE SHEET METAL, STEEL BOXES IN DRY LOCATIONS.	B. USE CAST IRON OR CAST ALUMINUM BOXES WITH THREADED HUBS WHERE EXPOSED RIGID METAL CONDUIT IS USED.	C. USE NONMETALLIC BOXES WHERE EXPOSED RIGID PVC CONDUIT IS USED.	D. USE SUITABLE CONCRETE TYPE BOXES WHERE FLUSH-MOUNTED IN CONCRETE.	E. USE SUITABLE MASONRY TYPE BOXES WHERE FLUSH-MOUNTED IN MASONRY WALLS.	F. USE RATED COVERS SUITABLE FOR TYPE OF WALL CONSTRUCTION AND DEVICES TO BE INSTALLED. PROVIDE FLEXIBLE FITTING FOR TYPE OF WALL CONSTRUCTION AND DEVICES TO BE INSTALLED. PROVIDE LOCKABLE, HINGE COVER TYPE FOR EQUIPMENT ENCLOSURES.	H. MECHANICAL SLEEVE SEALS: MODULAR MECHANICAL, TYPE, WITH A SPRING-LOADED RUBBER LINKS SHAPED TO CONTINUOUSLY FILL ANULAR SPACE BETWEEN OBJECTS AND SLEEVE, CONNECTED WITH BOLTS AND PRESSURE PLATES TO PROVIDE A WATERIGHT SEAL AND ELECTRICAL INSULATION.	I. REMOVE EXPOSED ABANDONED RACEWAY, INCLUDING ABANDONED RACEWAY ABOVE ACCESSIBLE CEILING FINISHES. CUT RACEWAY FLUSH WITH WALLS AND FLOORS, PATCH SURFACES TO MATCH ADJACENT SURFACES.	J. DISCONNECT AND REMOVE ABANDONED OUTLETS AND DEVICES.	K. INSTALL BLANK PLATES ON ABANDONED, EMPTY BOXES.	L. EXTEND EXISTING RACEWAY AND BOX INSTALLATION USING MATERIALS AND METHODS IDENTIFIED ON DRAWINGS.	M. SURFACE MOUNTED METAL RACEWAYS: #7000 AND #2400 SINGLE-CHANNEL METAL RACEWAY BY PROVIDE PROPER CLEARANCES AND ACCESS FOR THE CONDUCTORS TO BE INSTALLED.	A. MATERIAL: GALVANIZED STEEL, MINIMUM THICKNESS 0.040".	B. FINISH: FACTORY ENGRAVED, PERMITTED OR REQUIRED BY FIELD-APPLIED OVER RYR BASE SUITABLE FOR FIELD-APPLIED TOPCOAT. COLOR BY ARCHITECT.	C. STEEL DEVICE BRACKETS AND PLATES: STEEL OVERLAP DEVICE PLATE FOR HORIZONTAL CONNECTIONS. PROVIDE PLATE OVERLAP TYPE FOR VERTICAL CONNECTIONS. 12 AWG AND SMALLER PLASTIC OVERLAPPING COVER BRACKET AND FACELATE. PLASTIC DEVICE MOUNTING BRACKETS SHALL BE 600V OR GREATER, OR IF OTHERWISE SPECIFIED, 2 ANNEALED COPPER OR ALUMINUM AND SIGNAL CIRCUITS SHALL BE TYPE TW, THW, OR TF ANNEALED COPPER, UNDERGROUND.	E. ADJUSTABLE LENGTH RACEWAY COUPLINGS: PROVIDE RACEWAY BASE SECTIONS WITH ADJUSTABLE COUPLINGS. EACH PAIR OF COUPLINGS WORKS IN CONJUNCTION WITH THE RACEWAY BASE'S SCORED LINES TO ALLOW LESS ACCURATE FIELD CUTS. THE COUPLING SHALL ACCOMMODATE 1/4" OF LATERAL MOVEMENT AND FACILITATE THE ABILITY OF THE USER TO MAINTAIN COORDINATION WITH THE WALL FRAMING TO BE CONSIDERED. EACH COUPLING SHALL PROVIDE A MEANS OF ADDING SUPPLEMENTAL GROUND SCREWS.	F. FITTINGS: FITTING MODELS SHALL INCLUDE FLAT, INTERNAL AND EXTERNAL, EXTERIOR, AND TE. ENTRANCE FITTINGS: WIRE CLIPS, COVER CLIPS, COUPLINGS, SUPPORT CLIPS, AND END CAPS. COVERS FOR FITTINGS SHALL OVERLAP ADJOINING RACEWAY SECTIONS A MINIMUM OF 1/4".	G. FITTINGS: FITTINGS SHALL BE IDENTIFIED BY COLOR CODING. THE COLOR OF THE INSULATION ON PHASES A, B, AND C RESPECTIVELY (FOR THREE PHASE) OR PHASES A AND B RESPECTIVELY (FOR SINGLE PHASE) OF DIFFERENT VOLTAGE SYSTEMS SHALL BE AS FOLLOWS:	1. 120/208 VOLT, THREE PHASE, BLACK, RED, AND BLUE.	L. UNLESS OTHERWISE INDICATED, THE WIRING METHOD SHALL CONSIST OF THE INSTALLATION OF INSULATED CONDUCTORS INSTALLED IN ELECTRICAL METALLIC AND/OR WIREMESH RACEWAYS.	M. METALLIC-ARMORED TYPE MC CABLES, WHERE ALLOWED, SHALL INCLUDE 600V INSULATION RATING, TYPE THHN/THHW OR THW/THWN-2, OR IF OTHERWISE SPECIFIED, 2 ANNEALED COPPER OR ALUMINUM AND SIGNAL CIRCUITS SHALL BE TYPE TW, THW, OR TF ANNEALED COPPER, UNDERGROUND.	N. PROVIDE INSULATED, GREEN EQUIPMENT GROUNDING CONDUCTOR IN FEEDER AND BRANCH CIRCUITS. INSULATE IN CONDUIT OR RACEWAYS, INCLUDING LIGHTING CIRCUITS. GROUNDING CONDUCTOR SHALL BE SEPARATE FROM ELECTRICAL SYSTEM NEUTRAL CONDUCTOR.	SECTION 26.05.33 - IDENTIFICATION FOR ELECTRICAL SYSTEMS	A. EXISTING WORK: UNLESS SPECIFICALLY EXCLUDED, IDENTIFY EXISTING ELEMENTS TO REMAIN AND MAKE ALL SPLICES IN ACCESSIBLE LOCATIONS. MAKE SPLICES IN CONDUCTORS NO. 10 AWG AND SMALLER DIAMETER WITH INSULATED, SPRING WIRE CONNECTORS WITH PLASTIC CAPS. MAKE SPLICES IN CONDUCTORS NO. 14 AWG AND LARGER WITH DIECAST OR ALUMINUM SOLDERLESS PRESS-ON CONNECTORS WITH INSULATING COVERS. MAKE SPLICES IN CONDUCTORS NO. 6 AND LARGER WITH PLASTIC DIECAST OR ALUMINUM SOLDERLESS PRESS-ON CONNECTORS WITH INSULATING COVERS.	B. IDENTIFICATION: PROVIDE IDENTIFICATION PRODUCTS TO BE PLAINLY VISIBLE FOR EXAMINATION, ADJUSTMENT, SERVICING AND MAINTENANCE.	C. IDENTIFICATION PRODUCTS: CENTERED, LEVEL AND PARALLEL WITH LINES OF ITEM BEING IDENTIFIED.	SECTION 26.05.33 - IDENTIFICATION FOR ELECTRICAL SYSTEMS	A. EXISTING WORK: UNLESS SPECIFICALLY EXCLUDED, IDENTIFY EXISTING ELEMENTS TO REMAIN AND MAKE ALL SPLICES IN ACCESSIBLE LOCATIONS. 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MAKE SPLICES IN CONDUCTORS NO. 14 AWG AND LARGER WITH DIECAST OR ALUMINUM SOLDERLESS PRESS-ON CONNECTORS WITH INSULATING COVERS. MAKE SPLICES IN CONDUCTORS NO. 6 AND LARGER WITH PLASTIC DIECAST OR ALUMINUM SOLDERLESS PRESS-ON CONNECTORS WITH INSULATING COVERS.	B. IDENTIFICATION: PROVIDE IDENTIFICATION PRODUCTS TO BE PLAINLY VISIBLE FOR EXAMINATION, ADJUSTMENT, SERVICING AND MAINTENANCE.	C. IDENTIFICATION PRODUCTS: CENTERED, LEVEL AND PARALLEL WITH LINES OF ITEM BEING IDENTIFIED.	SECTION 26.05.33 - IDENTIFICATION FOR ELECTRICAL SYSTEMS	A. EXISTING WORK: UNLESS SPECIFICALLY EXCLUDED, IDENTIFY EXISTING ELEMENTS TO REMAIN AND MAKE ALL SPLICES IN ACCESSIBLE LOCATIONS. MAKE SPLICES IN CONDUCTORS NO. 10 AWG AND SMALLER DIAMETER WITH INSULATED, SPRING WIRE CONNECTORS WITH PLASTIC CAPS. MAKE SPLICES IN CONDUCTORS NO. 14 AWG AND LARGER WITH DIECAST OR ALUMINUM SOLDERLESS PRESS-ON CONNECTORS WITH INSULATING COVERS. MAKE SPLICES IN CONDUCTORS NO. 6 AND LARGER WITH PLASTIC DIECAST OR ALUMINUM SOLDERLESS PRESS-ON CONNECTORS WITH INSULATING COVERS.	B. IDENTIFICATION: PROVIDE IDENTIFICATION PRODUCTS TO BE PLAINLY VISIBLE FOR EXAMINATION, ADJUSTMENT, SERVICING AND MAINTENANCE.	C. IDENTIFICATION PRODUCTS: CENTERED, LEVEL AND PARALLEL WITH LINES OF ITEM BEING IDENTIFIED.	SECTION 26.05.33 - IDENTIFICATION FOR ELECTRICAL SYSTEMS	A. EXISTING WORK: UNLESS SPECIFICALLY EXCLUDED, IDENTIFY EXISTING ELEMENTS TO REMAIN AND MAKE ALL SPLICES IN ACCESSIBLE LOCATIONS. MAKE SPLICES IN CONDUCTORS NO. 10 AWG AND SMALLER DIAMETER WITH INSULATED, SPRING WIRE CONNECTORS WITH PLASTIC CAPS. MAKE SPLICES IN CONDUCTORS NO. 14 AWG AND LARGER WITH DIECAST OR ALUMINUM SOLDERLESS PRESS-ON CONNECTORS WITH INSULATING COVERS. MAKE SPLICES IN CONDUCTORS NO. 6 AND LARGER WITH PLASTIC DIECAST OR ALUMINUM SOLDERLESS PRESS-ON CONNECTORS WITH INSULATING COVERS.	B. 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IDENTIFICATION PRODUCTS: CENTERED, LEVEL AND PARALLEL WITH LINES OF ITEM BEING IDENTIFIED.	SECTION 26.05.33 - IDENTIFICATION FOR ELECTRICAL SYSTEMS	A. EXISTING WORK: UNLESS SPECIFICALLY EXCLUDED, IDENTIFY EXISTING ELEMENTS TO REMAIN AND MAKE ALL SPLICES IN ACCESSIBLE LOCATIONS. MAKE SPLICES IN CONDUCTORS NO. 10 AWG AND SMALLER DIAMETER WITH INSULATED, SPRING WIRE CONNECTORS WITH PLASTIC CAPS. MAKE SPLICES IN CONDUCTORS NO. 14 AWG AND LARGER WITH DIECAST OR ALUMINUM SOLDERLESS PRESS-ON CONNECTORS WITH INSULATING COVERS. MAKE SPLICES IN CONDUCTORS NO. 6 AND LARGER WITH PLASTIC DIECAST OR ALUMINUM SOLDERLESS PRESS-ON CONNECTORS WITH INSULATING COVERS.	B. IDENTIFICATION: PROVIDE IDENTIFICATION PRODUCTS TO BE PLAINLY VISIBLE FOR EXAMINATION, ADJUSTMENT, SERVICING AND MAINTENANCE.	C. IDENTIFICATION PRODUCTS: CENTERED, LEVEL
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