



Dear Prospective Bidder:

Kinexus Group is a 501c3 private non-profit organized in 1983 to provide workforce and business development services to the tri-county region of Berrien, Cass and Van Buren Counties. It is governed by a board consisting of private industry, community based organizations, education, labor, non-profits, and governmental officials from the three county area. Kinexus Group's family of subsidiaries for which we may be conducting an RFP process include: Michigan Works! Berrien-Cass- Van Buren, Market Van Buren, and Youth Solutions. Kinexus Group serves as the Education Service Provider for the Bridge Academy of Southwest Michigan.

We are seeking proposals from qualified bidders to provide [construction services for the Bridge Academy of Southwest Michigan \(BASM\)](#).

Request for Proposal (RFP) applications as well as an Intent to Bid form will also be available immediately online at <https://www.miworks.org/public-information>. Intent to bid forms are important to submit so that your organizational representative receives future communication regarding this bid process including questions and answers during the process.

If you have questions regarding the project documents in the RFP, please e-mail stacy@kinexus.org no later than the deadline for questions listed in the attached timeline. Please note that **no** verbal Q & A will be permitted and all proposers who wish to e-mail questions are encouraged to file an Intent-to-Bid form with Kinexus Group.

During the bid rating process, Kinexus Group staff may contact you for clarification or additional information.

Thank you for your interest.

Sincerely,

Stacy Neidlinger
Procurement Specialist



BASM Construction

REQUEST FOR PROPOSAL (RFP) TIMELINE

Date	Action
By 6/2/2021	Notice Sent to Bidders List with RFP
By 6/2/2021	Kinexus Group has RFP application available on miworks.org
By 6/2/2021	Legal Notice sent to Newspaper for publication
By 6/8/2021	Request for optional walk through made to Stacy Neidlinger at 269-215-4899
By 6/11/2021	Deadline for receipt of Bidder Questions at 8:00 AM Eastern
6/17/2021	Response to Bidder Questions by 5:00 PM Eastern
7/1/2021	Proposals due at Kinexus Group by 12:00 Noon Eastern
7/5-9/2021	Bidder Interviews
7/31/2021	Approximate Bidder Notification <i>linked to State of Michigan Licensing and Regulatory Affairs Bureau of Construction Codes and Bureau of Fire Services approval and issuance of permits</i>

The dates set forth above are for informational purposes only and Kinexus Group reserves the right to change the dates.



Request for Proposal BASM Construction

Statement of Need

Kinexus Group is seeking construction services to attain an education certificate of occupancy for fall 2021 for the BASM located in a portion of 499 West Main Street, Benton Harbor, MI 49022 to comply with regulations associated with school facilities as required by the Michigan Department of Education through the jurisdiction of the State of Michigan Licensing and Regulatory Affairs Bureau of Construction Codes and Bureau of Fire Services and other necessary authorities having jurisdiction alongside minimal owner requested improvements.

Bidder Qualifications

To be considered for award of this RFP, the proposing individual or company must meet the following minimum qualifications:

- Have necessary construction education, skill, knowledge, and experience required for overseeing building construction
- Possess all applicable licenses and insurances to legally perform the job requested in this RFP
- Are not debarred from doing business with the Federal Government

Proposal Requirements

This is not a solicitation of sealed bids. Kinexus Group reserves the right, for any reason, to accept or reject any one or more proposals, to negotiate the terms and specifications for the facility, to modify any part of the RFP, or to issue a new RFP. The proposer assumes all liability and the use of such information in developing their proposal. Kinexus Group assumes no responsibility or liability for costs incurred by the proposer in the preparation of a proposal and response to this RFP. Materials submitted in connection with this RFP are for the exclusive use of Kinexus Group.

Kinexus Group reserves the right to request additional information for clarification purposes or to allow corrections to errors or omissions provided errors or omissions do not provide a competitive advantage to any proposer.

The selected proposal may be subject to further negotiation if deemed, at Kinexus Group's sole discretion, to be advantageous to Kinexus Group.

Submission of a proposal indicates acceptance of all terms and conditions set out in this solicitation.

Proposers **may** be requested to appear before the Chief Executive Officer or any designated Senior Management Staff to further discuss the submitted proposal.

The resulting agreement will be for modifications made to an existing facility that will allow it to be compliant with requirements for an educational facility certificate of occupancy.

Submission Document Checklist

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|---|---|
| ☐ Attachment I: Cover Page | ☐ Additional Management Information |
| ☐ Attachment II: Proposal Narrative | ☐ Attachment VI: Certification of Debarment and Lobbying |
| ☐ Attachment III: Project Bid Documents (Drawings) | ☐ Attachment VI: Certification Regarding Lobbying |
| ☐ Attachment IV: Project Manual (Specifications) | ☐ Attachment VI: Equal Opportunity Policy Statement |
| ☐ Attachment V: Bid Add Alternate 1 | |
| ☐ One Page Summary | |

A. KINEXUS GROUP AGENCY BACKGROUND

Kinexus Group is a private, non-profit, community-based organization that operates within the Workforce, Community, and Business Development arena in the tri-county area. A Workforce Development Board (WBD) comprised of representatives from business, education, economic development and community organizations governs the agency and provides direction for staff operations. Kinexus Group acts as the 'parent' company of Michigan Works! BCVB, who delivers their Workforce Development activities. Kinexus Group is the Education Service Provider for the BASM.

Kinexus Group Competitive Procurement Policy: All procurement transactions shall be conducted in a manner to provide, to the maximum extent practical, open and free competition. Awards shall be made to the bidder or offeror whose bid or offer is responsive to the solicitation and is most advantageous to the recipient, price, quality and other factors considered. Solicitations shall clearly set forth all requirements that the bidder or offeror shall fulfill in order for the bid or offer to be evaluated by the recipient. Any and all bids or offers may be rejected when it is in the recipient's interest to do so.

B. RENOVATION FOR ATTAINING AN EDUCATION CERTIFICATE OF OCCUPANCY FROM THE STATE OF MICHIGAN

An approximately 6,000 SF portion of the facility located at 499 West Main Street, Benton Harbor, MI 49022 will be updated to education use classification for use as a public charter school.-The facility must meet all codes and regulations required by the authorities having jurisdiction over public charter schools and be ADA compliant.

1. **Americans With Disabilities Act (ADA) Compliance**

The Proposer must also indemnify and hold Kinexus Group harmless from any and all liabilities arising out of building changes required by the ADA. Proposed building must be ADA compliant. Proposer must acknowledge and agree to expend all monies necessary to comply with Public Law, also known as the Americans with Disabilities Act (ADA), including all incorporated statutes, rules and regulations.

Section 188 of the WIOA.

- Section 504 of the Rehabilitation Act of 1998, as amended.
- Titles I and II of the Americans with Disabilities Act (ADA).
- The ADA Accessibility Guidelines or the Uniform Federal Accessibility Standards.

D. **SUCCESSFUL PROPOSER RESPONSIBILITIES**

The successful proposer shall have all of the following responsibilities:

- **Coordination:** Initiate and coordinate all aspects of this project's construction including but not limited to picking up permits, subcontractor bidding, construction activity, shop drawing and submittal coordination and review, and inspections culminating in a successful conclusion securing an education certificate of occupancy from the State of Michigan.
- **Project Management:** Provide or assign an individual that will act as the Project Manager to oversee all aspects of the work, be the main contact for Kinexus Group, and throughout the project participate in intermittent and regularly scheduled project meetings anticipated to be weekly during construction.
- **Scheduling:** Time is of the essence. Provide a regularly updated schedule that responds to the activities of the project with key dates for progress, equipment, and materials procurement in an expeditious and economical manner.
- **Long Lead Items:** Continuously advise on procurement strategy for of long lead items to avoid project delay.
- **Fire Safety Related Submissions:** Include vendor(s) for all fire safety related aspects including but not limited to the delegated design, submission, and approval of fire suppression system as well as fire alarm systems.
- **Construction:** Provide all labor and materials to construct improvements of the BASM space. Construction must be done in compliance with the Uniform Public Construction Cost Accounting Act, Public Contract Code 22000 et seq.
- **Punchlist:** Conduct project walkthrough punch list identification and completion in preparation for final inspections to foster complete conditions for approval. Conduct post-inspection approval punch list for final project completion with Owner.
- **Means, Methods, and Safety:** Responsible for construction means, methods, techniques, sequences or procedures, and for safety precautions and programs in connection with the project.
- **Owner Occupancy:** Owner intends to occupy adjacent space in the building during construction and the project upon substantial completion. Cooperate with owner to minimize conflict and to facilitate Owner's operations. Schedule the work to accommodate owner occupancy.
- **Security:** Provide at all times site, building, and materials security. Superintendent will need to be on site at all times while activity is taking place.

- **Quality:** Review and reject work that does not conform to the construction documents or that do not comply with any applicable law, statute, building code, rule or regulation for authorities having jurisdiction or work that is not consistent with customary workmanship.
- **Understanding of Scope:** Be thoroughly familiar with and understands the requirements of the project scope and aspects likely to have an impact.
- **Budget:** Furnish on a Cost Plus with a Guaranteed Maximum Price (GMP) basis in an expeditious and economical manner.
- **Addendum and Bulletins:** Respond to addendum and bulletins which become part of the contract documents throughout the project as required to attain the education certificate of occupancy.
- **Professionalism:** Maintain a spirit of collaboration and open communication among the project team fostering clear shared understanding and preemptive problem solving.
- **Closeout:** Provide electronic package of all project closeout documentation including documentation necessary for “as-built” drawings, systems operations and maintenance instructions, material, and equipment warranty. Conduct closeout walkthrough training with Owner facility representative to ensure transfer of operational and maintenance knowledge.
- **One Year Warranty Walkthrough:** Approximately one year after construction, coordinate and conduct a walkthrough with the Owner to identify warranty repair items and coordinate completion with subcontractors.
- **Contract:** Project to utilize AIA contract documents.

The following items will need to be submitted for the project and bid alternate 1.

Kinexus Group will provide a contact person for this project who will respond directly to the successful proposer’s inquiries and who will coordinate with the proposer’s project manager. The successful proposer will periodically report to the Chief Operations Officer on the progress of the project.

E. CLOSING AND SUBMISSION

Electronic or hardcopy proposals must be received by Kinexus Group no later than the deadline listed in the attached timeline. Electronic proposals must be submitted in PDF or MS Office file formats.

Send electronic proposals to: stacy@kinexus.org

*Mail Hardcopy proposals to: Stacy Neidlinger
Procurement Specialist
Kinexus Group
330 W. Main Street, Suite 110
Benton Harbor, MI 49022

*Note: It is your responsibility to assure that your bid/questions have arrived. Please confirm receipt of electronic proposals and questions by contacting Stacy Neidlinger at 269-215-4899. **If you are sending a hard copy version, please include an electronic version scanned onto a thumb drive or something similar for electronic archival purposes. This should include all attachments/submitted items. *Due to remote work, electronic submission is preferred. If you intend to mail a hard copy, please contact me to make arrangements so that it is received in time.***

F. INQUIRIES

If you have specific questions regarding the goods and services requested in this RFP, submit them via email to Stacy Neidlinger at stacy@kinexus.org no later than the deadline listed in the attached timeline. **Verbal Q&A will not be permitted.** To ensure equitable dissemination of information, responses to e-mailed questions will be forwarded to all proposal offerors who identify themselves as interested bidders.

G. COST OF PROPOSAL PREPARATION

All costs incurred in the preparation of a response to this RFP will be at the responsibility of the offeror and will not be reimbursed by Kinexus Group.

H. RIGHT TO REJECT

Kinexus Group reserves the right to reject any and all proposals, in whole or in part, to waive any informalities or irregularities in the proposals received, and to accept any proposal in whole or in part that is deemed most favorable to Kinexus Group.

I. SELECTION CRITERIA

Proposals will be evaluated on the following criteria using a weighted scale.

Criteria	Maximum Points Possible
Overall Project Approach and Schedule	20
Materials, Procurement Outlook	20
Gross Maximum Price (GMP)	40
Previous School Construction Experience	10
Bidder Interviews	10
Total Possible Points	100

ATTACHMENT I: COVER PAGE
Request for Proposal – please fill in this form

Applicant Organization

Federal ID Number

Street Address

City

State

Zip Code

Printed Name and Title of Applicant's Signatory Authority

Telephone Number

Fax Number

Email Address

Certification

I certify that I have been authorized to submit and sign this proposal on behalf of the submitting organization(s). In addition, I certify that the entire proposal is true and accurate and to the best of my knowledge the projected costs are reasonable and necessary for the proposed Service and do not duplicate other funds already available, or which will be available, to pay the projected costs. I also certify that my organization will implement this project in compliance with the stipulations and guidelines set forth by Kinexus Group.

Signature of Authorized Representative

Date

ATTACHMENT II: PROPOSAL NARRATIVE

PROPOSAL NARRATIVE FORMAT / STYLE REQUIREMENTS FOR RESPONSE:

- ✓ Number pages
- ✓ Use 11-point font
- ✓ Limit proposal narrative to a maximum of 10 pages – excluding Attachments

A. SUMMARY

Provide a concise one-page summary of the proposed work. The summary should give a description of the proposal and what is included. This should be written in terms that someone with no understanding of building design could understand.

B. REQUIREMENTS

Discuss, point by point and in order, how the proposed construction plan either meets, exceeds, or falls short of the requirements as specified in this RFP.

C. SCHEDULE

Outline the activities and timeline. Define a project schedule for completing all necessary project activity from permit to certificate of occupancy, turnover, and closeout in most expeditious and economical manner for the earliest possible Fall school opening.

D. QUALIFICATIONS AND EXPERIENCE

Discuss your qualifications and experience with school construction including a list of project work similar to the work requested in this RFP. Included proof of licensure and insurance.

E. BUDGET AS COST PLUS WITH A GUARANTEED MAXIMUM PRICE (GMP) Detail the project, costs from project beginning to end inclusive of all costs including but not limited to labor, materials, permits, architectural, mechanical, electrical, plumbing, fire alarm system, fire suppression system, etc. as Cost-Plus Guaranteed Maximum Price (GMP). Prepare and furnish GMP as summation of general conditions, final bid tabulation summary by subcontractor and division, and final budget amount with details and scope clarifications, construction contingency, and overhead and profit. Provide what the budget impact (Project Management Rate) would be if the project goes over the agreed upon timeline (IE: daily rate).

On separate line/column include cost addition and schedule impact of Bid Add Alternate 1.

ATTACHMENT VI: CERTIFICATIONS

Debarment and Lobbying

CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION Lower Tier Covered Transactions
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This certification is required by the regulations implementing Executive Order 12549 Debarment and Suspension (3 CFR, 1986 Comp.); Executive Order 12689 Debarment and Suspension (3 CFR, 1989 Comp.); 2 CFR Part 215, Appendix A, Section 8; 13 CFR Part 145; and 29 CFR Part 98, Section 98.510, Participants' Responsibilities. The regulations were published as Part VII of the May 26, 1988 Federal Register (pages 19160-19211).

**BEFORE COMPLETING CERTIFICATION, READ ATTACHED INSTRUCTIONS
THAT ARE AN INTEGRAL PART OF THE CERTIFICATION.**

- (1) The prospective recipient of federal assistance funds certified, by submission of this proposal, that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from participation in this transaction by any federal department or agency.
- (2) Where the prospective recipient of federal assistance funds is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

Printed Name and Title of Authorized Representative

Signature of Authorized Representative

INSTRUCTIONS FOR CERTIFICATION

1. By signing and submitting this proposal, the prospective recipient of Federal assistance funds is providing the certification as set out below.
2. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective recipient of Federal assistance funds knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the Department of Labor (DOL) may pursue available remedies, including suspension and/or debarment.
3. The prospective recipient of Federal assistance funds shall provide immediate written notice to the person to whom this proposal is submitted if at any time the prospective recipient of Federal assistance funds learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
4. The terms "covered transaction", "debarred", "suspended", "ineligible", "lower tier covered transaction", "participant", "proposal" and "voluntarily excluded", as used in this clause have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations.
5. The prospective recipient of Federal assistance funds agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any low tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized the DOL.
6. The prospective recipient of Federal assistance funds further agrees by submitting his proposal that it will include clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transactions", without modification, in all lower tier covered transactions and in all solicitation for lower tier covered transactions.
7. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it known that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the List of Parties Excluded from Procurement or Nonprocurement Programs.
8. Nothing contained in the foregoing shall be construed to require establishing a system of records on order to render in good faith the certification required by this clause. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
9. Except for transactions authorized under paragraph 5 of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntary excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the DOL may pursue available remedies, including suspension and/or debarment.

CERTIFICATION REGARDING LOBBYING

The undersigned certifies, to the best of his or her knowledge and belief that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan or cooperative agreement.
2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement the undersigned shall complete and submit Standard Form-LLL "Disclosure Form to Report Lobbying," in accordance with its instructions.
3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants and contract under grants, loans, and cooperative agreements) and that all Subrecipient shall certify and disclose accordingly.
4. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$10,000 and not more than \$100,000 for each such failure.

SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL

TITLE

APPLICATION ORGANIZATION

DATE

EQUAL OPPORTUNITY POLICY STATEMENT

State of Michigan (WDA/TIA)- KINEXUS GROUP

THIS POLICY APPLIES TO ALL PROGRAMS ADMINISTERED BY THE Workforce Development Agency, State of Michigan and Kinexus Group. It is the policy of the State of Michigan and Kinexus Group to assure that equal opportunity will be provided under any contract, program, or activity funded in whole or in part with funds made available by or through any state department, institution, or agency. All recipients of financial assistance are required to assure the equitable treatment of all persons in the opportunity for employment as well as their access to and receipt of, program services without discrimination based upon religion, race, color, national origin, age, sex, height, weight, marital status, arrest record, handicap, or other non-merit factors.

This policy applies to all programs administered by the State, subgrantees, contractors, and subcontractors. All personnel will actively promote equal employment opportunity within their respective organizational units. This policy extends to the active recruitment of female and minority-owned enterprises in the delivery of services related to employment and training.

This policy will affect all employment and training practices including, but not limited to, recruitment, hiring, transfer, promotions training, compensation, benefits, layoffs, placements, and selection of subgrantees and contractors.

To ensure compliance with the established policy, a goal-oriented program has been structured with specific targets and timetables. Failure on the part of subgrantees and contractors to comply with this policy will jeopardize initial, continued, or renewed funding under federal and state-funded programs. The Workforce Innovation Act(WIOA) further requires for all programs receiving WIOA funds the following assurance:

As a condition to the award of financial assistance under WIOA from the Workforce Development Agency, State of Michigan the grant applicant assures, with respect to operation of the WIOA-funded program or activity and all agreements or arrangements to carry out the WIOA-funded program or activity, that it will comply fully with nondiscrimination and equal opportunity provisions of the Workforce Innovation and Opportunity Act of 2014, as amended; including the nontraditional Employment for Women Act of 1991; Title VI of the Civil Rights Act of 1964, as amended; Section 504 of the Rehabilitation Act of 1973, as amended; the Age Discrimination Act of 1975, as amended; Title IX of the Education Amendments of 1972, as amended; and with all applicable requirements imposed by or pursuant to regulations implementing those laws, including but not limited to 29 CFR Part 38. The United States has the right to seek judicial enforcement of this assurance.

Issued by: Workforce Development/Talent Agency, State of Michigan

Signature of Contractor Authorized Representative

This section is for informational purposes only; should you be awarded the contract, these requirements must be strictly adhered to.

A. STIPULATIONS

1. In connection with the performance of work, the CONTRACTOR agrees or certifies as follows:
The CONTRACTOR will not discriminate against any employee, applicant for employment, or applicant for services provided by any DLEG funds because of Race, Religion, Color, National Origin, Sex, Age, Height, Weight, Marital Status, Disability, Arrest Without Conviction, or other categories or groups protected by the law. The CONTRACTOR will take affirmative action to ensure that applicants receive services, that applicants are employed and that employees are treated during employment without regard to Race, Religion, Color, National Origin, Sex, Age, Height, Weight, Marital Status, Handicap, Arrest Without Conviction, or other categories or groups protected by law. Such action will include, but is not limited to, the following: Employment, Upgrading, Demotion or Transfer, Recruitment Advertising, Layoff or Termination, Rates of Pay or other forms of Compensation, and Selection for Training, including Apprenticeship. See:
 - a. Executive Order 11246, as amended by 11375 (41 CFR parts 60-64);
 - b. The Rehabilitation Act of 1973, as amended, Sections 503 and 504 (29 USC 793 and 794), PL 93-112;
 - c. The Americans with Disabilities Act of 1990 (42 USC 12101 et seq.), PL 101-336;
 - d. The Immigration and Naturalization Act of 1986 (8 USC 1324a), PL 99-603;
 - e. The Age Discrimination Act of 1975, as amended (29 USC 621), PL 94-135;
 - f. The Family and Medical Leave Act of 1993 (29 USC 2601), PL 103-3;
 - g. The Pregnancy Discrimination Act of 1975 (92 Stat 2076), PL 95-555;
 - h. The Civil Rights Act of 1964, Titles VI and VII (42 USC 2000 et seq.), PL 88-352;
 - i. The Civil Rights Act of 1968, Title VIII (42 USC 3601 et seq.), PL 90-284;
 - j. The Civil Rights Restoration Act of 1991 (20 USC 1686-1688), 29 USC 706 and 709, 42 USC 2000[d]-4[a] and 6107) PL 100-259;
 - k. The Education Amendments of 1972, Title IX, as amended (29 USC 1681), PL 92-318, PL 93-568, and PL 94-482;
 - l. The Older Americans Act of 1965 as amended (47 USC 3001 and 3056 et seq.), PL 89-73;
 - m. Military Selective Service Act, Title I, Section 3, as amended (50 USC 453), PL 97-86;
 - n. Affirmative Action Provisions of the Vietnam Era Veterans' Readjustment Assistance Act, as amended (38 USC 4218), PL 72-74;
 - o. Equal Pay Act of 1963, as amended (29 USC 206d, PL 88-38;
 - p. The Privacy Act of 1974 (5 USC 522a[e][3], PL 93-579;
 - q. The Elliott Larsen-Civil Rights Act, as amended (MCLA 37.2101 et seq.), 1976, PA 456;
 - r. The Whistle Blower's Protection Act (MCLA 15.361 et seq.), 1980 PA 469;
 - s. Persons with Disabilities Civil Rights Act (MCLA 37.1101 et seq.) PA 220 of 1976;
 - t. The Federal Hatch Act (5 U.S.C. Sections 1501-1508)

2. The CONTRACTOR must comply with all applicable Federal and State laws including, but not limited to, the following:
 - a. The Michigan Youth Employment Standards Act, as amended (MCLA 409.101-124), PA 90 of 1978; or the Federal Child Labor Regulations, Part 570, as amended, whichever is more stringent.
 - b. Michigan Minimum Wage Law, as amended (MCLA 408.381-398), PA 154 of 1964;
 - c. Michigan Payment of Wages and Fringe Benefits, as amended (MCLA 408.471-583), PA 390 of 1978; and Overtime Protection (MCLA 408.477), PA 390 of 1978);
 - d. Michigan Workers' Disability Compensation Act, as amended (MCLA 418.101-941); and Administrative Rules, PA 317 of 1969;
 - e. Michigan Open Meetings Act, as amended (MCLA 15.261 et. seq), PA 267 of 1976;
 - f. Michigan Contracts with Employers Engaging in Unfair Practices, as amended (MCLA 423.321 et seq.), PA 278 of 1980;
 - g. Michigan Occupational Safety and Health Act, as amended (MCLA 408.1001-1094); PA 154 of 1974;
 - h. Michigan Right to Know Act (MCLA 408.1014a-1014n), PA 80 of 1986;
 - i. MCL 35.1093 (PA 39 of 1994), insuring delivery of effective and equitable employment services to Veterans;
 - j. Social Welfare Act 280, P.A. 1939, as amended (MCLA 400.55a and 400 56f);
 - k. Title IV-F of the Social Security Act (P.L. 74-271), as amended;
 - l. Michigan welfare policy provisions; Public Act 223 of 1995;
 - m. Title IV-A of the Social Security Act (P.L. 74-271) as amended;
 - n. Forty-five Code of Federal Regulations (CFR); Parts 201-257;
 - o. Food Stamp Act of 1977 (P.L. 105-33) as amended;
 - p. Seven Code of Federal Regulations (CFR); Parts 271, 272, 273;
 - q. The Workforce Investment Act of 1998.
 - r. The Workforce Innovation and Opportunity Act
3. Progress payments and final payments to the CONTRACTOR are subject to KINEXUS GROUP's approval based upon the progress and quality of the CONTRACTOR's performance.
4. The Contract is subject to audit.
5. The CONTRACTOR shall be liable to repay, from other than Federal, State or contract funds, any disallowed costs.
6. The CONTRACTOR shall have all personnel bonded who are authorized to act in its behalf for the purpose of receiving funds. The amount of coverage shall be the lessor of:
 - a. \$1,000,000; or
 - b. The greatest amount planned for immediate needs during the contract period.

7. The CONTRACTOR shall indemnify, defend, and hold harmless KINEXUS GROUP, its departments, divisions, agencies, sections, commissions, officers, employees, and agents, from and against all losses, liabilities, penalties, fines, damages, and claims (including taxes), and all related costs and expenses (including reasonable attorneys' fees and disbursements and costs of investigation, litigation, settlement, judgment, interest, and penalty), arising from or in connection with any of the following:
- a. any claim, demand, action, citation, or legal proceeding against KINEXUS GROUP, its employees and agents arising out of or resulting from (1) the product provided or (2) performance of the work, duties, responsibilities, actions, or omissions of the CONTRACTOR or any of its subcontractors under this contract;
 - b. any claim, demand, action, citation, or legal proceeding against KINEXUS GROUP, its employees and agents arising out of or resulting from a breach by the CONTRACTOR of any representation or warranty made by the CONTRACTOR in this contract;
 - c. any claim, demand, action, citation, or legal proceeding against KINEXUS GROUP, its employees and agents arising out of or related to occurrences that the CONTRACTOR is required to insure against as provided for in this contract;
 - d. any claim, demand, action, citation, or legal proceeding against KINEXUS GROUP, its employees and agents arising out of or resulting from the death or bodily injury of any person, or the damage, loss, or destruction of any real or tangible personal property, in connection with the performance of services by the CONTRACTOR, by any of its subcontractors, by anyone directly or indirectly employed by the CONTRACTOR, or by anyone for whose acts the CONTRACTOR may be liable; provided, however, that this indemnification obligation shall not apply to the extent, if any, that such death, bodily injury, or property damage is caused solely by the negligence or reckless or intentional wrongful conduct of KINEXUS GROUP;
 - e. any claim, demand, action, citation, or legal proceeding against KINEXUS GROUP, its employees and agents which results from an act or omission of the CONTRACTOR or any of its subcontractors in its capacity as an employer of a person;
 - f. any claim, demand, action, citation, or legal proceeding against KINEXUS GROUP, its employees and agents incurred in connection with any action or proceeding threatened or brought against the state to the extent that such action or proceeding is based on a claim that any piece of equipment, software, commodity, or service supplied by the CONTRACTOR or its subcontractors, or the operation of such equipment, software, commodity, or service, or the use or reproduction of any documentation provided with such equipment, software, commodity, or service infringes any United States or foreign patent, copyright, trade secret, or other proprietary right of any person or entity, which right is enforceable under the laws of the United States. In addition, should the equipment, software, commodity, or service, or the operation thereof, become, or in the CONTRACTOR's opinion be likely to become, the subject of a claim of infringement, the KINEXUS GROUP shall at the CONTRACTOR's sole expense (i) procure for the state the right to continue using the equipment, software, commodity, or service or, if such option is not reasonably available to the CONTRACTOR, (ii) replace or modify the same with equipment, software, commodity, or service of equivalent function and performance so that it becomes non-infringing, or, if such option is not reasonably available to the CONTRACTOR, (iii) accept its return by the state with appropriate

credits to the state against the CONTRACTOR's charges and reimburse the state for any losses or costs incurred as a consequence of the state ceasing its use and returning it.

In any and all claims against KINEXUS GROUP, or any of its agents or employees, by any employee of the CONTRACTOR or any of its subcontractors, the indemnification obligation under the contract shall not be limited in any way by the amount or type of damages, compensation or benefits payable by or for the CONTRACTOR under workers' disability compensation acts, disability benefits acts, or other employee benefits acts. This indemnification clause is intended to be comprehensive. Any overlap in subclauses, or the fact that greater specificity is provided as to some categories of risk, is not intended to limit the scope of indemnification under any other subclause.

8. KINEXUS GROUP may cancel this plan for any of the following reasons:

- a. Default of the Contractor: In case default by the CONTRACTOR, KINEXUS GROUP may immediately cancel the plan without further liability to KINEXUS GROUP, its departments, agencies, and employees. KINEXUS GROUP may procure the articles or services from other sources, and may hold the CONTRACTOR responsible for any excess costs incurred. Default is defined as the failure of the CONTRACTOR to fulfill the obligations of the quotation, contract, or purchase order.
- b. Lack of Further Need for the Service or Commodity: In the event the state no longer needs the service or commodity specified in the plan or purchase order due to program changes, changes in law, rules or regulations, relocation of offices, or insufficient funding, KINEXUS GROUP may cancel the contract or purchase order, without further liability to KINEXUS GROUP, its department, and employees by giving the CONTRACTOR written notice of such cancellations 30 days prior to the date of cancellation.
- c. Failure of the Legislature or the Federal Government to Provide the Necessary Funding: In the event the Legislature or the federal government fails to provide or terminates the funding necessary for this plan, KINEXUS GROUP may cancel the plan by providing written notice to the CONTRACTOR 30 days prior to the date of cancellation provided, however, that in the event the action of the Legislature or federal government results in an immediate absence or termination of funding, cancellation may be made effective immediately upon delivery of written notification to the CONTRACTOR. In the event of a termination under this sub-paragraph, the CONTRACTOR shall, unless otherwise directed by KINEXUS GROUP in writing, immediately take all reasonable steps to terminate its operations under and to avoid and/or minimize further expenditures under the plan.
- d. Upon Order of a Court or Direction by the Federal Government: In the event of a court order halting or suspending activities under the plan or, in the case of a plan involving federal funds or otherwise subject to federal oversight, issuance of an order or directive by the federal government halting or suspending activities under the plan, the state shall promptly notify KINEXUS GROUP in writing of the entry or receipt of such order or directive. In the event of a termination or suspension of the plan under this sub-paragraph, KINEXUS GROUP shall, unless otherwise directed by the state in writing, immediately take all reasonable steps to terminate its operations and to avoid and/or minimize further expenditures under the plan.
- e. Criminal Conviction: KINEXUS GROUP may immediately cancel the plan or purchase order without further liability to KINEXUS GROUP, its departments, and employees, if the CONTRACTOR or an officer of the CONTRACTOR, is convicted of a criminal offense incident to

the application for or performance of a state, public, or private contract or subcontract; or convicted of a criminal offense including, but not limited to, any of the following: embezzlement, theft, forgery, bribery, falsification or destruction of records, receiving stolen property, attempting to influence a public or KINEXUS GROUP employee to breach the ethical conduct standards for KINEXUS GROUP or State of Michigan employees; convicted under state or federal antitrust statutes; or convicted of any other criminal offense which in the sole discretion of KINEXUS GROUP, reflects on the Workforce Development Board's business integrity.

9. The performance of work under this contract may be terminated in whole or in part, whenever for any reason, KINEXUS GROUP shall determine that termination is in the best interests of KINEXUS GROUP. Any such termination shall be instituted by delivery to the CONTRACTOR of a written notice specifying the extent to which performance of the work under the contract is terminated and the date on which termination becomes effective. The contract shall be equitably adjusted to compensate for termination and modified accordingly.
10. The CONTRACTOR shall not assign or subcontract any part of this contract or the responsibilities stated herein without prior written permission from Kinexus Group in compliance with 20CFR 626.420 (h).
11. The CONTRACTOR must comply with Section .42 of OMB Circular A-110 (Conflict of Interest) which states: No employee, officer, or agent shall participate in the selection, award or administration of a contract supported by Federal funds if a real or apparent conflict of interest would be involved. Such a conflict would arise when the employee, officer, or agent, any member of his/her immediate family, his/her partner, or an organization which employs or is about to employ any of the parties indicated herein, has a financial or other interest in the firm selected for an award. The officers, employees, and agents of the recipient shall not solicit gratuities, favors, or anything of monetary value from CONTRACTORS, or parties to sub agreements. The officers, employees, and agents of the recipient shall not accept gratuities, favors, or anything of a monetary value over \$100 (annually) from CONTRACTORS, or parties to sub agreements. Noncompliance with this policy will result in a penalty to the CONTRACTOR which will include disallowed costs and/or termination of the contract.

B. OTHER CONTRACT OBLIGATIONS

1. The CONTRACTOR shall provide all services listed in the "Statement of Work" appropriate for the level of funding provided through the contract.
2. Policy Issuances issued by the Michigan Department of Labor and Economic Growth subsequent to the start date of this contract, if different from the terms of this contract, shall supersede this contract and serve as a contract modification.
3. Adherence to Policy Memorandums set forth by Kinexus Group.



PROJECT MANUAL FOR:

**KINEXUS GROUP
BRIDGE ACADEMY RENOVATION
499 WEST MAIN STREET
BENTON HARBOR, MICHIGAN
PROGRESSIVE AE PROJECT NO: 85710002
ISSUED FOR CONSTRUCTION
MAY 26, 2021**

**PROJECT MANUAL FOR:
KINEXUS GROUP
BRIDGE ACADEMY RENOVATION
BENTON HARBOR, MICHIGAN**

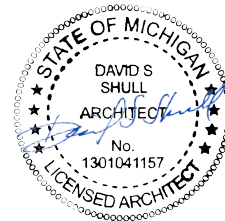
**PREPARED FOR:
KINEXUS GROUP
330 WEST MAIN STREET, SUITE 110
BENTON HARBOR, MICHIGAN 49022**

**PREPARED BY:
PROGRESSIVE AE
1811 4 MILE ROAD, NE
GRAND RAPIDS, MI 49525-2442
616/361-2664 (TELEPHONE)
616/361-1493 (FAX)
616/447-3367 (PLAN ROOM HOTLINE)
PRINTROOM@PROGRESSIVEAE.COM**

PROJECT NO: 85710002

MAY 26, 2021 - ISSUED FOR CONSTRUCTION

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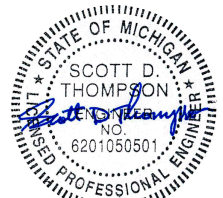
This item has been electronically signed and sealed by David S. Shull using a Digital Signature and date. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

**05/26/2021
Architecture**



This item has been electronically signed and sealed by Kevin Mersman using a Digital Signature and date. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

Mechanical



This item has been electronically signed and sealed by Scott D. Thompson using a Digital Signature and date. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

**05/26/2021
ELECTRICAL**

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28 4600 FIRE DETECTION AND ALARM

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 OWNER:

- A. Name: Jake Gustafson.
 - 1. Address Line 1: 499 West Main St.
 - 2. City: Benton Harbor.
 - 3. State: MI.
 - 4. Zip Code: 49022.
 - 5. Telephone: _____.
- B. Primary Contact: All correspondence from the Contractor to the Architect will be through this party, unless alternate arrangements are mutually agreed upon at preconstruction meeting.
 - 1. Title: Project Architect.
 - 2. Name: Brandon Yancharas.
 - 3. Email: yancharasb@progressiveae.com.

1.03 CONSULTANTS:

- A. Architect: Design Professional of Record. All correspondence from the Contractor regarding construction documents authored by Architect's consultants will be through this party, unless alternate arrangements are mutually agreed upon at preconstruction meeting.
 - 1. Company Name: Progressive AE.
 - a. Address Line 1: 1811 4 Mile Rd.
 - b. City: Grand Rapids.
 - c. State: MI.
 - d. Zip Code: 49544.
 - e. Telephone: 616-361-2664.
 - 2. Primary Contact: .
 - a. Title: Project Architect.
 - b. Name: Brandon Yancharas.
 - c. Email: yancharasb@progressiveae.com.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 OWNER:

- A. Name: Jake Gustafson, Kinexus Group.

1.03 PROJECT TEAM

- A. Project Manager
 - 1. Name: Brandon Yancharas, PAE.
- B. Project Assistant
 - 1. Name: Ann Yoder, PAE.
- C. Project Architect
 - 1. Name: Brandon Yancharas, PAE.
- D. Architectural Specification Writer
 - 1. Name: Brandon Yancharas, PAE.
- E. Mechanical Engineering Specification Writer - Plumbing
 - 1. Name: Derek Witt, PAE.
- F. Mechanical Engineering Specification Writer - HVAC
 - 1. Name: Derek Witt, PAE.
- G. Electrical Engineering Specification Writer
 - 1. Name: Scott Thompson, PAE.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 00 4322 UNIT PRICES FORM

PARTICULARS

1.01 THE FOLLOWING IS THE LIST OF UNIT PRICES REFERENCED IN THE BID SUBMITTED BY:

1.02 (BIDDER) _____

1.03 TO (OWNER): KINEXUS GROUP

1.04 DATED _____ AND WHICH IS AN INTEGRAL PART OF THE BID FORM.

1.05 THE FOLLOWING ARE UNIT PRICES FOR SPECIFIC PORTIONS OF THE WORK AS LISTED,
AND ARE APPLICABLE TO AUTHORIZED VARIATIONS FROM THE CONTRACT
DOCUMENTS.

UNIT PRICE LIST

ITEM DESCRIPTION	QUANTITY	UNIT VALUE
A. _____	_____	_____
B. _____	_____	_____
C. _____	_____	_____
D. _____	_____	_____

END OF SECTION

SECTION 00 4323 ALTERNATES FORM

PARTICULARS

THE FOLLOWING IS THE LIST OF ALTERNATES REFERENCED IN THE BID SUBMITTED BY:
(BIDDER) _____

1.01 TO (OWNER): KINEXUS GROUP

DATED _____ AND WHICH IS AN INTEGRAL PART OF THE BID FORM.

ALTERNATES LIST

THE FOLLOWING AMOUNTS SHALL BE ADDED TO OR DEDUCTED FROM THE BID
AMOUNT. REFER TO SECTION 01 2300 - ALTERNATES.

ALTERNATE # 1: ADD / (DEDUCT) \$ _____

ALTERNATE # 2: ADD / (DEDUCT) \$ _____

ALTERNATE # 3: ADD / (DEDUCT) \$ _____

ALTERNATE # 4: ADD / (DEDUCT) \$ _____

ALTERNATE # 5: ADD / (DEDUCT) \$ _____

ALTERNATE # 6: ADD / (DEDUCT) \$ _____

ALTERNATE # 7: ADD / (DEDUCT) \$ _____

ALTERNATE # 8: ADD / (DEDUCT) \$ _____

END OF SECTION

SECTION 00 4325 SUBSTITUTION REQUEST FORM - DURING PROCUREMENT

PROJECT: BRIDGE ACADEMY RENOVATION

PROJECT NO. : 85710002

To: Progressive AE; Attention: _____; _____@progressiveae.com

Re: _____

From: _____ Date: _____

DESCRIPTION:

Specification Title: _____

Section No.: _____ Page: _____

Article/Paragraph: _____

Proposed Substitution: _____

Manufacturer: _____

Trade Name: _____

Model No.: _____

Web Site: _____

SUPPORTING DATA ATTACHED:

- Attached data to include product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are to be clearly identified.

- Attached data to also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

() Drawings () Product Data () Samples () Tests () Reports () _____

THE UNDERSIGNED CERTIFIES:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.

- Same warranty will be furnished for proposed substitution as for specified product.

- Same maintenance service and source of replacement parts, as applicable, is available.

- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.

- Proposed substitution does not affect dimensions and functional clearances.

- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

Signed by: (printed) _____

(signature) _____

Address: _____

Email: _____

AE'S REVIEW AND ACTION:

() Substitution approved - Make submittals in accordance with Specification Section 01 6000 - Product Requirements, Substitution Procedures.

() Substitution approved as noted - Make submittals in accordance with Specification Section 01 6000, Substitution Procedures.

() Substitution rejected - Use specified materials.

() Substitution request received too late - Use specified materials.

Remarks _____

Signed by: _____ Date: _____

END OF SECTION

PART 1 GENERAL

1.01 AGREEMENT AND CONDITIONS OF THE CONTRACT

- A. See Section 00 7300 - Supplementary Conditions for the Supplementary Conditions.
- B. The Agreement form is AIA A101.
- C. The General Conditions form is AIA A201.

1.02 FORMS

- A. Use the following forms for the specified purposes unless otherwise indicated elsewhere in Contract Documents.
- B. Bond Forms:
 - 1. Performance and Payment Bond Form: AIA A312.
- C. Post-Award Certificates and Other Forms:
 - 1. Application for Payment Forms: AIA G702 with AIA G703 (for Contractors).
- D. Clarification and Modification Forms:
 - 1. Request for Interpretation Form: Section 00 6313.
 - 2. Architect's Supplemental Instructions Form: AIA G710.
 - 3. Construction Change Directive Form: AIA G714.
 - 4. Change Order Form: AIA G701.
- E. Closeout Forms:
 - 1. Certificate of Substantial Completion Form: AIA G704.

1.03 REFERENCE STANDARDS

- A. AIA A101 - Standard Form of Agreement Between Owner and Contractor where the basis of Payment is a Stipulated Sum; 2007.
- B. AIA A201 - General Conditions of the Contract for Construction; 2007.
- C. AIA A312 - Performance Bond and Payment Bond; 2010.
- D. AIA G701 - Change Order; 2001.
- E. AIA G702 - Application and Certificate for Payment; 1992.
- F. AIA G703 - Continuation Sheet; 1992.
- G. AIA G704 - Certificate of Substantial Completion; 2000.
- H. AIA G710 - Architect's Supplemental Instructions; 1992.
- I. AIA G714 - Construction Change Directive; 2007.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

PART 1 GENERAL

1.01 FORM OF AGREEMENT

- A. AIA Document C106 - 2013: Digital Data Licensing Agreement

1.02 AGREEMENT TO BE EXECUTED

- A. Section 00 5433.01 - Digital/Electronic Media Data Protocol - EXHIBIT is attached following this page.
- B. Use of agreement is to give licence from the Architect/Engineer to the Receiving Party for use of Digital Data on this project.
- C. Sample AIA document is for showing content and expected agreement.

1.03 SUPPLEMENTAL INFORMATION TO THE LICENSING AGREEMENT

A. ARTICLE 3 LICENSE CONDITIONS

- 1. Receiving Party to use digital media for the support of the construction of this project.
- 2. Document is not to be returned as 'the' required submittal requested in individual technical specification sections.

B. ARTICLE 4 LICENSING FEE OR OTHER COMPENSATION

- 1. Cost for drawings: \$100.00 per sheet with a maximum cost of \$500.00.

C. ARTICLE 5 DIGITAL DATA

- 1. Electronic media copies of the documents are available upon written request. Architect will fill in AIA C106 after formal request from Receiving Party and forward for approval. Payment must be received by Progressive AE before electronic media can be released.
- 2. Formal Request:
 - a. List all documents requested.
 - b. Indicate format/version requested (.dwg, .rvt, .docx, etc.).
 - c. Clearly identify purpose for request.
- 3. After Requesting Party receives licensing agreement:
 - a. Sign form as indicated, including e-mail address and telephone number, and submit accordingly to Progressive AE.
 - b. Submit check payable to "Progressive AE" in the correct amount. Identify on the check the Project Name and Number, and reference "Electronic Media."

1.04 RELATED REQUIREMENTS

- A. Section 00 7200 - General Conditions.
- B. Section 00 7300 - Supplementary Conditions.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

DRAFT AIA® Document C106™ - 2013**Digital Data Licensing Agreement**

AGREEMENT made as of the day of in the year
(In words, indicate day, month and year.)

BETWEEN the Party transmitting Digital Data ("Transmitting Party"):
(Name, address and contact information, including electronic addresses)

« »
 « »
 « »
 « »
 « »

and the Party receiving the Digital Data ("Receiving Party"):
(Name, address and contact information, including electronic addresses)

« »
 « »
 « »
 « »
 « »

for the following Project:
(Name and location or address)

«Draft Contracts»
 «»

The Transmitting Party and Receiving Party agree as follows.

TABLE OF ARTICLES

- | | |
|---|-------------------------------------|
| 1 | GENERAL PROVISIONS |
| 2 | TRANSMISSION OF DIGITAL DATA |
| 3 | LICENSE CONDITIONS |
| 4 | LICENSING FEE OR OTHER COMPENSATION |
| 5 | DIGITAL DATA |

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 The purpose of this Agreement is to grant a license from the Transmitting Party to the Receiving Party for the Receiving Party's use of Digital Data on the Project, and to set forth the license terms.

§ 1.2 This Agreement is the entire and integrated agreement between the parties. Except as specifically set forth herein, this Agreement does not create any other contractual relationship between the parties.

§ 1.3 For purposes of this Agreement, the term Digital Data is defined to include only those items identified in Article 5 below.

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An Additions and Deletions Report that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

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 User Notes: 1
 (2034970473)

§ 1.3.1 Confidential Digital Data is defined as Digital Data containing confidential or business proprietary information that the Transmitting Party designates and clearly marks as "confidential."

ARTICLE 2 TRANSMISSION OF DIGITAL DATA

§ 2.1 The Transmitting Party grants to the Receiving Party a nonexclusive limited license to use the Digital Data identified in Article 5 solely and exclusively to perform services for, or construction of, the Project in accordance with the terms and conditions set forth in this Agreement.

§ 2.2 The transmission of Digital Data constitutes a warranty by the Transmitting Party to the Receiving Party that the Transmitting Party is the copyright owner of the Digital Data, or otherwise has permission to transmit the Digital Data to the Receiving Party for its use on the Project in accordance with the terms and conditions of this Agreement.

§ 2.3 If the Transmitting Party transmits Confidential Digital Data, the transmission of such Confidential Digital Data constitutes a warranty to the Receiving Party that the Transmitting Party is authorized to transmit the Confidential Digital Data. If the Receiving Party receives Confidential Digital Data, the Receiving Party shall keep the Confidential Digital Data strictly confidential and shall not disclose it to any other person or entity except as set forth in Section 2.3.1.

§ 2.3.1 The Receiving Party may disclose the Confidential Digital Data as required by law or court order, including a subpoena or other form of compulsory legal process issued by a court or governmental entity. The Receiving Party may also disclose the Confidential Digital Data to its employees, consultants or contractors in order to perform services or work solely and exclusively for the Project, provided those employees, consultants and contractors are subject to the restrictions on the disclosure and use of Confidential Digital Data as set forth in this Agreement.

§ 2.4 The Transmitting Party retains its rights in the Digital Data. By transmitting the Digital Data, the Transmitting Party does not grant to the Receiving Party an assignment of those rights; nor does the Transmitting Party convey to the Receiving Party any right in the software used to generate the Digital Data.

§ 2.5 To the fullest extent permitted by law, the Receiving Party shall indemnify and defend the Transmitting Party from and against all claims arising from or related to the Receiving Party's modification to, or unlicensed use of, the Digital Data.

ARTICLE 3 LICENSE CONDITIONS

The parties agree to the following conditions on the limited license granted in Section 2.1:

(State below rights or restrictions applicable to the Receiving Party's use of the Digital Data, requirements for data format, transmission method or other conditions on data to be transmitted.)

« »

ARTICLE 4 LICENSING FEE OR OTHER COMPENSATION

The Receiving Party agrees to pay the Transmitting Party the following fee or other compensation for the Receiving Party's use of the Digital Data:

(State the fee, in dollars, or other method by which the Receiving Party will compensate the Transmitting Party for the Receiving Party's use of the Digital Data.)

« »

ARTICLE 5 DIGITAL DATA

The Parties agree that the following items constitute the Digital Data subject to the license granted in Section 2.1:

(Identify below, in detail, the information created or stored in digital form the parties intend to be subject to this Agreement.)

« »

SECTION 00 5433.01 DIGITAL/ELECTRONIC MEDIA DATA PROTOCOL EXHIBIT

This Agreement is entered into as of the day and year first written above and will terminate upon Substantial Completion of the Project, as that term is defined in AIA Document A201™-2007, General Conditions of the Contract for Construction, unless otherwise agreed by the parties and set forth below.
(Indicate when this Agreement will terminate, if other than the date of Substantial Completion.)

00 5433.01

TRANSMITTING PARTY (Signature)

00 5433.01

(Printed name and title)

RECEIVING PARTY (Signature)

00 5433.01

(Printed name and title)

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User Notes: [2034970673]

3

END OF SECTION

PROJECT: BRIDGE ACADEMY RENOVATION

PROJECT NO: 85710002

To Progressive AE: Attention; _____ email: _____@progressiveae.com

Progressive AE

1811 4 Mile Road, NE
Grand Rapids, MI 49525

616-361-2664 VOICE
616-361-1493 FAX

From: Contractor: _____ RFI No: _____

Phone No: _____

Fax No: _____

Date: _____

Submitted By: _____

Name/Trades Contractor: _____

Question Is: Civil _____ Architectural _____ Interiors _____ Structural _____ Mechanical _____

Electrical _____ Communications _____ Other (specify) _____

Re: Project Manual/Drawing/Detail No: _____

Question: _____

Contractor Recommendation and advise of any cost/schedule impacts.: _____

Signed (Contractor Project Manager): _____

Progressive AE Reply: _____

Signed (AE): _____ Date _____

Distribution:

Owner: _____

Progressive AE: _____

Contractor: _____

END OF SECTION

SECTION 00 6325 SUBSTITUTION REQUEST FORM - DURING CONSTRUCTION

PROJECT: BRIDGE ACADEMY RENOVATION

PROJECT NO. : 85710002

To: Progressive AE; Attention: _____; _____@progressiveae.com

Re: _____

From: _____ Date: _____

DESCRIPTION:

Specification Title: _____

Section No.: _____ Page: _____

Article/Paragraph: _____

Proposed Substitution: _____

Manufacturer: _____

Trade Name: _____

Model No.: _____

Web Site: _____

Installer: _____

Address: _____

Telephone: _____

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 - REQUIRED BY A/E

Reason for not providing specified item: _____

Similar Installation

Project: _____ Architect: _____

Address: _____ Owner: _____

Date Installed: _____

Proposed Substitution affects other parts of the work: () No () Yes Explain: _____

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

Proposed substitution changes contract time: () No () Yes [add] [deduct] _____ days

SUPPORTING DATA ATTACHED:

- Attached data to include product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are to be clearly identified.

- Attached data to also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

() Drawings () Product Data () Samples () Tests () Reports () _____

SECTION 00 6325 SUBSTITUTION REQUEST FORM - DURING CONSTRUCTION

THE UNDERSIGNED CERTIFIES:

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

Submitted by (Firm): _____

Signed by: (printed) _____

(signature) _____

Address: _____

Email: _____

Attachments: ()

A/E'S REVIEW AND RECOMMENDATION:

- () Substitution approved - Make submittals in accordance with Specification Section 01 3000 Submittal Procedures.
- () Substitution approved as noted - Make submittals in accordance with Specification Section 01 3000 Submittal Procedures.
- () Substitution rejected - Use specified materials.

Remarks _____

Signed by: _____ Date: _____

OWNERS REVIEW AND ACTION:

- () Substitution approved - Make submittals in accordance with Specification Section 01 3000 Submittal Procedures. Prepare Change Order.
- () Substitution approved as noted - Make submittals in accordance with Specification Section 01 3000 Submittal Procedures. Prepare Change Order
- () Substitution rejected - Use specified materials.

Remarks _____

Signed by: _____ Date: _____

ADDITIONAL COMMENTS:

() Contractor () Subcontractor () Supplier () Manufacturer () A/E

END OF SECTION

SECTION 00 7200 GENERAL CONDITIONS

FORM OF GENERAL CONDITIONS

1.01 GENERAL CONDITIONS

- A. The General Conditions applicable to this contract is _____ attached _____ following this page.
- B. The General Conditions of the Contract for Construction (AIA Document A201, 2017) Articles 1 through 15, as published by the American Institute of Architects, are herewith made part of the specifications.
- C. The General Conditions are modified in certain particulars. See Section 00 7300 - Supplementary Conditions.

1.02 RELATED REQUIREMENTS

- A. SECTION 00 7300 - Supplementary Conditions.

1.03 SUPPLEMENTARY CONDITIONS

- A. Refer to Section 00 7300 - Supplementary Conditions for amendments to these General Conditions.

END OF SECTION

All questions will be handled as stated above. No telephone/verbal responses will be provided except in extreme emergencies. In such instances, an RFI confirming the verbal communication must be submitted by the Contractor for record purposes, as reasonably practical within 5 business days.

All questions and responses given by the Architect during field visits will be documented in Field Reports. The Contractor should not wait for the Architect's visit to the site to obtain responses, but questions should be e-mailed to the Architect as they occur."

1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

Add 1.5.3 as follows:

"1.5.3 Electronic media copies of the documents are available upon written request. Requesting party shall utilize Section 00 5433 - Digital/Electronic Media Data Protocol and AIA Document C106: Digital Data Licensing Agreement form (example included herein). Architect will fill in after formal request from requester and forward for approval. Payment must be received by Progressive AE before electronic media can be released.

List all documents requested.

- Indicate CAD format/version requested.
- Clearly identify purpose for request.
- Submit check payable to "Progressive AE" in the correct amount.
- Identify on the check the Project Name and Number, and reference "Electronic Media."
- Sign form as indicated, including e-mail address and telephone number, and submit accordingly to Progressive AE."

ARTICLE 3 - CONTRACTOR

3.2 Review of Contract Documents and Field Conditions by Contractor

Delete Subparagraph 3.2.2 and substitute the following:

"3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4 The Contractor shall take field measurements and verify field conditions and other information known to the Contractor with the contract documents before commencing activities. Errors, inconsistencies or omissions discovered or made known to the Contractor shall be reported to the Architect promptly as a request for information in such form as the Architect may require."

3.5 Warranty

Add 3.5.3 as follows:

"3.5.3 The Contractors shall guarantee their work for a period of 1 year from the date of Substantial Completion and shall leave the work in perfect order at completion. Neither the final certificate of payment nor any provision in the contract documents shall relieve the Contractor of the responsibility for negligence or faulty material or workmanship within the extent and period provided by law. Upon written notice, he/she shall remedy the defects due thereto and shall pay all expenses for any damage to other work resulting therefrom. Any material or system specifically specified to have a longer guarantee period shall be guaranteed for the length of the specified time."

3.14 Cutting and Patching

Add 3.14.3 as follows:

" 3.14.3 Permission to patch any areas or items of work does not imply a waiver of the Architect's right to require complete removal and replacement if, in Architect's opinion, said patching does not satisfactorily restore the quality and appearance of the work."

3.15 Cleaning Up

Add 3.15.3 as follows:

"3.15.3 Contractor shall also clean and remove all broken or scratched glass and replace it with new glass meeting the requirements of the specifications; shall remove all paint droppings, spots, stains, and dirt from finished surfaces; and shall thoroughly clean all plumbing fixtures, hardware, and floors. Carpet shall be vacuum cleaned. To the maximum extent that is reasonably possible, Contractor shall keep the interior of the building free from waste combustible material and debris at all times."

D. ARTICLE 9 - PAYMENTS AND COMPLETION

9.8 Substantial Completion

Add 9.8.6 as follows:

"9.8.6. The Contractor is obligated to complete the punch list items of the work within 60 days after the issuance of the Certificate of Substantial Completion unless otherwise noted in said Certificate. In the event the Contractor fails to complete the punch list items to the satisfaction of the Owner and within the time specified, the Owner may elect to give notice and complete the work in accordance with Article 2.5."

E. ARTICLE 10 - PROTECTION OF PERSONS AND PROPERTY

10.2 Safety of Persons and Property

Add 10.2.1.4 as follows:

"10.2.1.4 All finished construction under his/her contract and shall repair and restore any and all damage to his/her finished construction to its original state."

F. ARTICLE 11 - INSURANCE AND BONDS

11.1 Contractors Insurance and Bonds

Revise 11.1.1: In the second line, between the word "companies" and "lawfully" insert the following: ". . . acceptable to the Owner and . . ."

Add to 11.1.2 as follows:

SECTION 00 7300 SUPPLEMENTARY CONDITIONS

"11.1.2 The insurance required by Subparagraph 11.1.1 shall be written for not less than any limits of liability required by law or by those shown below and shall include contractual liability insurance as applicable to the Contractor's obligations under Paragraph 3.18:

Workmen's Compensation:	Statutory
Employer's Liability:	\$500,000--Each Accident
	\$500,000--Disease, Policy Limit
	\$500,000--Disease, Each Employee

General Liability (Including Premises - Operations, Independent Contractors' Protective, Products and Completed Operations, Broad Form Property Damage):

Bodily Injury:	\$1,000,000--Each Occurrence
	\$2,000,000--Aggregate or Combined Single Limit

Property Damage:	\$1,000,000--Each Occurrence
	\$2,000,000--Aggregate or Combined Single Limit

.....Products and completed operations insurance shall be maintained for a
.....minimum of 2 years after final payment with evidence of such coverage
.....being provided on an annual basis.
.....Property damage liability insurance shall include coverage for
.....explosion, collapse, and underground hazards.

Contractual Liability (Hold Harmless):

Bodily Injury:	\$1,000,000--Each Occurrence
Property Damage:	\$1,000,000--Each Occurrence
	\$1,000,000--Aggregate

.....If the general liability policy includes a general aggregate, such general
.....aggregate shall not be less than \$2,000,000.

Umbrella Excess Liability:

Over Primary	\$1,000,000
Insurance:	
Maximum	\$10,000
Retention:	

Automobile Liability (Owned, Non-owned, Hired):

Bodily Injury:	\$1,000,000--Each Person
	\$1,000,000--Each Accident
Property Damage:	\$500,000--Each Occurrence

Certificates of Insurance: Before commencing the work, the Contractor shall furnish the Owner with certificates of insurance showing the companies carrying the previously named coverages with the effective dates and expiration dates of each policy. The Owner and Architect shall be named additional insured with respect to comprehensive general liability and automobile coverages. The certificates shall provide that the policies may not be changed or terminated during the term mentioned except upon not less than 30 days' written notice to the Owner. Contractors shall, if requested, exhibit policies to the Owner.

Fire Insurance and Certain Other Risks: The Contractor shall assume the risk of loss/damage to its machinery, tools/equipment, and field offices (including contents). The Contractor shall also assume the risk of loss/damage to its employees' tools and effects. The Owner shall in no event be liable for any such loss/damage to such property, nor shall the Owner be liable for any such loss/damage to any property of subcontractors.

Contractor's Responsibility for Personal Injury and Property Damage: Except where due to Owner's sole negligence, Contractor agrees to indemnify Owner against all liability, loss, and damage arising out of injury to persons or properties (including Contractor's employees or properties) caused by the Contractor or his employees and agents."

G. ARTICLE 12 - UNCOVERING AND CORRECTION OF WORK

12.2 Correction of Work

Revise the second to the last sentence in 12.2.2.1 as follows:

"During the one-year period for correction of the Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the right to make a claim for breach of warranty."

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

SECTION 01 1000 SUMMARY

PART 1 GENERAL

1.01 PROJECT

- A. Project Name: Bridge Academy Renovation
- B. Owner's Name: Kinexus Group.
- C. Architect's Name: Progressive AE.
- D. Additional Project contact information is specified in Section 00 0103 - Project Directory.
- E. The Project consists of the alteration of an existing building.

1.02 CONTRACT DESCRIPTION

1.03 OWNER OCCUPANCY

- A. Owner intends to occupy the Project upon Substantial Completion.
- B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
- C. Schedule the Work to accommodate Owner occupancy.

1.04 CONTRACTOR USE OF SITE AND PREMISES

- A. Provide access to and from site as required by law and by Owner:
 - 1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
 - 2. Do not obstruct roadways, sidewalks, or other public ways without permit.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 2300 ALTERNATES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Description of Alternates.
- B. Procedures for pricing Alternates.
- C. Documentation of changes to Contract Sum and Contract Time.

1.02 RELATED REQUIREMENTS

- A. Document 00 2113 - Instructions to Bidders: Instructions for preparation of pricing for Alternates.
- B. Document 00 4323 - Alternates Form: List of Alternates as supplement to Bid Form.
- C. Document 00 5200 - Agreement Form: Incorporating monetary value of accepted Alternates.

1.03 ACCEPTANCE OF ALTERNATES

- A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in the Owner-Contractor Agreement.
- B. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.

1.04 SCHEDULE OF ALTERNATES

- A. Alternate Toilet Layout: Refer to architectural, mechanical, and electrical sheets to provide (2) unisex toilet rooms

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Procedural requirements for proposed substitutions.

1.02 RELATED REQUIREMENTS

- A. Section 00 2113 - Instructions to Bidders: Restrictions on timing of substitution requests.
- B. Section 00 4325 - Substitution Request Form - During Procurement: Required form for substitution requests made prior to award of contract (During procurement).
- C. Section 00 6325 - Substitution Request Form - During Construction: Required form for substitution requests made after award of contract (During construction).
- D. Section 01 6000 - Product Requirements: Fundamental product requirements, product options, delivery, storage, and handling.

1.03 DEFINITIONS

- A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials, products, assemblies, and equipment.
 - 1. Substitutions for Cause: Proposed due to changed Project circumstances beyond Contractor's control.
 - a. Unavailability.
 - b. Regulatory changes.
 - 2. Substitutions for Convenience: Proposed due to possibility of offering substantial advantage to the Project.
 - a. Substitution requests offering advantages solely to the Contractor will not be considered.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
 - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
 - 2. Agrees to provide the same warranty for the substitution as for the specified product.
 - 3. Agrees to provide same or equivalent maintenance service and source of replacement parts, as applicable.
 - 4. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
 - 5. Waives claims for additional costs or time extension that may subsequently become apparent.
 - 6. Agrees to reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.
- B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.
 - 1. Note explicitly any non-compliant characteristics.
- C. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
 - 1. Forms included in the Project Manual are adequate for this purpose, and must be used.
- D. Limit each request to a single proposed substitution item.

3.02 SUBSTITUTION PROCEDURES DURING PROCUREMENT

- A. Submittal Time Restrictions:
 - 1. Section 00 2113 - Instructions to Bidders specifies time restrictions and the documents required for submitting substitution requests during the bidding period.
- B. Submittal Form (before award of contract):

SECTION 01 2500 SUBSTITUTION PROCEDURES

1. Submit substitution requests by completing the form in Section 00 4325; see this section for additional information and instructions. Use only this form; other forms of submission are unacceptable.

3.03 SUBSTITUTION PROCEDURES DURING CONSTRUCTION

- A. Submittal Form (after award of contract):
 1. Submit substitution requests by completing the form in Section 00 6325; see this section for additional information and instructions. Use only this form; other forms of submission are unacceptable.
- B. Submit request for Substitution for Cause within 14 days of discovery of need for substitution, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.
- C. Substitutions will not be considered under one or more of the following circumstances:
 1. When they are indicated or implied on shop drawing or product data submittals, without having received prior approval.
 2. Without a separate written request.
 3. When acceptance will require revisions to Contract Documents.

3.04 RESOLUTION

- A. Architect may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.
- B. Architect will notify Contractor in writing of decision to accept or reject request.
 1. Architect's decision following review of proposed substitution will be noted on the submitted form.

3.05 ACCEPTANCE

- A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

3.06 CLOSEOUT ACTIVITIES

- A. See Section 01 7800 - Closeout Submittals, for closeout submittals.
- B. Include completed Substitution Request Forms as part of the Project record. Include both approved and rejected Requests.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Administrative and procedural requirements for handling and processing Contract modifications.

1.02 RELATED REQUIREMENTS:

- A. Section 01 2100 - Allowances: Procedural requirements for handling and processing allowances.
- B. Section 01 2200 - Unit Prices: Administrative requirements for using unit prices.
- C. Section 01 2500 - Substitution Procedures: Administrative procedures for handling requests for substitutions made after the Contract award.

1.03 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, using AIA Document G710 - Architects Supplemental Instructions.

1.04 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Request: 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. Proposed Modifications are not instructions either to stop work in progress or to execute the proposed change.
 - 2. Within time specified in Proposal Request submit a quotation, estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. 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 Proposed Modifications: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a Proposed Change Order.
 - 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 Order 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 by superintendent or foreman 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 Section 01 2500 - Substitution Procedures if the proposed change requires substitution of one product or system for product or system specified.

1.05 ADMINISTRATIVE CHANGE ORDERS

- A. Allowance Adjustment: See Section 01 2100 - Allowances for administrative procedures for preparation of Change Order for adjusting the Contract Sum to reflect actual costs of allowances.
- B. Unit-Price Adjustment: See Section 01 2200 - Unit Prices for administrative procedures for preparation of Change Order for adjusting the Contract Sum to reflect measured scope of unit-price work.

SECTION 01 2600 CONTRACT MODIFICATION PROCEDURES

1.06 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Proposal Request, Architect [Construction Manager] will issue a Change Order for signatures of Owner and Contractor, using AIA Document G701 - Change Order.

1.07 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive (CCD): Architect [Construction Manager] may issue a CCD, using AIA Document G714 - Construction Change Directive. CCD instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 - 1. CCD contains a complete description of change in the Work and designates method to be followed to determine change in the Contract Sum or Contract Time.
 - a. CCD is a directive for changes in the Work for use where the owner and contractor have not agreed on proposed changes in the Contract Sum or Contract Time. CCD is used to direct changes in the Work which, if not expeditiously implemented, might delay the project. Upon receipt of a completed CCD, the contractor must promptly proceed with the change in the work described therein.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. General administrative requirements.
- B. Progress photographs.
- C. Submittals for review, information, and project closeout.
- D. Number of copies of submittals.
- E. Requests for Interpretation (RFI) procedures.
- F. Submittal procedures.

1.02 RELATED REQUIREMENTS

- A. Section 01 6000 - Product Requirements: General product requirements.
- B. Section 01 7000 - Execution and Closeout Requirements: Additional coordination requirements.
- C. Section 01 7800 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.

1.03 GENERAL ADMINISTRATIVE REQUIREMENTS

- A. Comply with requirements of Section 01 7000 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.

1.04 PROJECT COORDINATOR

- A. Project Coordinator: General Contractor.
- B. Cooperate with the Project Coordinator in allocation of mobilization areas of site; for field offices and sheds, for site access, traffic, and parking facilities.
- C. During construction, coordinate use of site and facilities through the Project Coordinator.
- D. Comply with Project Coordinator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.
- E. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities. Responsibility for providing temporary utilities and construction facilities is identified in Section 01 1000 - Summary.
- F. Coordinate field engineering and layout work under instructions of the Project Coordinator.
- G. Make the following types of submittals to Architect through the Project Coordinator:
 - 1. Requests for Interpretation.
 - 2. Requests for substitution.
 - 3. Shop drawings, product data, and samples.
 - 4. Test and inspection reports.
 - 5. Design data.
 - 6. Manufacturer's instructions and field reports.
 - 7. Applications for payment and change order requests.
 - 8. Coordination drawings.
 - 9. Correction Punch List and Final Correction Punch List for Substantial Completion.
 - 10. Closeout submittals.

PART 2 PRODUCTS - NOT USED**PART 3 EXECUTION****3.01 PROGRESS PHOTOGRAPHS**

- A. Submit photographs with each application for payment, taken not more than 3 days prior to submission of application for payment.
- B. Photography Type: Digital; electronic files.
- C. Provide photographs of site and construction throughout progress of work produced by an experienced photographer, acceptable to Architect.
- D. In addition to periodic, recurring views, take photographs of each of the following events:
 - 1. Completion of site clearing.

SECTION 01 3000 ADMINISTRATIVE REQUIREMENTS

2. Excavations in progress.
 3. Foundations in progress and upon completion.
 4. Structural framing in progress and upon completion.
 5. Enclosure of building, upon completion.
- E. Take photographs as evidence of existing project conditions as follows:
1. Interior views: ____.
 2. Exterior views: ____.
- F. Views:
1. Provide non-aerial photographs from four cardinal views at each specified time, until date of Substantial Completion.
 2. Consult with Architect for instructions on views required.
 3. Provide factual presentation.
 4. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.
 5. Point of View Sketch: Provide sketch identifying point of view of each photograph.
- G. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.
1. Delivery Medium: Via email.
 2. File Naming: Include project identification, date and time of view, and view identification.
 3. Point of View Sketch: Include digital copy of point of view sketch with each electronic submittal; include point of view identification in each photo file name.
 4. PDF File: Assemble all photos into printable pages in PDF format, with 2 to 3 photos per page, each photo labeled with file name; one PDF file per submittal.

3.02 360 SPHERICAL PROGRESS PHOTOGRAPHY

- A. Submit new photography weekly, within 3 days after being taken.
- B. See _____ drawings for camera placement.
- C. Photography: Provide 360 spherical digital image files on web hosted site with linked image navigation for project team access. Ref 303 F 2.
1. Matterport; Insta360 Camera: www.matterport.com
 2. Other cameras providing the same functionality are acceptable.
- D. Provide photographs of site and construction throughout progress of work produced by an experienced photographer, acceptable to Architect.
- E. In addition to periodic, recurring views, take photographs of each of the following events:
- F. Views:
1. Provide non-aerial photographs from four cardinal views at each specified time, until date of Substantial Completion.
 2. Consult with Architect for instructions on views required.
 3. Provide factual presentation.
 4. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.

3.03

3.04 REQUESTS FOR INTERPRETATION (RFI)

- A. Definition: A request seeking one of the following:
1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
 2. A resolution to an issue which has arisen due to field conditions and affects design intent.
- B. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.

SECTION 01 3000 ADMINISTRATIVE REQUIREMENTS

- C. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
 - 1. Prepare a separate RFI for each specific item.
 - a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
 - b. Do not forward requests which solely require internal coordination between subcontractors.
 - 2. Prepare in a format and with content acceptable to Owner.
 - a. Use Section 00 6313 - Request for Interpretation Form or contractor prepared form.
- D. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
 - 1. Include in each request Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.
 - 2. Unacceptable Uses for RFIs: Do not use RFIs to request the following:
 - a. Approval of submittals (use procedures specified elsewhere in this section).
 - b. Approval of substitutions (see Section - 01 6000 - Product Requirements)
 - c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
 - d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
 - 3. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.
 - 4. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.
 - a. The Owner reserves the right to assess the Contractor for the costs (on time-and-materials basis) incurred by the Architect, and any of its consultants, due to processing of such RFIs.
- E. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
 - 1. Official Project name and number, and any additional required identifiers established in Contract Documents.
 - 2. Submit on form found in Section 00 6313 - Request for Interpretation, providing all information requested.
- F. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.
- G. Review Time: Architect will respond and return RFIs to Contractor within two calendar days of receipt, excluding Saturday and Sunday. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
 - 1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.
- H. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.
 - 1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
 - 2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.
 - 3. Notify Architect within two calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

3.05 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:
 - 1. Product data.
 - 2. Shop drawings.
 - 3. Samples for selection.
 - 4. Samples for verification.
- B. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.
- C. Samples will be reviewed for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 7800 - Closeout Submittals.

3.06 SUBMITTALS FOR INFORMATION

- A. When the following are specified in individual sections, submit them for information:
 - 1. Design data.
 - 2. Certificates.
 - 3. Test reports.
 - 4. Inspection reports.
 - 5. Manufacturer's instructions.
 - 6. Manufacturer's field reports.
 - 7. Material Safety Data Sheets (MSDS).
 - 8. Other types indicated.
- B. Submit for Architect's knowledge as contract administrator or for Owner. No action will be taken.

3.07 SUBMITTALS FOR PROJECT CLOSEOUT

- A. Submit Correction Punch List for Substantial Completion.
- B. Submit Final Correction Punch List for Substantial Completion.
- C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 7800 - Closeout Submittals:
 - 1. Project record documents.
 - 2. Operation and maintenance data.
 - 3. Warranties.
 - 4. Bonds.
 - 5. Other types as indicated.
- D. Submit for Owner's benefit during and after project completion.

3.08 NUMBER OF COPIES OF SUBMITTALS

- A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.
- B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
 - 1. After review, produce duplicates.
 - 2. Retained samples will not be returned to Contractor unless specifically so stated.

3.09 SUBMITTAL PROCEDURES

- A. General Requirements:
 - 1. Use a separate transmittal for each item.
 - 2. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.
 - 3. Transmit using approved form.
 - a. Use Contractor's form, subject to prior approval by Architect.
 - 4. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.

SECTION 01 3000 ADMINISTRATIVE REQUIREMENTS

5. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
 6. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
 - a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
 7. Schedule submittals to expedite the Project, and coordinate submission of related items.
 - a. For each submittal for review, allow 10 days excluding delivery time to and from the Contractor.
 - b. For sequential reviews involving Architect's consultants, Owner, or another affected party, allow an additional 7 days.
 8. Provide space for Contractor and Architect review stamps.
 9. When revised for resubmission, identify all changes made since previous submission.
 10. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
 11. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.
 12. Submittals not requested will be recognized, but will be returned without comment,
- B. Product Data Procedures:
1. Submit only information required by individual specification sections.
 2. Collect required information into a single submittal.
 3. Do not submit (Material) Safety Data Sheets for materials or products.
- C. Shop Drawing Procedures:
1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
 2. Do not reproduce Contract Documents to create shop drawings.
 3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.
- D. Samples Procedures:
1. Transmit related items together as single package.
 2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.
 3. Include with transmittal high-resolution image files of samples to facilitate electronic review and approval. Provide separate submittal page for each item image.
 - a. Photographs of each sample submitted for electronic filing for record purposes.
 - b. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.
 - c. Delivery Medium: Via email.
 - d. File Naming: Include project identification.

3.10 SUBMITTAL REVIEW

- A. Submittals for Review: Architect will review each submittal and take appropriate action.
- B. Submittals for Information: Architect will acknowledge receipt and review. See below for actions to be taken.
- C. Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals or an actual stamp on hard copies of submittals.
- D. Architect's Action: General: Except for submittals for the record and similar purposes, where action and return on submittals are required or requested, the Architect will review each submittal and mark with appropriate "action" within 10 working days. Where the submittal must be held for coordination, the Architect will so advise the Contractor without delay. The Architect's review of a specific item shall not indicate review of an assembly of which the item is a component.
1. Architect's Action Stamp: The Architect will stamp each submittal to be returned with a uniform, self explanatory action stamp, appropriately marked and executed. It shall read as follows:

SECTION 01 3000 ADMINISTRATIVE REQUIREMENTS

- a. "This submittal is reviewed for general conformance with the design concept of the project and with information given in the Contract Documents. This review shall not constitute approval of safety precautions and is not conducted for substantiating instructions for installation or performance of equipment or systems. This review does not relieve the contractor of responsibility for conformance with the Contract Documents and applicable codes, all of which have priority over this submittal. The Architect/Engineer does not warrant or represent that the information within the submittal is either accurate or complete. The contractor is responsible for coordinating and verifying all quantities, dimensions, tolerances, clearances, fabrication processes, techniques, sequences, means, methods of construction and compatibility of materials. It is also understood that the contractor has reviewed and coordinated all related trades and components of an assembly prior to issuing a submittal for review."
- b. Marking X No Exceptions Taken
 - 1) Final unrestricted release. Where the submittals are marked as above, the work covered by the submittal may proceed, provided it complies with the requirements of the contract documents; acceptance of the work will depend upon that compliance.
- c. Marking X Make Corrections Noted
 - 1) Final but restricted release. When submittals are marked as above, work covered by submittal may proceed, provided it complies with both Architect's notations or corrections on the submittal and with the requirements of the contract documents; acceptance of the work will depend on that compliance.
- d. Marking X Revise and Resubmit
 - 1) Returned for resubmittal. When submittal is marked as above, revise or prepare new submittal in accordance with Architect's notations stating reasons for returning submittal; cloud all revisions to expedite review; resubmit submittal without delay. Repeat if necessary to obtain a different action marking. Do not permit submittals with the above marking to be used at the project site or elsewhere where work is in progress.
- e. Marking X Rejected
 - 1) Returned for resubmittal. When the submittal is marked as above, do not proceed with the work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise the submittal, or prepare a new submittal in accordance with the Architect's notations stating the reasons for returning the submittal. Resubmit the submittal without delay. Repeat if necessary to obtain a different action marking. Do not permit submittals with the above marking to be used at the project site or elsewhere where work is in progress."
- f. Marking X For Record Purposes Only
 - 1) No Action Taken/Required or Not Required for Review. When a submittal is marked as above, the A/E has retained submittal for their record keeping purposes or to track informational submittals that do not require review or approval. These submittals are processed only as a record of the construction.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preliminary schedule.
- B. Construction progress schedule, bar chart type.
- C. Submittal schedule.

1.02 RELATED SECTIONS

- A. Section 01 1000 - Summary: Work sequence.

1.03 SUBMITTALS

- A. Within 10 days after date of Agreement, submit preliminary schedule.
- B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
- D. Within 10 days after joint review, submit complete schedule.
- E. Submit updated schedule with each Application for Payment.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRELIMINARY SCHEDULE

- A. Prepare preliminary schedule in the form of a horizontal bar chart.

3.02 CONTENT

- A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
- B. Identify each item by specification section number.
- C. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.
- D. Provide legend for symbols and abbreviations used.

3.03 BAR CHARTS

- A. Include a separate bar for each major portion of Work or operation.
- B. Identify the first work day of each week.

3.04 REVIEW AND EVALUATION OF SCHEDULE

- A. Participate in joint review and evaluation of schedule with Architect at each submittal.
- B. Evaluate project status to determine work behind schedule and work ahead of schedule.
- C. After review, revise as necessary as result of review, and resubmit within 10 days.

3.05 UPDATING SCHEDULE

- A. Maintain schedules to record actual start and finish dates of completed activities.
- B. Indicate progress of each activity to date of revision, with projected completion date of each activity.
- C. Annotate diagrams to graphically depict current status of Work.
- D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.
- E. Indicate changes required to maintain Date of Substantial Completion.
- F. Submit reports required to support recommended changes.
- G. Provide narrative report to define problem areas, anticipated delays, and impact on the schedule. Report corrective action taken or proposed and its effect.

3.06 DISTRIBUTION OF SCHEDULE

- A. Distribute copies of updated schedules to Contractor's project site file, to subcontractors, suppliers, Architect, Owner, and other concerned parties.

SECTION 01 3216 CONSTRUCTION PROGRESS SCHEDULE

- B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

END OF SECTION

SECTION 01 3553 SECURITY PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Security measures including formal security program, entry control, personnel identification, guard service, and miscellaneous restrictions.

1.02 RELATED REQUIREMENTS

- A. Section 01 1000 - Summary: use of premises and occupancy.
- B. Section 01 5000 - Temporary Facilities and Controls: Temporary lighting.

1.03 SECURITY PROGRAM

- A. Protect Work, existing premises and Owner's operations from theft, vandalism, and unauthorized entry.
- B. Initiate program at project mobilization.
- C. Maintain program throughout construction period until Owner occupancy.

1.04 ENTRY CONTROL

- A. Restrict entrance of persons and vehicles into Project site and existing facilities.
- B. Allow entrance only to authorized persons with proper identification.
- C. Owner will control entrance of persons and vehicles related to Owner's operations.

1.05 GUARD SERVICE

1.06 RESTRICTIONS

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 RELATED REQUIREMENTS

- A. Document 00 3100 - Available Project Information: Soil investigation data.
- B. Section 01 3000 - Administrative Requirements: Submittal procedures.

1.03 REFERENCE STANDARDS

- A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants; 2008 (Reapproved 2014).
- B. ASTM C1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation; 2014.
- C. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry; 2013.
- D. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2012a.
- E. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2018.
- F. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2015.
- G. ASTM E699 - Standard Specification for Agencies Involved in Testing, Quality Assurance, and Evaluating of Manufactured Building Components; 2016.
- H. IAS AC89 - Accreditation Criteria for Testing Laboratories; 2017.

1.04 DEFINITIONS

- A. Contractor's Professional Design Services: Design of some aspect or portion of the project by party other than the design professional of record. Provide these services as part of the Contract for Construction.
 - 1. Design Services Types Required:
 - a. Design-Related: Design services explicitly required to be performed by another design professional due to highly-technical and/or specialized nature of a portion of the project. Services primarily involve engineering analysis, calculations, and design, and are not intended to alter the aesthetic aspects of the design.
- B. Design Data: Design-related, signed and sealed drawings, calculations, specifications, certifications, shop drawings and other submittals provided by Contractor, and prepared directly by, or under direct supervision of, appropriately licensed design professional.

1.05 CONTRACTOR'S DESIGN-RELATED PROFESSIONAL DESIGN SERVICES

- A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.
- B. Base design on performance and/or design criteria indicated in individual specification sections.
- C. Scope of Contractor's Professional Design Services: Provide for the following items of work:
 - 1. Structural Design of Formwork: As described in Section 03 1000 - Concrete Forming and Accessories.

SECTION 01 4000 QUALITY REQUIREMENTS

2. Concrete Mix Design: As described in Section 03 3000 - Cast-in-Place Concrete. No specific designer qualifications are required.
3. Structural Design of Steel Connections: As described in Section 05 1200 - Structural Steel Framing.
4. Structural Design of Steel Connections: As described in Section 05 2100 - Steel Joist Framing.
5. Structural Design of Steel Decking: As described in Section 05 3100 - Steel Decking.
6. Structural Design of Metal Framing: As described in Section 05 4000 - Cold-Formed Metal Framing.
7. Structural Design of Metal Fabrications: As described in Section 05 5000 - Metal Fabrications.
8. Structural Design of Stairs: As described in Section 05 5100 - Metal Stairs.
9. Structural Design of Railings: As described in Section 05 5213 - Pipe and Tube Railings.
10. Structural Design of Wood Trusses: As described in Section 06 1753 - Shop-Fabricated Wood Trusses
11. Structural Design: Include physical characteristics, engineering calculations, and resulting dimensional limitations as described in Section 08 4313 - Aluminum-Framed Storefronts.
12. Structural Design: Include calculations for resisting wind loads, anchor locations, loads at points of attachment to building structure, physical characteristics, resulting dimensional limitations as described in Section 08 4413 - Glazed Aluminum Curtain Walls.
13. Structural Design: Include calculations for resisting wind loads, physical characteristics, resulting dimensional limitations as described in Section 08 4500 - Translucent Wall and Roof Assemblies.
14. Structural Design of Floor System: As described in Section 09 6900 - Access Flooring.
15. Structural Design and Calculations: As described in Section 10 7113.43 - Fixed Sun Screens.
16. Structural Design of Foundation: As described in Section 10 7500 - Flagpoles.
17. Design of Structural Components: Include development of shop drawings, and performing shop and site work, as described in Section 13 3419 - Metal Building Systems.
18. Design of Structural Components: As described in Section 14 2100 - Electric Traction Elevators.
19. Design of Structural Components: As described in Section 14 2400 - Hydraulic Elevators.
20. Sprinkler Layout: Coordinate with ceiling installation, detailed pipe layout, and hydraulic calculations as described in Section 21 1300 - Fire-Suppression Sprinkler Systems.
21. Design of Structural Fill: As described in Section 31 2323 - Fill.
22. Design of Geofoam Fill: As described in Section 31 2323.43 - Geofoam.
23. Design of Piles: As described in Section 31 6316 - Auger Cast Grout Piles.
24. Structural Calculations and Design: As described in Section 32 3223 - Segmental Retaining Walls

1.06 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Designer's Qualification Statement: Submit for Architect's knowledge as contract administrator, or for Owner's information.
 1. Include information for each individual professional responsible for producing, or supervising production of, design-related professional services provided by Contractor.
 - a. Full name.
 - b. Professional licensure information.
 - c. Statement addressing extent and depth of experience specifically relevant to design of items assigned to Contractor.
- C. Design Data: Submit for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.
 1. Include calculations that have been used to demonstrate compliance to performance and regulatory criteria provided, and to determine design solutions.
 2. Include required product data and shop drawings.
 3. Include a statement or certification attesting that design data complies with criteria indicated, such as building codes, loads, functional, and similar engineering requirements.

SECTION 01 4000 QUALITY REQUIREMENTS

4. Include signature and seal of design professional responsible for allocated design services on calculations and drawings.
- D. Test Reports: After each test/inspection, promptly submit two copies of report to Architect and to Contractor.
 1. Include:
 - a. Date issued.
 - b. Project title and number.
 - c. Name of inspector.
 - d. Date and time of sampling or inspection.
 - e. Identification of product and specifications section.
 - f. Location in the Project.
 - g. Type of test/inspection.
 - h. Date of test/inspection.
 - i. Results of test/inspection.
 - j. Compliance with Contract Documents.
 - k. When requested by Architect, provide interpretation of results.
 2. Test report submittals are for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.
- E. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.
 1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
 2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.
- F. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
- G. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator or for Owner.
 1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.
- H. Erection Drawings: Submit drawings for Architect's benefit as contract administrator or for Owner.
 1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.
 2. Data indicating inappropriate or unacceptable Work may be subject to action by Architect or Owner.

1.07 QUALITY ASSURANCE

- A. Testing Agency Qualifications:
 1. Prior to start of work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
 2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
 3. Qualification Statement: Provide documentation showing testing laboratory is accredited under IAS AC89.
- B. Designer Qualifications: Where professional engineering design services and design data submittals are specifically required of Contractor by Contract Documents, provide services of a Professional Engineer experienced in design of this type of work and licensed in Michigan.

1.08 REFERENCES AND STANDARDS

- A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the

SECTION 01 4000 QUALITY REQUIREMENTS

- standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.
 - C. Obtain copies of standards where required by product specification sections.
 - D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.
 - E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.
 - F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from Contract Documents by mention or inference otherwise in any reference document.

1.09 TESTING AND INSPECTION AGENCIES AND SERVICES

- A. Contractor shall employ and pay for services of an independent testing agency to perform other specified testing.
- B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
- C. Contractor Employed Agency:
 - 1. Testing agency: Comply with requirements of ASTM E329, ASTM E543, ASTM E699, ASTM C1021, ASTM C1077, ASTM C1093, and ASTM D3740.
 - 2. Inspection agency: Comply with requirements of ASTM D3740 and ASTM E329.
 - 3. Laboratory: Authorized to operate in Michigan.
 - 4. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.
 - 5. Testing Equipment: Calibrated at reasonable intervals either by NIST or using an NIST established Measurement Assurance Program, under a laboratory measurement quality assurance program.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
- D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 MOCK-UPS

- A. Before installing portions of the Work where mock-ups are required, construct mock-ups in location and size indicated for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.
- B. Accepted mock-ups establish the standard of quality the Architect will use to judge the Work.
- C. Integrated Exterior Mock-ups: Construct integrated exterior mock-up as indicated on drawings. Coordinate installation of exterior envelope materials and products as required in individual Specification Sections. Provide adequate supporting structure for mock-up materials as necessary.

SECTION 01 4000 QUALITY REQUIREMENTS

- D. Provide supervisory personnel who will oversee mock-up construction. Provide workers that will be employed during the construction at Project.
- E. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.
- F. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- G. Architect will use accepted mock-ups as a comparison standard for the remaining Work.
- H. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by Architect.

3.03 TOLERANCES

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

3.04 TESTING AND INSPECTION

- A. Testing Agency Duties:
 - 1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
 - 2. Perform specified sampling and testing of products in accordance with specified standards.
 - 3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 - 4. Promptly notify Architect and Contractor of observed irregularities or non-compliance of Work or products.
 - 5. Perform additional tests and inspections required by Architect.
 - 6. Submit reports of all tests/inspections specified.
- B. Limits on Testing/Inspection Agency Authority:
 - 1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 - 2. Agency may not approve or accept any portion of the Work.
 - 3. Agency may not assume any duties of Contractor.
 - 4. Agency has no authority to stop the Work.
- C. Contractor Responsibilities:
 - 1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
 - 2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
 - 3. Provide incidental labor and facilities:
 - a. To provide access to Work to be tested/inspected.
 - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
 - c. To facilitate tests/inspections.
 - d. To provide storage and curing of test samples.
 - 4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
 - 5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
 - 6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- D. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.
- E. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.05 MANUFACTURERS' FIELD SERVICES

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance equipment as applicable, and to initiate instructions when necessary.
- B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.06 DEFECT ASSESSMENT

- A. Replace Work or portions of the Work not complying with specified requirements.

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Construction procedures to promote adequate indoor air quality after construction.

1.02 PROJECT GOALS

- A. Dust and Airborne Particulates: Prevent deposition of dust and other particulates in HVAC ducts and equipment.
 - 1. Cleaning of ductwork is not contemplated under this Contract.
 - 2. Contractor shall bear the cost of cleaning required due to failure to protect ducts and equipment from construction dust.
- B. Airborne Contaminants: Procedures and products have been specified to minimize indoor air pollutants.
 - 1. Furnish products meeting the specifications.
 - 2. Avoid construction practices that could result in contamination of installed products leading to indoor air pollution.

1.03 REFERENCE STANDARDS

- A. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size; 2012, with 2015 amendments.
- B. SMACNA (OCC) - IAQ Guidelines for Occupied Buildings Under Construction; 2007.

1.04 DEFINITIONS

- A. Adsorptive Materials: Gypsum board, acoustical ceiling tile and panels, carpet and carpet tile, fabrics, fibrous insulation, and other similar products.
- B. Contaminants: Gases, vapors, regulated pollutants, airborne mold and mildew, and the like, as specified.
- C. Particulates: Dust, dirt, and other airborne solid matter.
- D. Wet Work: Concrete, plaster, coatings, and other products that emit water vapor or volatile organic compounds during installation, drying, or curing.

PART 2 PRODUCTS**2.01 MATERIALS**

- A. Low VOC Materials: See other sections for specific requirements for materials with low VOC content.
- B. Auxiliary Air Filters: MERV of 8, minimum, when tested in accordance with ASHRAE Std 52.2.

PART 3 EXECUTION**3.01 CONSTRUCTION PROCEDURES**

- A. Prevent the absorption of moisture and humidity by adsorptive materials by:
 - 1. Sequencing the delivery of such materials so that they are not present in the building until wet work is completed and dry.
 - 2. Delivery and storage of such materials in fully sealed moisture-impermeable packaging.
 - 3. Provide sufficient ventilation for drying within reasonable time frame.
- B. Begin construction ventilation when building is substantially enclosed.
- C. If extremely dusty or dirty work must be conducted inside the building, shut down HVAC systems for the duration; remove dust and dirt completely before restarting systems.
- D. HVAC equipment and supply air ductwork may be used for ventilation during construction:
 - 1. Operate HVAC system on 100 percent outside air, with 1.5 air changes per hour, minimum.
 - 2. Ensure that air filters are correctly installed prior to starting use; replace filters when they lose efficiency.
 - 3. Do not use return air ductwork for ventilation.
 - 4. Seal return air inlets or otherwise positively isolate return air system to prevent recirculation of air; provide alternate return air pathways.
- E. Do not store construction materials or waste in mechanical or electrical rooms.

SECTION 01 5719 TEMPORARY ENVIRONMENTAL CONTROLS

- F. Prior to use of return air ductwork without intake filters clean up and remove dust and debris generated by construction activities.
 - 1. Inspect duct intakes, return air grilles, and terminal units for dust.
 - 2. Clean plenum spaces, including top sides of lay-in ceilings, outsides of ducts, tops of pipes and conduit.
 - 3. Clean tops of doors and frames.
 - 4. Clean mechanical and electrical rooms, including tops of pipes, ducts, and conduit, equipment, and supports.
 - 5. Clean return plenums of air handling units.
 - 6. Remove intake filters last, after cleaning is complete.
- G. Do not perform dusty or dirty work after starting use of return air ducts without intake filters.
- H. Use other relevant recommendations of SMACNA (OCC) for avoiding unnecessary contamination due to construction procedures.

END OF SECTION

SECTION 01 6000 PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Re-use of existing products.
- B. Transportation, handling, storage and protection.
- C. Product option requirements.
- D. Substitution limitations.
- E. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

- A. Section 01 2500 - Substitution Procedures: Substitutions made during procurement and/or construction phases.
- B. Section 01 7419 - Construction Waste Management and Disposal: Waste disposal requirements potentially affecting product selection, packaging and substitutions.

1.03 SUBMITTALS

- A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
 - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

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

2.02 NEW PRODUCTS

- A. Provide new products unless specifically required or permitted by Contract Documents.
- B. Use of products having any of the following characteristics is not permitted:
 - 1. Made using or containing CFC's or HCFC's used in the manufacturing process.
 - 2. Containing lead, cadmium, or asbestos.

2.03 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.04 MAINTENANCE MATERIALS

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION LIMITATIONS

- A. See Section 01 2500 - Substitution Procedures.

3.02 TRANSPORTATION AND HANDLING

- A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.
- B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
- C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- D. Transport and handle products in accordance with manufacturer's instructions.
- E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
- H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.03 STORAGE AND PROTECTION

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 01 7419.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- G. Comply with manufacturer's warranty conditions, if any.
- H. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- I. Prevent contact with material that may cause corrosion, discoloration, or staining.
- J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Examination, preparation, and general installation procedures.
- B. Requirements for alterations work, including selective demolition, except removal, disposal, and/or remediation of hazardous materials and toxic substances.
- C. Pre-installation meetings.
- D. Cutting and patching.
- E. Surveying for laying out the work.
- F. Cleaning and protection.
- G. Starting of systems and equipment.
- H. Demonstration and instruction of Owner personnel.
- I. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.
- J. General requirements for maintenance service.

1.02 RELATED REQUIREMENTS

- A. Section 01 1000 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.
- B. Section 01 3000 - Administrative Requirements: Submittals procedures.
- C. Section 01 4000 - Quality Requirements: Testing and inspection procedures.
- D. Section 01 5000 - Temporary Facilities and Controls: Temporary exterior enclosures.
- E. Section 01 5000 - Temporary Facilities and Controls: Temporary interior partitions.
- F. Section 01 5100 - Temporary Utilities: Temporary heating, cooling, and ventilating facilities.
- G. Section 01 7800 - Closeout Submittals: Project record documents, operation and maintenance data, warranties, and bonds.
- H. Section 01 7900 - Demonstration and Training: Demonstration of products and systems to be commissioned and where indicated in specific specification sections
- I. Section 02 4100 - Demolition: Demolition of whole structures and parts thereof; site utility demolition.
- J. Section 07 8400 - Firestopping.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
 - 1. Structural integrity of any element of Project.
 - 2. Integrity of weather exposed or moisture resistant element.
 - 3. Efficiency, maintenance, or safety of any operational element.
 - 4. Visual qualities of sight exposed elements.
 - 5. Work of Owner or separate Contractor.
- C. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.04 QUALIFICATIONS

- A. For demolition work, employ a firm specializing in the type of work required.

1.05 PROJECT CONDITIONS

- A. Use of explosives is not permitted.
- B. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- C. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
 - 1. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.

SECTION 01 7000 EXECUTION AND CLOSEOUT REQUIREMENTS

- D. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
 - 1. Indoors: Limit conduct of especially noisy interior work to the hours of 6 pm to 7 am.
- E. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.
- F. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.
- G. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.06 COORDINATION

- A. See Section 01 1000 for occupancy-related requirements.
- B. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- C. Notify affected utility companies and comply with their requirements.
- D. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- E. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- F. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- G. Coordinate completion and clean-up of work of separate sections.
- H. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work,

SECTION 01 7000 EXECUTION AND CLOSEOUT REQUIREMENTS

assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

- A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Architect four days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
 - 1. Review conditions of examination, preparation and installation procedures.
 - 2. Review coordination with related work.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.04 LAYING OUT THE WORK

- A. Promptly notify Architect of any discrepancies discovered.
- B. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- C. Periodically verify layouts by same means.

3.05 GENERAL INSTALLATION REQUIREMENTS

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.06 ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
 - 1. Verify that construction and utility arrangements are as indicated.
 - 2. Report discrepancies to Architect before disturbing existing installation.
 - 3. Beginning of alterations work constitutes acceptance of existing conditions.
- B. Keep areas in which alterations are being conducted separated from other areas that are still occupied.
 - 1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 5000 in locations indicated on drawings.
- C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
 - 1. Where openings in exterior enclosure exist, provide construction to make exterior enclosure weatherproof.
 - 2. Insulate existing ducts or pipes that are exposed to outdoor ambient temperatures by alterations work.
- D. Remove existing work as indicated and as required to accomplish new work.
 - 1. Remove items indicated on drawings.
 - 2. Relocate items indicated on drawings.

SECTION 01 7000 EXECUTION AND CLOSEOUT REQUIREMENTS

3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
- E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
 1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
 2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
 3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
 - a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
 - b. See Section 01 7000 for other limitations on outages and required notifications.
 - c. Provide temporary connections as required to maintain existing systems in service.
 4. Verify that abandoned services serve only abandoned facilities.
 5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.
- F. Protect existing work to remain.
 1. Prevent movement of structure; provide shoring and bracing if necessary.
 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 3. Repair adjacent construction and finishes damaged during removal work.
- G. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
 1. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Architect.
 2. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.
- H. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.
- I. Refinish existing surfaces as indicated:
 1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
 2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.
- J. Clean existing systems and equipment.
- K. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
- L. Do not begin new construction in alterations areas before demolition is complete.
- M. Comply with all other applicable requirements of this section.

3.07 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. See Alterations article above for additional requirements.
- C. Perform whatever cutting and patching is necessary to:

SECTION 01 7000 EXECUTION AND CLOSEOUT REQUIREMENTS

1. Complete the work.
 2. Fit products together to integrate with other work.
 3. Provide openings for penetration of mechanical, electrical, and other services.
 4. Match work that has been cut to adjacent work.
 5. Repair areas adjacent to cuts to required condition.
 6. Repair new work damaged by subsequent work.
 7. Remove samples of installed work for testing when requested.
 8. Remove and replace defective and non-complying work.
- D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- E. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- G. Restore work with new products in accordance with requirements of Contract Documents.
- H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material , to full thickness of the penetrated element.
- J. Patching:
1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
 2. Match color, texture, and appearance.
 3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.08 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.09 PROTECTION OF INSTALLED WORK

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Protect work from spilled liquids. If work is exposed to spilled liquids, immediately remove protective coverings, dry out work, and replace protective coverings.
- G. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- H. Prohibit traffic from landscaped areas.
- I. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.10 SYSTEM STARTUP

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- D. Verify that wiring and support components for equipment are complete and tested.
- E. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- F. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- G. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.11 DEMONSTRATION AND INSTRUCTION

- A. See Section 01 7900 - Demonstration and Training.

3.12 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.
- B. Testing, adjusting, and balancing HVAC systems: See Section 23 0593 - Testing, Adjusting, and Balancing for HVAC.
 - 1. To avoid conflicts, the Testing and Balancing subcontractor is not to be the the controls subcontractor engaged in this project.

3.13 FINAL CLEANING

- A. Use cleaning materials that are nonhazardous.
- B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- C. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
- D. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- E. Clean filters of operating equipment.
- F. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, drainage systems, and _____.
- G. Clean site; sweep paved areas, rake clean landscaped surfaces.
- H. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.14 CLOSEOUT PROCEDURES

- A. Make submittals that are required by governing or other authorities.
 - 1. Provide copies to Architect.
- B. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.
- C. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.
- D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.

SECTION 01 7000 EXECUTION AND CLOSEOUT REQUIREMENTS

- E. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.
- F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
- G. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.
- H. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

3.15 MAINTENANCE

- A. Provide service and maintenance of components indicated in specification sections.
- B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.
- C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
- D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.
- E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Project record documents.
- B. Operation and maintenance data.
- C. Warranties and bonds.

1.02 RELATED REQUIREMENTS

- A. Section 01 3000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- B. Section 01 7000 - Execution and Closeout Requirements: Contract closeout procedures.
- C. Individual Product Sections: Specific requirements for operation and maintenance data.
- D. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

- A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.
- B. Operation and Maintenance Data:
 - 1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
 - 2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
 - 3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
 - 4. Submit two sets of revised final documents in final form within 10 days after final inspection.
- C. Warranties and Bonds:
 - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
 - 2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
 - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED**PART 3 EXECUTION****3.01 PROJECT RECORD DOCUMENTS**

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Reviewed shop drawings, product data, and samples.
 - 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
 - 1. Manufacturer's name and product model and number.
 - 2. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:

SECTION 01 7800 CLOSEOUT SUBMITTALS

1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
3. Field changes of dimension and detail.
4. Details not on original Contract drawings.

3.02 OPERATION AND MAINTENANCE DATA

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

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

- A. For Each Product, Applied Material, and Finish:
- B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
- C. Additional information as specified in individual product specification sections.
- D. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

- A. For Each Item of Equipment and Each System:
 1. Description of unit or system, and component parts.
 2. Identify function, normal operating characteristics, and limiting conditions.
 3. Include performance curves, with engineering data and tests.
 4. Complete nomenclature and model number of replaceable parts.
- B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.
- C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.
- D. Include color coded wiring diagrams as installed.
- E. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- F. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- G. Provide servicing and lubrication schedule, and list of lubricants required.
- H. Include manufacturer's printed operation and maintenance instructions.
- I. Include sequence of operation by controls manufacturer.
- J. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- K. Additional Requirements: As specified in individual product specification sections.

3.05 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

- A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.
- B. Where systems involve more than one specification section, provide separate tabbed divider for each system.
- C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- E. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.
- F. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.
- G. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.
- H. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.
- I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

3.06 WARRANTIES AND BONDS

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.

END OF SECTION

PART 1 GENERAL**1.01 SUMMARY**

- A. Demonstration of products and systems where indicated in specific specification sections.
- B. Training of Owner personnel in operation and maintenance is required for:
 - 1. All software-operated systems.
 - 2. HVAC systems and equipment.
 - 3. Plumbing equipment.
 - 4. Electrical systems and equipment.
 - 5. Items specified in individual product Sections.
- C. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:
 - 1. Roofing, waterproofing, and other weather-exposed or moisture protection products.
 - 2. Finishes, including flooring, wall finishes, ceiling finishes.
 - 3. Items specified in individual product Sections.

1.02 RELATED REQUIREMENTS

- A. Section 01 7800 - Closeout Submittals: Operation and maintenance manuals.
- B. Section 01 9113 - General Commissioning Requirements: Additional requirements applicable to demonstration and training.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Training Plan: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees.
 - 1. Submit to Architect for transmittal to Owner.
 - 2. Submit not less than four weeks prior to start of training.
 - 3. Revise and resubmit until acceptable.
 - 4. Provide an overall schedule showing all training sessions.
 - 5. Include at least the following for each training session:
 - a. Identification, date, time, and duration.
 - b. Description of products and/or systems to be covered.
 - c. Name of firm and person conducting training; include qualifications.
 - d. Intended audience, such as job description.
 - e. Objectives of training and suggested methods of ensuring adequate training.
 - f. Methods to be used, such as classroom lecture, live demonstrations, hands-on, etc.
 - g. Media to be used, such as slides, hand-outs, etc.
 - h. Training equipment required, such as projector, projection screen, etc., to be provided by Contractor.
- C. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.
 - 1. Include applicable portion of O&M manuals.
 - 2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.
 - 3. Provide one extra copy of each training manual to be included with operation and maintenance data.

1.04 QUALITY ASSURANCE

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

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 DEMONSTRATION - GENERAL

- A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by Owner.
- B. Demonstration may be combined with Owner personnel training if applicable.
- C. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.
 - 1. Perform demonstrations not less than two weeks prior to Substantial Completion.
 - 2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- D. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
 - 1. Perform demonstrations not less than two weeks prior to Substantial Completion.

3.02 TRAINING - GENERAL

- A. Conduct training on-site unless otherwise indicated.
- B. Owner will provide classroom and seating at no cost to Contractor.
- C. Provide training in minimum two hour segments.
- D. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to charge Contractor for personnel "show-up" time.
- E. Review of Facility Policy on Operation and Maintenance Data: During training discuss:
 - 1. The location of the O&M manuals and procedures for use and preservation; backup copies.
 - 2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
 - 3. Typical uses of the O&M manuals.
- F. Product- and System-Specific Training:
 - 1. Review the applicable O&M manuals.
 - 2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
 - 3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
 - 4. Provide hands-on training on all operational modes possible and preventive maintenance.
 - 5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
 - 6. Discuss common troubleshooting problems and solutions.
 - 7. Discuss any peculiarities of equipment installation or operation.
 - 8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
 - 9. Review recommended tools and spare parts inventory suggestions of manufacturers.
 - 10. Review spare parts and tools required to be furnished by Contractor.
 - 11. Review spare parts suppliers and sources and procurement procedures.
- G. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Firestopping systems.
- B. Firestopping of joints and penetrations in fire-resistance-rated and smoke-resistant assemblies, whether indicated on drawings or not, and other openings indicated.

1.02 RELATED REQUIREMENTS

- A. Section 01 7000 - Execution and Closeout Requirements: Cutting and patching.
- B. Section 07 0553 - Fire and Smoke Assembly Identification.

1.03 REFERENCE STANDARDS

- A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2019.
- B. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops; 2013a.
- C. ASTM E2837 - Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies; 2013.
- D. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.
- E. ITS (DIR) - Directory of Listed Products; current edition.
- F. FM 4991 - Approval Standard for Firestop Contractors; 2013.
- G. FM (AG) - FM Approval Guide; current edition.
- H. UL 1479 - Standard for Fire Tests of Penetration Firestops; Current Edition, Including All Revisions.
- I. UL (DIR) - Online Certifications Directory; Current Edition.
- J. UL (FRD) - Fire Resistance Directory; current edition.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.
- C. Product Data: Provide data on product characteristics, performance ratings, and limitations.
- D. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Installer's qualification statement.

1.05 QUALITY ASSURANCE

- A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
 - 1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.
 - 2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.
- B. Installer Qualifications: Company specializing in performing the work of this section and:
 - 1. Trained by manufacturer.
 - 2. Approved by Factory Mutual Research Corporation under FM 4991, or meeting any two of the following requirements:
 - 3. Verification of minimum three years documented experience installing work of this type.
 - 4. Verification of at least five satisfactorily completed projects of comparable size and type.
 - 5. Licensed by local authorities having jurisdiction (AHJ).

1.06 FIELD CONDITIONS

- A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.
- B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Firestopping Manufacturers:
 - 1. 3M Fire Protection Products: www.3m.com/firestop/#sle.
 - 2. A/D Fire Protection Systems Inc: www.adfire.com/#sle.
 - 3. Hilti, Inc: www.us.hilti.com/#sle.
 - 4. Specified Technologies Inc: www.stifirestop.com/#sle.
 - 5. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
 - 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Firestopping manufactures listed in specific paragraphs below is for Basis of Design purposes only. Equivalent products meeting design standard from preceding list of manufacturers are acceptable.

2.02 MATERIALS

- A. Firestopping Materials: Any materials meeting requirements.
- B. Mold and Mildew Resistance: Provide firestopping materials with mold and mildew resistance rating of zero(0) in accordance with ASTM G21.
- C. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.
- D. Fire Ratings: Refer to drawings for required systems and ratings.

2.03 FIRESTOPPING ASSEMBLY REQUIREMENTS

- A. Head-of-Wall (HW) Joint System Firestopping at Joints Between Fire-Rated Wall Assemblies and Non-Rated Horizontal Assemblies: Use system that has been tested according to ASTM E2837 to have fire resistance F Rating equal to required fire rating of wall assembly.
 - 1. Movement: Provide systems that have been tested to show movement capability as indicated.
- B. Through Penetration Firestopping: Use system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.
 - 1. Temperature Rise: Provide systems that have been tested to show T Rating as indicated.
 - 2. Air Leakage: Provide systems that have been tested to show L Rating as indicated.
 - 3. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.

2.04 FIRESTOPPING PENETRATIONS THROUGH GYPSUM BOARD WALLS

- A. Blank Openings:
 - 1. 1 Hour Construction: UL System W-L-0020; Specified Technologies Inc. Composite Sheet.
 - 2. 1 Hour Construction: UL System W-L-0032; Specified Technologies Inc. FP Intumescent Firestop Plug.
 - 3. 1 Hour Construction: UL System W-L-0038; Specified Technologies Inc. FP Intumescent Firestop Plug.
 - 4. 1 Hour Construction: UL System W-L-3334; Hilti CP 653 Speed Sleeve.
- B. Penetrations By:
 - 1. Multiple Penetrations in Large Openings:
 - a. 1 Hour Construction: UL System W-L-1408; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - b. 1 Hour Construction: UL System W-L-8013; Hilti CFS-BL Firestop Block.
 - c. 1 Hour Construction: UL System W-L-8025; Specified Technologies Inc. LCI Intumescent Firestop Sealant.

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- d. 1 Hour Construction: UL System W-L-8050; Specified Technologies Inc. SSB Intumescent Firestop pillows.
- e. 1 Hour Construction: UL System W-L-8071; Hilti FS-ONE MAX Intumescent Firestop Sealant.
- f. 1 Hour Construction: UL System W-L-8073; Specified Technologies Inc. Composite Sheet.
- g. 1 Hour Construction: UL System W-L-8079; Hilti FS-ONE MAX Intumescent Firestop Sealant.
- 2. Uninsulated Metallic Pipe, Conduit, and Tubing:
 - a. 1 Hour Construction: UL System W-L-1042; Specified Technologies Inc. WF300 Intumescent Firestop Caulk (For Wood Frame Construction).
 - b. 1 Hour Construction: UL System W-L-1049; Specified Technologies Inc. SSS Intumescent Firestop Sealant.
 - c. 1 Hour Construction: UL System W-L-1054; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - d. 1 Hour Construction: UL System W-L-1090; Specified Technologies Inc. LC Endothermic Firestop Sealant.
 - e. 1 Hour Construction: UL System W-L-1164; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - f. 1 Hour Construction: UL System W-L-1222; Specified Technologies Inc. LCI Intumescent Firestop Sealant.
 - g. 1 Hour Construction: UL System W-L-1477; Specified Technologies Inc. EZ Firestop Grommet.
 - h. 1 Hour Construction: UL System W-L-1506; Hilti CFS-D Firestop Cable Disc.
- 3. Uninsulated Non-Metallic Pipe, Conduit, and Tubing:
 - a. 1 Hour Construction: UL System W-L-2048; Specified Technologies Inc. SSW Wrap Strips.
 - b. 1 Hour Construction: UL System W-L-2074; Specified Technologies Inc. SSC Collars.
 - c. 1 Hour Construction: UL System W-L-2078; Hilti CP 643N/644 Firestop Collar.
 - d. 1 Hour Construction: UL System W-L-2128; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - e. 1 Hour Construction: UL System W-L-2237; Specified Technologies Inc. LCC Intumescent Firestop Collars.
 - f. 1 Hour Construction: UL System W-L-2241; Specified Technologies Inc. WF300 Intumescent Firestop Caulk (For Wood Frame Construction).
 - g. 1 Hour Construction: UL System W-L-2243; Specified Technologies Inc. SSW Wrap Strips.
 - h. 1 Hour Construction: UL System W-L-2493; Specified Technologies Inc. RTC Range-Taking Collar.
- 4. Electrical Cables Not In Conduit:
 - a. 1 Hour Construction: UL System W-L-3024; Specified Technologies Inc. SSP Firestop Putty.
 - b. 1 Hour Construction: UL System W-L-3065; Hilti FS-ONE MAX Intumescent Firestop Sealant, CP 606 Flexible Firestop Sealant, CD 601S Elastomeric Firestop Sealant, or CP 618 Firestop Putty Stick.
 - c. 1 Hour Construction: UL System W-L-3076; Specified Technologies Inc. SSS Intumescent Firestop Sealant.
 - d. 1 Hour Construction: UL System W-L-3084; Specified Technologies Inc. SSB Intumescent Firestop Pillows.
 - e. 1 Hour Construction: UL System W-L-3135; Specified Technologies Inc. SSP Firestop Putty.
 - f. 1 Hour Construction: UL System W-L-3169; Specified Technologies Inc. LCI Intumescent Firestop Sealant.
 - g. 1 Hour Construction: UL System W-L-3218; Specified Technologies Inc. EZ-Path Series 33 Fire-Rated Pathway.
 - h. 1 Hour Construction: UL System W-L-3255; Specified Technologies Inc. EZ-Path Series 22 Fire-Rated Pathway.

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- i. 1 Hour Construction: UL System W-L-3256; Specified Technologies Inc. EZ-Path Series 22 Fire-Rated Pathway.
- j. 1 Hour Construction: UL System W-L-3265; Specified Technologies Inc. EZ-Path Series 33 Fire-Rated Pathway.
- k. 1 Hour Construction: UL System W-L-3303; Specified Technologies Inc. Ready Split Sleeve.
- l. 1 Hour Construction: UL System W-L-3306; Specified Technologies Inc. EZ-Path Series 44 Fire-Rated Pathway.
- m. 1 Hour Construction: UL System W-L-3334; Hilti CP 653 Speed Sleeve.
- n. 1 Hour Construction: UL System W-L-3350; Specified Technologies Inc. LC Endothermic Firestop Sealant.
- o. 1 Hour Construction: UL System W-L-3357; Specified Technologies Inc. FP Intumescent Firestop Plug.
- p. 1 Hour Construction: UL System W-L-3358; Specified Technologies Inc. Ready Split Sleeve.
- q. 1 Hour Construction: UL System W-L-3358; Specified Technologies Inc. Ready-Sleeve.
- r. 1 Hour Construction: UL System W-L-3369; Specified Technologies Inc. EZ Firestop Grommet.
- s. 1 Hour Construction: UL System W-L-3370; Specified Technologies Inc. EZ Firestop Grommet.
- t. 1 Hour Construction: UL System W-L-3374; Specified Technologies Inc. FP Intumescent Firestop Plug.
- u. 1 Hour Construction: UL System W-L-3376; Specified Technologies Inc. Ready-Sleeve.
- v. 1 Hour Construction: UL System W-L-3377; Specified Technologies Inc. EZ-Path Series 22 Fire-Rated Pathway.
- w. 1 Hour Construction: UL System W-L-3377; Specified Technologies Inc. EZ-Path Series 33 Fire-Rated Pathway.
- x. 1 Hour Construction: UL System W-L-3378; Specified Technologies Inc. EZ Firestop Grommet.
- y. 1 Hour Construction: UL System W-L-3379; Specified Technologies Inc. EZ Firestop Grommet.
- z. 1 Hour Construction: UL System W-L-3390; Specified Technologies Inc. EZ-Path Series 44 Fire-Rated Pathway.
- aa. 1 Hour Construction: UL System W-L-3393; Hilti CFS-SL RK Retrofit Sleeve Kit for Existing Cables.
- ab. 1 Hour Construction: UL System W-L-3414; Hilti CFS-D Firestop Cable Disc.
- 5. Cable Trays with Electrical Cables:
 - a. 1 Hour Construction: UL System W-L-4008; Specified Technologies Inc. SSB Intumescent Firestop Pillows.
 - b. 1 Hour Construction: UL System W-L-4011; Hilti CFS-BL Firestop Block.
 - c. 1 Hour Construction: UL System W-L-4060; Hilti FS-ONE MAX Intumescent Firestop Sealant.
- 6. Insulated Pipes:
 - a. 1 Hour Construction: UL System W-L-5014; Specified Technologies Inc. SSS Intumescent Firestop Sealant.
 - b. 1 Hour Construction: UL System W-L-5028; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - c. 1 Hour Construction: UL System W-L-5029; Hilti FS-ONE Intumescent Firestop Sealant.
 - d. 1 Hour Construction: UL System W-L-5121; Specified Technologies Inc. LCI Intumescent Firestop Sealant.
 - e. 1 Hour Construction: UL System W-L-5273; Specified Technologies Inc. LC Endothermic Firestop Sealant.
 - f. 1 Hour Construction: UL System W-L-5298; Specified Technologies Inc. WF300 Intumescent Firestop Caulk (For Wood Frame Construction).
- 7. HVAC Ducts, Insulated:

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- a. 1 Hour Construction: UL System W-L-7164; Specified Technologies Inc. FyreFlange HVAC Firestop Angle.
- b. 1 Hour Construction: UL System W-L-7238; Specified Technologies Inc. FyreFlange HVAC Firestop Angle.
- c. 1 Hour Construction: UL System W-L-7156; Hilti FS-ONE MAX Intumescent Firestop Sealant.

2.05 FIRESTOPPING SYSTEMS

- A. Firestopping: Any material meeting requirements.
 1. Fire Ratings: Use system that is listed by FM (AG), ITS (DIR), or UL (FRD) and tested in accordance with ASTM E814, ASTM E119, or UL 1479 with F Rating equal to fire rating of penetrated assembly and minimum T Rating Equal to F Rating and in compliance with other specified requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.
- B. Remove incompatible materials that could adversely affect bond.
- C. Install damming materials to prevent liquid material from leakage.

3.03 INSTALLATION

- A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.
- B. Do not cover installed firestopping until inspected by authorities having jurisdiction.

3.04 CLEANING

- A. Clean adjacent surfaces of firestopping materials.

3.05 PROTECTION

- A. Protect adjacent surfaces from damage by material installation.

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Nonsag gunnable joint sealants.
- B. Self-leveling pourable joint sealants.
- C. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping: Firestopping sealants.

1.03 REFERENCE STANDARDS

- A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2006 (Reapproved 2011).
- B. ASTM C834 - Standard Specification for Latex Sealants; 2014.
- C. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2012.
- D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- E. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.
- F. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2008 (Reapproved 2012).
- G. ASTM C1311 - Standard Specification for Solvent Release Sealants; 2014.
- H. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants; 2002 (Reapproved 2013).
- I. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2005 (Reapproved 2010).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data for Sealants: Where Basis of Design is indicated and another approved manufacturer is submitted, provide cross reference for comparison of characteristics and quality including product specified identifier, i.e. Type NS-1 or SL-1. Submit manufacturer's technical data sheets for each product to be used, that includes the following.
 - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
 - 2. List of backing materials approved for use with the specific product.
 - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
 - 4. Substrates the product should not be used on.
 - 5. Substrates for which use of primer is required.
- C. Installation information.
 - 1. Sealant installation location.
 - 2. Sealant proposed.
 - 3. Sealant ASTM standard being meet.
 - 4. Joint configuration.
 - 5. Sealant color or indication for architect to fill in color.
- D. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
- E. Samples for Verification: Where custom sealant color is specified, obtain directions from Architect and submit at least two physical samples for verification of color of each required sealant.

1.05 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a five year period after Date of Substantial Completion.
- C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Non-Sag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.
 - 1. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
 - 2. Bostik Inc: www.bostik-us.com.
 - 3. Dow Corning Corporation: www.dowcorning.com/construction/sle.
 - 4. Momentive Performance Materials, Inc (formerly GE Silicones): www.momentive.com/sle.
 - 5. Pecora Corporation: www.pecora.com.
 - 6. Sherwin-Williams Company: www.sherwin-williams.com.
 - 7. Sika Corporation: www.usa-sika.com.
 - 8. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
 - 9. W.R. Meadows, Inc: www.wrmeadows.com/#sle.
 - 10. Substitutions: See Section 01 6000 - Product Requirements.
- B. Self-Leveling Sealants: Pourable or self-leveling sealant that has sufficient flow to form a smooth, level surface when applied in a horizontal joint.
 - 1. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
 - 2. Bostik Inc: www.bostik-us.com/#sle.
 - 3. Dayton Superior Corporation: www.daytonsuperior.com/#sle.
 - 4. Dow Chemical Company: consumer.dow.com/en-us/industry/ind-building-construction.html/#sle.
 - 5. Pecora Corporation: www.pecora.com/#sle.
 - 6. Sherwin-Williams Company: www.sherwin-williams.com/#sle.
 - 7. Sika Corporation: www.usa-sika.com/#sle.
 - 8. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
 - 9. Substitutions: See Section 01 6000 - Product Requirements.

2.02 JOINT SEALANT APPLICATIONS

- A. Scope:
 - 1. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
 - a. Joints between door, window, and other frames and adjacent construction.
 - b. Interior Wet Areas: Bathrooms and restrooms; fixtures in wet areas include plumbing fixtures, countertops, cabinets, and other similar items.
 - c. Interior wall control joints.
 - d. Other interior joints for which no other type of sealant is indicated.
 - e. Other joints indicated below.
 - 2. Do not seal the following types of joints.
 - a. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
 - b. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
 - c. Joints where installation of sealant is specified in another section.
 - d. Joints between suspended panel ceilings/grid and walls.

2.03 NONSAG JOINT SEALANTS

- A. Type NS-1 - Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
 - 1. Application: Joint filler for all exterior applications, unless noted otherwise.
 - 2. Movement Capability: Plus and minus 25 percent, minimum.
 - 3. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
 - 4. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
 - 5. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.
 - 6. Color: To be selected by Architect from manufacturer's standard range.
 - 7. Cure Type: Single-component, neutral moisture curing.
 - 8. Service Temperature Range: Minus 20 to 180 degrees F.

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9. Manufacturers:
 - a. Basis of Design: Dow Chemical Company; DOWSIL 756 SMS Building Sealant: consumer.dow.com/en-us/industry/ind-building-construction.html/#sle.
 - b. Pecora Corporation; Pecora 890 NST (Non-Staining Technology): www.pecora.com/#sle.
 - c. Sika Corporation; Sikasil WS-290: www.usa-sika.com/#sle.
 - d. Tremco Commercial Sealants & Waterproofing; Spectrem 3: www.tremcosealants.com/#sle.
- B. Type NS-2 - Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
 1. Application: Joint filler between fixtures in wet areas and floors, walls and ceilings. Used for tub, tile, kitchen or bath.
 2. Color: White at porcelain. Clear at backsplashes.
 3. Manufacturers:
 - a. Basis of Design: Sika Corporation; Sikasil GP: www.usa-sika.com/#sle.
- C. Type NS-3 - Tamper-Resistant, Silyl-Terminated Polyurethane (STPU) Sealant: ASTM C920, Grade NS, Uses M and A; single component; not expected to withstand continuous water immersion or traffic.
 1. Application: Joint filler for wall, ceiling, and floor joints where tamper-resistance is required, including exterior joints at ground level.
 2. Movement Capability: Plus and minus 12-1/2 percent, minimum
 3. Hardness Range: 50 to 60, Shore A, when tested in accordance with ASTM C661.
 4. Color: To be selected by Architect from manufacturer's standard range.
 5. Service Temperature Range: Minus 40 to 180 degrees F.
 6. Manufacturers:
 - a. Basis of Design: Pecora Corporation; DynaFlex SC (Security Sealant): www.pecora.com/#sle.
- D. Type NS-4 - Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multicomponent; not expected to withstand continuous water immersion or traffic.
 1. Application: Joint filler at interior wall and ceiling joints in wet areas.
 2. Movement Capability: Plus and minus 25 percent, minimum.
 3. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
 4. Color: To be selected by Architect from manufacturer's standard range.
 5. Service Temperature Range: Minus 40 to 180 degrees F.
 6. Manufacturers:
 - a. Basis of Design: Tremco Commercial Sealants & Waterproofing; Dymeric 240 FC: www.tremcosealants.com/#sle.
- E. Type NS-5 - Polyurethane Sealant for Continuous Water Immersion: ASTM C920, Grade NS, Uses M and A; single or multicomponent; explicitly approved by manufacturer for continuous water immersion; suitable for traffic exposure when recessed below traffic surface .
 1. Application: Joint filler for continuous immersion in potable water. Control and expansion joints in concrete paving not concerned with wheeled traffic, i.e. forklift, and floor joints in wet areas.
 2. Movement Capability: Plus and minus 35 percent, minimum.
 3. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
 4. Color: To be selected by Architect from manufacturer's standard range.
 5. Service Temperature Range: Minus 40 to 180 degrees F.
 6. Manufacturers:
 - a. Sika Corporation; Sikaflex-1a: www.usa-sika.com/#sle.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- F. Type NS-6 - Epoxy Sealant: ASTM C920, Grade NS, Uses M and A; single or multicomponent; not expected to withstand continuous water immersion or traffic.
 1. Application: Joint filler for narrow control joints in interior concrete slabs.
 2. Hardness Range: 65 to 75, Shore D, when tested in accordance with ASTM C661.
 3. Color: To be selected by Architect from manufacturer's standard range.
 4. Service Temperature Range: 40 to 120 degrees F.

- G. Type NS-7 - Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use. Can be painted.
 - 1. Application: Joint filler for wall and ceiling joints, smoke partitions and sound rated walls.
 - 2. Color: To be selected by Architect from manufacturer's standard range.
 - 3. Grade: ASTM C834; Grade Minus 18 Degrees C (0 Degrees F).
 - 4. Manufacturers:
 - a. Tremco Commercial Sealants & Waterproofing; Tremstop Smoke and Sound: www.tremcosealants.com/#sle.
- H. Type NS-8 - Non-Curing Butyl Sealant: Solvent-based; ASTM C1311; single component, non-sag, non-skinning, non-hardening, non-bleeding; vapor-impermeable; intended for fully concealed applications.
 - 1. Application: Joint filler for manufactured metal panels, sheet metal fabrications, and under door thresholds. Can also be used for smoke partitions: Sealing gypsum board top and bottom edges to adjacent construction and behind electrical boxes.

2.04 SELF-LEVELING SEALANTS

- A. Type SL-1 - Self-Leveling Polyurethane Sealant for Continuous Water Immersion: Polyurethane; ASTM C920, Grade P, Uses M and A; single or multi-component; explicitly approved by manufacturer for traffic exposure and continuous water immersion.
 - 1. Application: Joint filler for exterior continuous water immersion. Also for sidewalk joints and joints between sidewalk and building face.
 - 2. Movement Capability: Plus and minus 25 percent, minimum.
 - 3. Color: To be selected by Architect from manufacturer's standard range.
 - 4. Service Temperature Range: Minus 40 to 180 degrees F.
 - 5. Manufacturers:
 - a. Basis of Design: Sika Corporation; Sikaflex-1c SL: www.usa-sika.com/#sle.
- B. Type SL-2 - Semi-Rigid Self-Leveling Epoxy Joint Filler: Epoxy or epoxy/polyurethane copolymer; intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.
 - 1. Application: Joint filler for concrete slab saw-cuts and narrow cracks, both interior and exterior.
 - 2. Composition: Multi-component, 100 percent solids by weight.
 - 3. Durometer Hardness: Minimum of 85 for Type A or 35 for Type D, after seven days when tested in accordance with ASTM D2240.
 - 4. Color: To be selected by Architect from manufacturer's standard colors.
 - 5. Joint Width, Minimum: 1/8 inch.
 - 6. Joint Width, Maximum: 1/4 inch.
 - 7. Joint Depth: Provide product suitable for joints from 1/8 inch to 2 inches in depth including space for backer rod.
 - 8. Manufacturers:
 - a. Basis of Design: Euclid Chemical Company; EUCO 700: www.euclidchemical.com/#sle.
- C. Type SL-3 - Semi-Rigid Self-Leveling Polyurea Joint Filler: Two-component, 100 percent solids; Intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.
 - 1. Application: Joint filler for concrete slab saw-cuts and narrow cracks both interior and exterior.
 - 2. Durometer Hardness, Type A: 75, minimum, after seven days when tested in accordance with ASTM D2240.
 - 3. Color: To be selected by Architect from manufacturer's standard colors.
 - 4. Joint Width, Minimum: 1/8 inch.
 - 5. Joint Width, Maximum: 3/4 inch.
 - 6. Joint Depth: Provide product suitable for joints from 1/8 inch to 1 inch in depth excluding space for backer rod.
 - 7. Manufacturers:
 - a. Basis of Design: Euclid Chemical Company; EUCO QWIKjoint UVR: www.euclidchemical.com/#sle.

2.05 ACCESSORIES

- A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
 - 1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type O - Open Cell Polyurethane.
 - 2. Type for Joints Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type B - Bi-Cellular Polyethylene.
 - 3. Open Cell: 40 to 50 percent larger in diameter than joint width.
 - 4. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.
- B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
- C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.
- D. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- E. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.
- E. Concrete Floor Joints That Will Be Exposed in Completed Work: Test joint filler in inconspicuous area to verify that it does not stain or discolor slab.

3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Perform acoustical sealant application work in accordance with ASTM C919.
- D. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
- E. Install bond breaker backing tape where backer rod cannot be used.
- F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- G. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- H. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.
- I. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

3.04 FIELD QUALITY CONTROL

- A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.
- B. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Non-fire-rated hollow metal doors and frames.
- B. Hollow metal frames for wood doors.
- C. Hollow metal borrowed lites glazing frames.
- D. Accessories, including glazing, louvers, and matching panels.

1.02 RELATED REQUIREMENTS

- A. Section 08 1416 - Flush Wood Doors
- B. Section 08 7100 - Door Hardware.
- C. Section 09 9123 - Interior Painting: Field painting.

1.03 ABBREVIATIONS AND ACRONYMS

- A. ANSI: American National Standards Institute.
- B. HMMA: Hollow Metal Manufacturers Association.

1.04 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.
- C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.
- D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- F. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2015.
- G. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2014.
- H. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2012.
- I. ASTM C476 - Standard Specification for Grout for Masonry; 2010.
- J. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2014.
- K. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
- L. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.
- M. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.
- N. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; 2007.
- O. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; 2006.
- P. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames; 2013.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.
- C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.
- D. Manufacturer's Qualification Statement.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Provide hollow metal doors and frames from SDI Certified manufacturer: <https://steeldoor.org/sdi-certified/#sle>.
- B. Maintain at project site copies of reference standards relating to installation of products specified.

1.07 WARRANTY

- A. Hollow metal work to be warranted from defects in workmanship and quality for a period of 3 years from date of Substantial Completion.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Hollow Metal Doors and Frames:
 - 1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com.
 - 2. Curries, an Assa Abloy Group company: www.assaabloydss.com.
 - 3. Republic Doors, an Allegion brand: www.republicdoor.com/#sle.
 - 4. Steelcraft, an Allegion brand: www.allegion.com/us.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

- A. Requirements for Hollow Metal Doors and Frames:
 - 1. Steel Sheet: Comply with one or more of the following requirements; galvanized steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
 - 2. Accessibility: Comply with ICC A117.1 and ADA Standards.
 - 3. Door Edge Profile: Manufacturers standard for application indicated.
 - 4. Typical Door Face Sheets: Flush.
 - 5. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturers standard.
 - 6. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
 - 7. Zinc Coating for Typical Interior Wet Areas and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvanized) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
 - a. Based on SDI Standards: Provide at least A40/ZF120 (galvanized) when necessary, coating not required for typical interior door applications, and at least A60/ZF180 (galvanized) for corrosive locations.
- B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 HOLLOW METAL DOORS

- A. Interior Doors, Non-Fire Rated:
 - 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 2 - Heavy-duty.
 - b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 1 - Full Flush.

- d. Door Face Metal Thickness: 18 gauge, 0.042 inch, minimum.
- 2. Door Core Material: Manufacturers standard core material/construction and in compliance with requirements.
- 3. Door Thickness: 1-3/4 inches, nominal.
- 4. Door Finish: Factory primed and field finished.

2.04 HOLLOW METAL FRAMES

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. Frame Finish: Same as hollow metal door.
- C. Interior Door Frames, Non-Fire Rated: Face welded type.
 - 1. Frame Metal Thickness: 16 gauge, 0.053 inch, minimum.
- D. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.
- E. Borrowed Lites Glazing Frames: Construction and face dimensions to match door frames, and as indicated on drawings.

2.05 FINISHES

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

2.06 ACCESSORIES

- A. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.
 - 1. Apply stop opposite primary circulation side.
- B. Grout for Frames: Mortar grout complying with ASTM C476 with maximum slump of 4 inches as measured in accordance with ASTM C143/C143M for hand troweling in place; plaster grout and thinner pumpable grout are prohibited.
- C. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.
- D. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 PREPARATION

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Coordinate frame anchor placement with wall construction.
- C. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
- D. Install door hardware as specified in Section 08 7100.

3.04 TOLERANCES

- A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.
- B. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.05 ADJUSTING

- A. Adjust for smooth and balanced door movement.

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Flush aluminum doors with aluminum face sheets.
- B. Glazed aluminum doors.
- C. Aluminum monumental stile and rail doors.
- D. Aluminum frames.
- E. Flush door panels.
- F. Glazing.

1.02 RELATED REQUIREMENTS

- A. Section 07 9200 - Joint Sealants: Sealing joints between door frames and adjacent construction.
- B. Section 08 7100 - Door Hardware: Hardware for aluminum doors.
- C. Section 08 8000 - Glazing: Glazing materials for aluminum doors and frames.

1.03 REFERENCE STANDARDS

- A. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.
- B. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2012.
- C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- D. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- E. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
- F. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- G. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.
- H. ASTM C1363 - Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus; 2011.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's descriptive literature for each type of door; include information on fabrication methods.
- C. Shop Drawings: Include elevations of each opening type.
 - 1. Verify dimensions by field measurements before fabrication and indicate on shop drawings.
- D. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver aluminum components in manufacturer's standard protective packaging, palletted, crated, or banded together.
- B. Inspect delivered components for damage and replace. Repaired components will not be accepted.
- C. Store components in clean, dry, indoor area, under cover in manufacturer's packaging until installation.
- D. Protect materials and finish from damage during handling and installation.

1.06 FIELD CONDITIONS

- A. Do not begin installation of interior aluminum components until space has been enclosed and ambient thermal conditions are being maintained at levels consistent with final project requirements.

1.07 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.
- C. Provide ten year manufacturer warranty for defects in workmanship and materials.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Flush Aluminum Doors with Aluminum Face Sheets:
 - 1. Basis of Design: Special-Lite, Inc; Model: SL-16: www.special-lite.com/#sle.
 - 2. Cross Aluminum Products; www.crossaluminum.com
 - 3. Substitutions: Not permitted.
- B. Glazed Aluminum Doors:
- C. Aluminum Monumental Stile and Rail Doors:

2.02 DOORS AND FRAMES

- A. Flush Aluminum Doors with Aluminum Face Sheets: Aluminum internal framing and faces; no steel components.
 - 1. Thickness: 1-3/4 inches, nominal.
 - 2. Facing: Seamless aluminum sheet, 0.040 inch thick, ribbed texture, laminated to 1/8 inch tempered hardboard.
 - 3. Finish: Class I - Natural anodized.
 - 4. Weatherstripping: Replaceable pile type; at jambs and head of exterior doors.
- B. Glazed Aluminum Doors: Extruded aluminum tube frame, full glazed, with middle rail; factory glazed.
 - 1. Thickness: Manufacturer's standard for door size and construction.
 - 2. Stile Width: As indicated on drawings.
 - 3. Finish: Class I - Natural anodized.
 - 4. Seals: Manufacturer's standard.
 - 5. Glazing, Exterior Doors: Sealed insulating units, 1 inch thick, made of clear 1/4 inch thick fully tempered glass.
- C. Aluminum Monumental Stile and Rail Doors: Extruded aluminum, alloy 6063-T6 temper, with 1/8 inch minimum wall thickness, with mid-rail, and having full width galvanized steel 3/8 inch tie rods within top and bottom rails.
 - 1. Thickness: 1-3/4 inches, nominal.
 - 2. Top Rail Height: 6-1/2 inches, nominal.
 - 3. Mid-Rail Height: 6-1/2 inch, nominal.
 - 4. Finish: Class I - Natural anodized.
 - 5. Glazing: Sealed insulating units, 1 inch thick, made of clear 1/4 inch thick fully tempered glass.
- D. Aluminum Frames for Doors, Sidelights, or Transoms: Extruded aluminum, thermally broken hollow or C-shaped sections; no steel components.
 - 1. Frame Depth: 4 1/2 inches.
 - 2. Finish: Same as doors.
 - 3. Weatherstripping: Replaceable pile type; at jambs and head.
 - 4. Sidelight/Transom Glazing: Sealed insulating glass units, 1 inch overall thickness, with two panes of clear 1/4 inch thick fully tempered glass.
- E. Dimensions and Shapes: As indicated on drawings; dimensions indicated are nominal.
 - 1. Provide the following clearances:
 - a. Hinge and Lock Stiles: 1/8 inch.
 - b. At Top Rail and Bottom Rail: 1/8 inch.

2.03 COMPONENTS

- A. Flush Door Panels: Without visible seams on face sheet.
 - 1. Framing and Hardware Backup: Extruded aluminum tubing, 1/8 inch minimum thickness.
 - 2. Perimeter Edges: Extruded aluminum cap.
 - 3. Exterior Doors Thermal Transmittance: U-value of 0.50, nominal, when tested in accordance with ASTM C1363.
- B. Frames: Extruded aluminum shapes, not less than 0.062 inch thick, reinforced at hinge and strike locations.
- C. Door Window Frames: Door window frames with glazing securely fastened within door opening.
- D. Additional Door Hardware: See Section 08 7100.

2.04 MATERIALS

- A. Aluminum Sheet: ASTM B209 (ASTM B209M), alloy 5005, temper H14, stretcher leveled.
- B. Extruded Aluminum: ASTM B221 (ASTM B221M), alloy 6063, temper T5, or alloy 6463, temper T5.

2.05 FINISHES

- A. Class I Natural Anodized Finish: Clear anodic coating; AAMA 611 AA-M12C22A41, minimum dry film thickness (DFT) of 0.7 mils, 0.0007 inch.

2.06 ACCESSORIES

- A. Fasteners: Aluminum, non-magnetic stainless steel, or other material warranted by manufacturer as non-corrosive and compatible with aluminum components.
- B. Brackets and Reinforcements: Manufacturer's high-strength aluminum units where feasible, otherwise, non-magnetic stainless steel or steel hot-dip galvanized in compliance with ASTM A123/A123M.
- C. Bituminous Coating: Cold-applied asphaltic mastic, compounded for 30-mil thickness per coat.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that wall surfaces and openings are ready to receive frames and are within tolerances specified in manufacturer's instructions.

3.02 PREPARATION

- A. Perform cutting, fitting, forming, drilling, and grinding of frames as required for project conditions.
- B. Replace components with damage to exposed finishes.
- C. Separate dissimilar metals to prevent electrolytic action between metals.

3.03 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and approved shop drawings.
- B. Set frames plumb, square, level, and aligned to receive doors. Anchor frames to adjacent construction in strict accordance with manufacturer's recommendations and within specified tolerances.
- C. Where aluminum surfaces contact metals other than stainless steel, zinc, or small areas of white bronze, protect from direct contact by painting dissimilar metal with heavy coating of bituminous paint.
- D. Hang doors and adjust hardware to achieve specified clearances and proper door operation.

3.04 CLEANING

- A. Upon completion of installation, thoroughly clean door and frame surfaces in accordance with AAMA 609 & 610.
- B. Do not use abrasive, caustic, or acid cleaning agents.

3.05 PROTECTION

- A. Protect products of this section from damage caused by subsequent construction until Date of Substantial Completion.
- B. Replace damaged or defective components that cannot be repaired to a condition indistinguishable from undamaged components.

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Flush wood doors; flush configuration; non-rated.

1.02 RELATED REQUIREMENTS

- A. Section 08 1113 - Hollow Metal Doors and Frames.
- B. Section 08 7100 - Door Hardware.
- C. Section 09 9300 - Staining and Transparent Finishing: Field finishing of doors.

1.03 REFERENCE STANDARDS

- A. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.
- B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
- C. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.0; 2016.
- D. WDMA I.S. 1A - Interior Architectural Wood Flush Doors; 2013.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.
- C. Samples: Submit two samples of door veneer, 12 by 12 inch in size illustrating wood grain, stain color, and sheen.
- D. Warranty, executed in Owner's name.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Package, deliver and store doors in accordance with specified quality standard.
- B. Accept doors on site in manufacturer's packaging, and inspect for damage.
- C. Protect doors with resilient packaging sealed with heat shrunk plastic; do not store in damp or wet areas or areas where sunlight might bleach veneer; seal top and bottom edges with tinted sealer if stored more than one week, and break seal on site to permit ventilation.

1.06 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Interior Doors: Provide manufacturer's warranty for the life of the installation.
- C. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Wood Veneer Faced Doors:
 - 1. Basis of Design: Field verify and match existing.
 - 2. Masonite Architectural: www.architectural.masonite.com/#sle.
 - 3. VT Industries, Inc: www.vtindustries.com/#sle.
 - 4. Oshkosh Architectural Door Company: www.oshkoshdoor.com.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.

2.02 DOORS

- A. Doors: See drawings for locations and additional requirements.
 - 1. Quality Standard: Custom Grade, Heavy Duty performance, in accordance with AWI/AWMAC/WI (AWS), unless noted otherwise.
 - 2. Wood Veneer Faced Doors: 5-ply or 7-ply unless otherwise indicated.
- B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
 - 1. Provide solid core doors at each location.

SECTION 08 1416 FLUSH WOOD DOORS

2. Smoke and Draft Control Doors: In addition to required fire rating, provide flush wood door assemblies in compliance with WDMA I.S. 1A requirements for "S" label; no additional gasketing or edge sealing allowed.
3. Wood veneer facing for field transparent finish as indicated on drawings.

2.03 DOOR AND PANEL CORES

- A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.

2.04 DOOR FACINGS

- A. Veneer Facing for Transparent Finish: Red oak, veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.
 1. Vertical Edges: Same species as face veneer.

2.05 DOOR CONSTRUCTION

- A. Fabricate doors in accordance with door quality standard specified.
- B. Cores Constructed with stiles and rails:
 1. Provide solid blocks at lock edge for hardware reinforcement.
- C. Glazed Openings: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
- D. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- E. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
- F. Provide edge clearances in accordance with the quality standard specified.

2.06 FINISHES - WOOD VENEER DOORS

- A. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
 1. Transparent:
 - a. System - 11, Polyurethane, Catalyzed.
 - b. Stain: As selected by Architect. Color to match Architects sample or color indicated on drawings.
 - c. Sheen: Satin.
- B. Factory finish doors in accordance with approved sample.
- C. Seal door top edge with color sealer to match door facing.

2.07 ACCESSORIES

- A. Hollow Metal Door Frames: See Section 08 1113.
- B. Glazed Openings:
 1. Heat-Strengthened and Fully Tempered Glass: ASTM C1048.
 2. Glazing: Single vision units, 1/4 inch thick glass.
 3. Tint: Clear.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and specified quality standard.
- B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- C. Use machine tools to cut or drill for hardware.

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- D. Coordinate installation of doors with installation of frames and hardware.

3.03 TOLERANCES

- A. Comply with specified quality standard for fit and clearance tolerances.
- B. Comply with specified quality standard for telegraphing, warp, and squareness.

3.04 ADJUSTING

- A. Adjust doors for smooth and balanced door movement.
- B. Adjust closers for full closure.

3.05 SCHEDULE - SEE DRAWINGS

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Fire-rated steel windows.

1.02 RELATED REQUIREMENTS

- A. Section 07 9200 - Joint Sealants: Sealing joints between frames and adjacent construction.
- B. Section 08 8000 - Glazing.

1.03 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- 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. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.
- D. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2019.
- E. NFPA 101 - Life Safety Code; 2015.
- F. UL 9 - Standard for Fire Tests of Window Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component dimensions, fasteners, anchors, glass, and manufacturer's standard color samples of painted finishes.
- C. Shop Drawings: Indicate opening dimensions, framed opening tolerances, affected related work; installation requirements; and _____.
- D. Test Reports: Prior to submitting shop drawings or starting fabrication, submit test report(s) by independent testing agency showing compliance with performance requirements.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing windows specified in this section, with not less than three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience and approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect factory finished surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond when exposed to sunlight or weather.

1.07 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F.
- B. Maintain this minimum temperature during and after installation of sealants.

1.08 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a 3 year period after Date of Substantial Completion.
- C. Provide 3 year manufacturer warranty for insulated glass units from seal failure, interpane dusting or misting, and replacement of same.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Fire-Rated Steel Windows:
 - 1. Fyre-Tec; Series 950 - Fixed Lite: www.fyre-tec.com/#sle.

2.02 STEEL WINDOWS**2.03 PERFORMANCE REQUIREMENTS**

- A. Fire-Rated Steel Windows: Comply with UL 9 and labeled with a 3/4 hour or 1 hour fire-test rating as indicated in window schedule, design and fabricate units to meet glass size and configuration, window size and opening dimensions in compliance with NFPA 80, and provide hardware complying with NFPA 80 requirements.
 - 1. Provide operable fire-rated windows that are self-closing and latching by means of heat activated fusible link operator.

2.04 COMPONENTS

- A. Frames: 2 inch by 2 inch deep profile; flush glass stops of snap-on type.
- B. Steel frames shall be fabricated from roll-formed galvanized lock-forming quality steel per ASTM A 653.

2.05 MATERIALS

- A. Steel Sheet: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating; 26 gauge, 0.0179 inch thick base metal.
- B. Fasteners: Stainless steel.

2.06 GLASS AND GLAZING MATERIALS

- A. Glass and Glazing Materials: See Section 08 8000 for Types as indicated below:

2.07 FABRICATION

- A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
- B. Accurately fit and secure joints and corners. Make joints flush and hairline.
- C. Prepare components to receive anchor devices. Fabricate anchors.
- D. Arrange fasteners to conceal from view.

2.08 FINISHES

- A. Window Frames: Prime painted finish.
- B. Finish Coat - Manufacturer's Standard Color
 - 1. Steel windows, fins, mullions, cover plates and associated parts shall be cleaned, pre-treated with iron phosphate and factory painted manufacturer's standard primer powder coat and cured in a dry film thickness of not less than 0.050 mm (2.0 mil).

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify wall openings and adjoining materials are ready to receive work of this section.
- B. Window openings shall conform to details and dimensions shown on the approved shop drawings.
- C. Notify the Architect immediately of conditions that may adversely affect the window installation. Correct conditions prior to installing windows.

3.02 INSTALLATION

- A. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.
- B. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.
- C. Install glass and infill panels in accordance with Section 08 8000, to glazing method required to achieve performance criteria.

3.03 CLEANING

- A. Remove labels and visible markings.
- B. Wash surfaces by method recommended and acceptable to window manufacturer; rinse and wipe surfaces clean.

3.04 PROTECTION

- A. Do not permit continuing construction activities near unprotected finish surfaces.

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Hardware for wood and aluminum doors.
- B. Electrically operated and controlled hardware.
- C. Thresholds.
- D. Weatherstripping and gasketing.
- E. Field verification, preparation, and modification of existing doors and frames to receive new door hardware.

1.02 RELATED REQUIREMENTS

- A. Section 08 1113 - Hollow Metal Doors and Frames.
- B. Section 08 1416 - Flush Wood Doors.
- C. Section 08 1433 - Stile and Rail Wood Doors.
- D. Section 08 4313 - Aluminum-Framed Storefronts: Door hardware, except as noted in section.
- E. Section 08 4413 - Glazed Aluminum Curtain Walls: Door hardware, except cylinders.
- F. Section 28 1000 - Access Control: Electronic access control devices.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. BHMA (CPD) - Certified Products Directory; 2016.
- C. BHMA A156.1 - American National Standard for Butts and Hinges; 2013.
- D. BHMA A156.2 - American National Standard for Bored and Preassembled Locks & Latches; 2011.
- E. BHMA A156.3 - American National Standard for Exit Devices; 2014.
- F. BHMA A156.4 - American National Standard for Door Controls - Closers; 2013.
- G. BHMA A156.5 - American National Standard for Cylinders and Input Devices for Locks; 2014.
- H. BHMA A156.6 - American National Standard for Architectural Door Trim; 2010.
- I. BHMA A156.7 - American National Standard for Template Hinge Dimensions; 2014.
- J. BHMA A156.8 - American National Standard for Door Controls - Overhead Stops and Holders; 2010.
- K. BHMA A156.12 - American National Standard for Interconnected Locks; 2013.
- L. BHMA A156.13 - American National Standard for Mortise Locks & Latches Series 1000; 2012.
- M. BHMA A156.15 - American National Standard for Release Devices - Closer Holder, Electromagnetic and Electromechanical; 2011.
- N. BHMA A156.16 - American National Standard for Auxiliary Hardware; 2013.
- O. BHMA A156.17 - American National Standard for Self Closing Hinges & Pivots; 2014.
- P. BHMA A156.18 - American National Standard for Materials and Finishes; 2012.
- Q. BHMA A156.21 - American National Standard for Thresholds; 2014.
- R. BHMA A156.22 - American National Standard for Door Gasketing and Edge Seal Systems, Builders Hardware Manufacturers Association; 2012.
- S. BHMA A156.23 - American National Standard for Electromagnetic Locks; 2010.
- T. BHMA A156.24 - American National Standard for Delayed Egress Locking Systems; 2012.
- U. BHMA A156.25 - American National Standard for Electrified Locking Devices; 2013.
- V. BHMA A156.26 - American National Standard for Continuous Hinges; 2012.
- W. BHMA A156.28 - American National Standard for Recommended Practices for Mechanical Keying Systems; 2013.
- X. BHMA A156.31 - American National Standard for Electric Strikes and Frame Mounted Actuators; 2013.

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- Y. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2014.
- Z. BHMA A156.115W - Hardware Preparation in Wood Doors with Wood or Steel Frames; 2006.
- AA. DHI (H&S) - Sequence and Format for the Hardware Schedule; 1996.
- AB. DHI (KSN) - Keying Systems and Nomenclature; 1989.
- AC. DHI (LOCS) - Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames; 2004.
- AD. DHI WDHS.3 - Recommended Locations for Architectural Hardware for Flush Wood Doors; 1993; also in WDHS-1/WDHS-5 Series, 1996.
- AE. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
- AF. ITS (DIR) - Directory of Listed Products; current edition.
- AG. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- AH. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2019.
- AI. NFPA 101 - Life Safety Code; 2015.
- AJ. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2016.
- AK. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2017.
- AL. UL (DIR) - Online Certifications Directory; Current Edition.
- AM. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- AN. 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 utility connections are achieved in an orderly and expeditious manner.
- C. Preinstallation Meeting: Convene a preinstallation meeting one week prior to commencing work of this section; attendance is required by affected installers and the following:
 - 1. Architect.
 - 2. 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.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project, and includes construction details, material descriptions, finishes, and dimensions and profiles of individual components.
- C. Shop Drawings - Door Hardware Schedule: Submit detailed listing that includes each item of hardware to be installed on each door. Use door numbering scheme as included in Contract Documents.
 - 1. Prepared by or under supervision of Architectural Hardware Consultant (AHC).
 - 2. Comply with DHI (H&S) using door numbers and hardware set numbers as indicated in construction documents.
 - 3. List groups and suffixes in proper sequence.
 - 4. Provide complete description for each door listed.
 - 5. Provide manufacturer's and product names, and catalog numbers; include functions, types, styles, sizes and finishes of each item.

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6. Include account of abbreviations and symbols used in schedule.
- D. Shop Drawings - Electrified Door Hardware: Submit diagrams for power, signal, and control wiring for electrified door hardware that include details of interface with building safety and security systems. Provide elevations and diagrams for each electrified door opening as follows:
 1. Prepared by or under supervision of Architectural Hardware Consultant (AHC) and Electrified Hardware Consultant (EHC).
 2. Elevations: Submit front and back elevations of each door opening showing electrified devices with connections installed and an operations narrative describing how opening operates from either side at any given time.
 3. Diagrams: Submit point-to-point wiring diagram that shows each device in door opening system with related colored wire connections to each device.
- E. Manufacturer's Installation Instructions: Indicate special procedures.
- F. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
- G. Installer's Qualification Statement.
- H. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- I. Project Record Documents: Record actual locations of concealed equipment, services, and conduit.
- J. Maintenance Materials and Tools: Furnish the following for Owner's use in maintenance of project.
 1. See Section 01 6000 - Product Requirements, for additional provisions.
 2. Lock Cylinders: One for each master keyed group.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of the type specified for commercial door hardware with at least three years of documented experience.

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 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Warranty against defects in material and workmanship for period indicated, from Date of Substantial Completion.
 1. Closers: Ten years, minimum.
 2. Exit Devices: Three years, minimum.
 3. Locksets and Cylinders: Three years, minimum.
 4. Other Hardware: Two years, minimum.

PART 2 PRODUCTS

2.01 DESIGN AND PERFORMANCE CRITERIA

- A. Provide specified door hardware as required to make doors fully functional, compliant with applicable codes, and secure to extent indicated.
- B. Provide individual items of single type, of same model, and by same manufacturer.
- C. Provide door hardware products that comply with the following requirements:
 1. Applicable provisions of federal, state, and local codes.
 2. Accessibility: ADA Standards and ICC A117.1.
 3. Applicable provisions of NFPA 101.
 4. Fire-Rated Doors: NFPA 80, listed and labeled by qualified testing agency for fire protection ratings indicated, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.
 5. Hardware on Fire-Rated Doors: Listed and classified by UL (DIR), ITS (DIR), or testing firm acceptable to authorities having jurisdiction as suitable for application indicated.

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6. Hardware for Smoke and Draft Control Doors (Indicated as "S" on Drawings): Provide door hardware that complies with local codes, and requirements of assemblies tested in accordance with UL 1784.
 - a. Air Leakage Rate: Tested in accordance with UL 1784, with air leakage rate not to exceed 3.0 cfm/sf of door opening at 0.10 inch of water for both ambient and elevated temperature tests.
 7. Listed and certified compliant with specified standards by BHMA (CPD).
 8. Auxiliary Hardware: BHMA A156.16.
 9. Hardware Preparation for Steel Doors and Steel Frames: BHMA A156.115.
 10. Hardware Preparation for Wood Doors with Wood or Steel Frames: BHMA A156.115W.
 11. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified.
- D. Electrically Operated and/or Controlled Hardware: Provide necessary power supplies, power transfer hinges, relays, and interfaces as required for proper operation; provide wiring between hardware and control components and to building power connection in compliance with NFPA 70.
1. Refer to Section 28 1000 for additional access control system requirements.
- E. Lock Function: Provide lock and latch function numbers and descriptions of manufacturer's series. Refer to Door Hardware Schedule.
- F. 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. Provide spacers or sex bolts with sleeves for through bolting of hollow metal doors and frames.
 6. Fire-Rated Applications: Comply with NFPA 80.
 - a. Provide wood or machine screws for hinges mortised to doors or frames, strike plates to frames, and closers to doors and frames.
 - b. Provide steel through bolts for attachment of surface mounted closers, hinges, or exit devices to door panels unless proper door blocking is provided.
 7. Concealed Fasteners: Do not use through or sex bolt type fasteners on door panel sides indicated as concealed fastener locations, unless otherwise indicated.

2.02 HINGES

- A. Manufacturers:
1. Ives, an Allegion brand; www.allegion.com/us.
 2. McKinney; an Assa Abloy Group company: www.assaabloydss.com/#sle.
 3. Pemko; an Assa Abloy Group company: www.assaabloydss.com/#sle.
 4. Bommer Industries, Inc: www.bommer.com/#sle.
 5. Hager Companies: www.hagerco.com/#sle.
 6. Stanley, dormakaba Group: www.stanleyhardwarefordoors.com/#sle.
 7. Substitutions: Not permitted.
- B. Hinges: Comply with BHMA A156.1, Grade 1.
1. Self Closing Hinges: Comply with BHMA A156.17.
 2. Butt Hinges: Comply with BHMA A156.1 and BHMA A156.7 for templated hinges.
 - a. Provide hinge width required to clear surrounding trim.
 3. Continuous Hinges: Comply with BHMA A156.26.
 4. Provide hinges on every swinging door.
 5. Provide five-knuckle full mortise butt hinges unless otherwise indicated.
 6. Provide ball-bearing hinges at each door with closer.

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7. Provide non-removable pins on exterior outswinging doors.
8. Provide non-removable pins on interior outswinging doors at locations as indicated in Door Hardware Schedule.
9. Provide power transfer hinges where electrified hardware is mounted in door leaf locations as indicated in Door Hardware Schedule.
10. Provide following quantity of butt hinges for each door:
 - a. Doors up to 60 inches High: Two hinges.
 - b. Doors From 60 inches High up to 90 inches High: Three hinges.
 - c. Doors 90 inches High up to 120 inches High: Four hinges.
 - d. Doors over 120 inches High: One additional hinge per each additional 30 inches in height.
 - e. Dutch Doors: Two hinges each leaf.

2.03 FLUSH BOLTS

- A. Manufacturers:
 1. Rockwood, an Assa Abloy Group company: www.assaabloydss.com/#sle.
 2. Hager Companies: www.hagerco.com/#sle.
 3. Ives, an Allegion brand: www.allegion.com/us/#sle.
 4. Trimco: www.trimcohardware.com/#sle.
 5. Substitutions: Not permitted.
- B. Flush Bolts: Comply with BHMA A156.16, Grade 1.
 1. Flush Bolt Throw: 3/4 inch, minimum.
 2. Provides extension bolts in leading edge of door, one bolt into floor, one bolt into top of frame.
 - a. Pairs of Swing Doors: At inactive leaves, provide flush bolts of type as required to comply with code.
 3. Provide dustproof floor strike for bolt into floor, except at metal thresholds.
 4. Manual Flush Bolts: Provide lever extensions for top bolt at over-sized doors.
 5. Self-Latching Flush Bolts: Automatically latch upon closing of door; manually retracted; located on inactive leaf of pair of doors.
 6. Automatic Flush Bolts: Automatically latch upon closing of door; automatic retraction of bolts when active leaf is opened; located on inactive leaf of pair of doors.

2.04 EXIT DEVICES

Specifier Note: Following is for premium open specification.

Specifier Note: Following is for non-premium open specification.

- A. Manufacturers:
 1. Corbin Russwin; an Assa Abloy Group company; ED5000/ED4000 Series: www.assaabloydss.com/#sle.
 2. DORMA USA, Inc; 9000 Series: www.dorma.com/#sle.
 3. Falcon, an Allegion brand; 24/25 series; www.allegion.com/us.
 4. Substitutions: Not permitted.
- B. Exit Devices: Comply with BHMA A156.3, Grade 1.
 1. Lever design to match lockset trim.
 2. Provide cylinder with cylinder dogging or locking trim.
 3. Provide exit devices properly sized for door width and height.
 4. Provide strike as recommended by manufacturer for application indicated.
 5. Provide less bottom rod (LBR) at scheduled locations to eliminate use of floor mounted strikes.
 6. Provide UL (DIR) listed exit device assemblies for fire-rated doors and panic device assemblies for non-fire-rated doors.
 7. For electrical options, provide quick connect plug-in pre-wired connectors.

2.05 ELECTRIC STRIKES

- A. Manufacturers:
 1. HES; an Assa Abloy Group company; 1006 series: www.assaabloydss.com/#sle.
 2. Von Duprin, an Allegion brand; 6000 series; www.allegion.com/us.

3. Substitutions: Not permitted.
- B. Electric Strikes: Comply with BHMA A156.31, Grade 1.
 1. Provide UL (DIR) listed burglary-resistant electric strike; style to suit locks.
Specifier Note: Confirm voltage requirements with Owner/Security Contractor.
 2. Provide non-handed 24 VDC electric strike suitable for door frame material and scheduled lock configuration.
 3. Provide field selectable Fail Safe/Fail Secure modes.
 4. Provide transformer and rectifier as necessary for complete installation.
 5. Connect electric strikes into fire alarm where non-rated doors are scheduled to release with fire or sprinkler alarm condition.

2.06 ELECTROMAGNETIC LOCKS

- A. Manufacturers:
 1. Securitron; an Assa Abloy Group company; M series: www.assaabloydss.com/#sle.
 2. Schlage Electronics, an Allegion brand M400 series: www.allegion.com/us/#sle.
 3. Security Door Controls, 1500 series: www.sdcsecurity.com.
 4. Substitutions: Not permitted.
- B. Electromagnetic Locks: Comply with BHMA A156.23, Grade 1.
 1. Holding Force: 600 lbs, minimum.
 2. Voltage: 12 VDC / 24 VDC, and provide power supplies by same manufacturer as locks.
 3. Provide electromagnetic locks for fire-rated doors in compliance with UL 10C.
 4. Mounting: Surface mounted to door and frame on secure side, with fasteners, brackets, and spacer bars as required for application.
 5. Provide concealed sensing device within device that monitors magnetic holding force to ensure appropriate door lock.
 6. Where magnetic locks are scheduled, provide complete assemblies of controls, switches, power supplies, relays, and parts/materials recommended and approved by manufacturer of magnetic locks for each individual leaf. Switches control both doors simultaneously at pairs. Locate controls as directed by Architect.

2.07 DELAYED-EGRESS ELECTROMAGNETIC LOCKS

- A. Manufacturers:
 1. Securitron; an Assa Abloy Group company: www.assaabloydss.com/#sle.
 2. Schlage Electronics, an Allegion brand: www.allegion.com/us/#sle.
 3. Security Door Controls,: www.sdcsecurity.com.
 4. Substitutions: Not permitted.
- B. Delayed-Egress Electromagnetic Locks: Comply with BHMA A156.24, Grade 1.
 1. Delayed-Egress Timer: Upon depressing push bar provide 15 seconds delay before door egress permitted, in compliance with NFPA 101.
 2. Holding Force: 500 lbs, minimum.
 3. Voltage: 12 VDC / 24 VDC, and provide power supplies by same manufacturer as locks.
 4. Provide electromagnetic locks for fire-rated doors in compliance with UL 10C.
 5. Mounting: Surface mounted to door and frame on secure side, with fasteners, brackets, and spacer bars as required for application.
 6. Provide concealed sensing device that monitors magnetic holding force to ensure appropriate door lock.

2.08 LOCK CYLINDERS

- A. Manufacturers:
 1. Basis of Design: Existing Facilities - Match owners key system.
- B. Lock Cylinders: Provide key access on outside of each lock, unless otherwise indicated.
 1. Provide standard, conventional, full size interchangeable core (FSIC), and small format interchangeable core (SFIC) type cylinders, Grade 1, with six-pin core in compliance with BHMA A156.5 at locations indicated.
 2. Provide cylinders from same manufacturer as locking device.
 3. Provide cams and/or tailpieces as required for locking devices.

4. Within specific Door Sections, when provisions for lock cylinder are being referenced to this Section, provide specified lock cylinder and keyed to building keying system, unless otherwise indicated.

2.09 CYLINDRICAL LOCKS

Specifier Note: Following is for premium open specification.

Specifier Note: Following is for non-premium open specification.

- A. Manufacturers:
 1. Yale; an Assa Abloy Group company; 5400LN series: www.assaabloydss.com/#sle.
 2. DORMA USA, Inc; C800 Series: www.dorma.com/#sle.
 3. Falcon, an Allegion brand; T Series: www.allegion.com/us/#sle.
 4. Substitutions: Not permitted.
- B. Cylindrical Locks (Bored): Comply with BHMA A156.2, Grade 1, 4000 Series.
 1. Bored Hole: 2-1/8 inch diameter.
 2. Latchbolt Throw: 1/2 inch, minimum.
 3. Backset: 2-3/4 inch unless otherwise indicated.
 4. Strikes: Provide manufacturer's standard strike for each latchset or lockset with strike box and curved lip extending to protect frame in compliance with indicated requirements.
 - a. Finish: To match lock or latch.
 - b. Flat-Lip Strikes: Provide for locks with three piece antifriction latchbolts as recommended by manufacturer.
 - c. Extra-Long-Lip Strikes: Provide for locks used on frames with applied wood casing trim.
 - d. Aluminum-Frame Strike Box: Provide strike box fabricated for use with aluminum framing by framing manufacturer.
 - e. Rabbet Front and Strike: Provide on locksets for use with rabbeted meeting rails.
 5. Provide a lock for each door, unless otherwise indicated that lock is not required.
 6. Trim: Provide lever handle or pull trim on outside of each lock, unless otherwise indicated.
 7. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide switches, and sensors integrated into the locks and latches.

2.10 MORTISE LOCKS

Specifier Note: Following is for non-premium open specification.

- A. Manufacturers:
 1. Yale; an Assa Abloy Group company; 8800 series: www.assaabloydss.com/#sle.
 2. DORMA USA, Inc; M9000 Series: www.dorma.com/#sle.
 3. Falcon, an Allegion brand; MA series: www.allegion.com/us/#sle.
 4. Substitutions: Not permitted.
- B. Mortise Locks: Comply with BHMA A156.13, Grade 1, Security, 1000 Series.
 1. Latchbolt Throw: 3/4 inch, minimum.
 2. Deadbolt Throw: 1 inch, minimum.
 3. Backset: 2-3/4 inch unless otherwise indicated.
 4. Strikes: Provide manufacturer's standard strike for each latchset or lockset with strike box and curved lip extending to protect frame in compliance with indicated requirements.
 - a. Flat-Lip Strikes: Provide for locks with three piece antifriction latchbolts as recommended by manufacturer.
 - b. Extra-Long-Lip Strikes: Provide for locks used on frames with applied wood casing trim.
 - c. Aluminum-Frame Strike Box: Provide strike box fabricated for use with aluminum framing by framing manufacturer.
 - d. Rabbet Front and Strike: Provide on locksets for use with rabbeted meeting rails.
 - e. Finish: To match lock or latch.
 5. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide switches, and sensors integrated into the locks and latches.

2.11 INTERCONNECTED LOCKS

- A. Manufacturers:

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1. Yale; an Assa Abloy Group company; 4800LN series: www.assaabloydss.com/#sle.
2. DORMA USA, Inc; J300 series: www.dorma.com/#sle.
3. Schlage, an Allegion brand; CS210 series: www.allegion.com/us/#sle.
4. Substitutions: Not permitted.

B. Interconnected Locks: Comply with BHMA A156.12, Grade 1, 5000 Series.

2.12 AUXILIARY LOCKS

A. Manufacturers: Deadlocks

1. Sargent; an Assa Abloy Group company; 4870 series: www.assaabloydss.com/#sle.
2. Best, dormakaba Group; 38H series: www.bestaccess.com/#sle.
3. Corbin Russwin; an Assa Abloy Group company; DL4100 series: www.assaabloydss.com/#sle.
4. Schlage, an Allegion brand; L400 series: www.allegion.com/us/#sle.
5. Substitutions: Not permitted.

Specifier Note: Following is for premium open specification.

B. Manufacturers: Deadbolts

1. Sargent; an Assa Abloy Group company; 480/470 series: www.assaabloydss.com/#sle.
2. Best, dormakaba Group; 83T/73T series: www.bestaccess.com/#sle.
3. Corbin Russwin; an Assa Abloy Group company; DL2200/DL3200 Series: www.assaabloydss.com/#sle.
4. Schlage, an Allegion brand; B600/B500 series: www.allegion.com/us/#sle.
5. Substitutions: Not permitted.

Specifier Note: Following is for non-premium open specification.

C. Manufacturers: Deadbolts

1. Yale; an Assa Abloy Group company; D100/D200 series: www.assaabloydss.com/#sle.
2. DORMA USA, Inc; D800 Series and DB600 Series: www.dorma.com/#sle.
3. Falcon, an Allegion brand; D100/D200 series: www.allegion.com/us/#sle.
4. Substitutions: Not permitted.

D. Auxiliary Locks: Comply with BHMA A156.36, Grade 1 and Grade 2 as listed in sets.

1. Backset: 2-3/4 inch, unless otherwise indicated.
2. Bolt Throw: 1 inch, with latch made of hardened steel.
3. Provide strike that matches frame.

2.13 DOOR PULLS AND PUSH PLATES

A. Manufacturers:

1. Rockwood; an Assa Abloy Group company: www.assaabloydss.com/#sle.
2. Hager Companies: www.hagerco.com/#sle.
3. Ives, an Allegion brand: www.allegion.com/us/#sle.
4. Trimco: www.trimcohardware.com/#sle.
5. Substitutions: Not permitted.

B. Door Pulls and Push Plates: Comply with BHMA A156.6.

1. Pull Type: Straight, unless otherwise indicated.
2. Push Plate Type: Flat, with square corners, unless otherwise indicated.
 - a. Edges: Beveled, unless otherwise indicated.
3. Material: Aluminum, unless otherwise indicated.
4. Provide door pulls and push plates on doors without a lockset, latchset, exit device, or auxiliary lock unless otherwise indicated.
5. On solid doors, provide matching door pull and push plate on opposite faces.

2.14 DOOR PULLS AND PUSH BARS

A. Manufacturers:

1. Rockwood; an Assa Abloy Group company: www.assaabloydss.com/#sle.
2. Hager Companies: www.hagerco.com/#sle.
3. Ives, an Allegion brand: www.allegion.com/us/#sle.
4. Trimco: www.trimcohardware.com/#sle.
5. Substitutions: Not permitted.

- B. Door Pulls and Push Bars: Comply with BHMA A156.6.
 - 1. Bar Type: Bar set, unless otherwise indicated.
 - 2. Material: Stainless steel, unless otherwise indicated.

2.15 CLOSERS

- A. Manufacturers; Surface Mounted Aluminum Closer:
 - 1. Sargent; an Assa Abloy Group company; 351/1431 series: www.assaabloydss.com/#sle.
 - 2. LCN, an Allegion brand; 4050/1450 series: www.allegion.com/us/#sle.
 - 3. Falcon, an Allegion brand; SC71A/SC81A series: www.allegion.com/us/#sle.
 - 4. Norton; an Assa Abloy Group company; 7500/8000 series: www.assaabloydss.com/#sle.
 - 5. Yale; an Assa Abloy Group company; 4400/3000 series: www.assaabloydss.com/#sle.
 - 6. Substitutions: Not permitted.
- B. Manufacturers; Concealed - Overhead:
 - 1. LCN, an Allegion brand; 2030 series: www.allegion.com/us/#sle.
 - 2. DORMA USA, Inc; RTS88: www.dorma.com/#sle.
 - 3. Norton; an Assa Abloy Group company; 7900 Series: www.assaabloydss.com/#sle.
 - 4. Rixson ; an Assa Abloy Group company; _____: www.assaabloydss.com/#sle.
 - 5. Substitutions: Not permitted.
- C. Manufacturers; Low Energy for ADA Applications:
 - 1. LCN, an Allegion brand; 4600 series: www.allegion.com/us/#sle.
 - 2. Norton; an Assa Abloy Group company; 6000 series: www.assaabloydss.com/#sle.
 - 3. Besam; an Assa Abloy Group company; Power Swing series: www.assaabloydss.com/#sle.
 - 4. Substitutions: Not permitted.
- D. Closers: Comply with BHMA A156.4, Grade 1.
 - 1. Type: Surface mounted to door.
 - 2. Provide series as listed in the sets.
 - 3. Provide door closer on each exterior door.
 - 4. Provide door closer on each fire-rated and smoke-rated door.
 - 5. Where an overlapping astragal is included on pairs of swinging doors, provide coordinator to ensure door leaves close in proper order.
 - 6. At corridor entry doors, mount closer on room side of door.
 - 7. At outswinging exterior doors, mount closer on interior side of door.

2.16 OVERHEAD STOPS AND HOLDERS

- A. Manufacturers:
 - 1. Rixson; an Assa Abloy Group company: www.assaabloydss.com/#sle.
 - 2. Glynn-Johnson, an Allegion brand: www.allegion.com/us/#sle.
 - 3. ABH; an Architectural Builders Hardware company: www.abhmfg.com.
 - 4. Substitutions: Not permitted.
- B. Overhead Stops and Holders (Door Checks): Comply with BHMA A156.8, Grade 1.
 - 1. Provide stop for every swinging door, unless otherwise indicated.
 - 2. 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.

2.17 PROTECTION PLATES

- A. Manufacturers:
 - 1. Rockwood; an Assa Abloy Group company: www.assaabloydss.com/#sle.
 - 2. Hager Companies: www.hagerco.com/#sle.
 - 3. Ives, an Allegion brand: www.allegion.com/us/#sle.
 - 4. Trimco: www.trimcohardware.com/#sle.
 - 5. Substitutions: Not permitted.
- B. Protection Plates: Comply with BHMA A156.6.
- C. Metal Properties: Stainless steel.
 - 1. Metal, Standard Duty: Thickness 0.05 inch, minimum.
- D. Edges: Beveled, on four sides unless otherwise indicated.

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- E. Fasteners: Countersunk screw fasteners.
- F. Armor Plates: Provide on bottom half of push side of doors that require protection from objects moving through openings that may damage door surface.
- G. Kick Plates: Provide along bottom edge of push side of every door with closer, except aluminum storefront and glass entry doors, unless otherwise indicated.

2.18 ELECTROMAGNETIC DOOR HOLDERS

- A. Manufacturers:
 - 1. Rixson; an Assa Abloy Group company; 900 series: www.assaabloydss.com/#sle.
 - 2. LCN, an Allegion brand; SEM series: www.allegion.com/us/#sle.
 - 3. DORMA USA, Inc; EM Series: www.dorma.com/#sle.
 - 4. Substitutions: Not permitted.
- B. Electromagnetic Door Holders: Comply with BHMA A156.15.
 - 1. Type: Wall mounted, single unit, standard duty, with strike plate attached to door.
 - 2. Holding Force, Standard Duty: 35 lbs-force, minimum.
 - 3. Voltage: 12 VDC / 24 VDC, and provide power supplies by same manufacturer as holders.
 - 4. Provide interface with fire detectors and fire-alarm system for fire-rated door assemblies.

2.19 WALL STOPS

- A. Manufacturers:
 - 1. Rockwood; an Assa Abloy Group company: www.assaabloydss.com/#sle.
 - 2. Hager Companies: www.hagerco.com/#sle.
 - 3. Ives, an Allegion brand: www.allegion.com/us/#sle.
 - 4. Trimco: www.trimcohardware.com/#sle.
 - 5. Substitutions: Not permitted.
- B. Wall Stops: Comply with BHMA A156.16, Grade 1 and Resilient Material Retention Test as described in this standard.
 - 1. Provide wall stops to prevent damage to wall surface upon opening door.
 - 2. Material: Stainless steel housing with rubber insert.

2.20 THRESHOLDS

- A. Manufacturers:
 - 1. Pemko; an Assa Abloy Group company: www.assaabloydss.com/#sle.
 - 2. National Guard Products, Inc: www.ngpinc.com/#sle.
 - 3. Reese Enterprises, Inc: www.reeseusa.com/#sle.
 - 4. Zero International, Inc: www.zerointernational.com/#sle.
 - 5. Substitutions: Not permitted.
- B. Thresholds: Comply with BHMA A156.21.
 - 1. Provide threshold at interior doors for transition between two different floor types, and over building expansion joints, unless otherwise indicated.
 - 2. Provide threshold at each exterior door, unless otherwise indicated.
 - 3. Type: Flat surface.
 - 4. Material: Aluminum.
 - 5. Threshold Surface: Fluted horizontal grooves across full width.
 - 6. Field cut threshold to profile of frame and width of door sill for tight fit.
 - 7. Provide non-corroding fasteners at exterior locations.

2.21 WEATHERSTRIPPING AND GASKETING

- A. Manufacturers:
 - 1. Pemko; an Assa Abloy Group company: www.assaabloydss.com/#sle.
 - 2. National Guard Products, Inc: www.ngpinc.com/#sle.
 - 3. Reese Enterprises, Inc: www.reeseusa.com/#sle.
 - 4. Zero International, Inc: www.zerointernational.com/#sle.
 - 5. Substitutions: Not permitted.
- B. Weatherstripping and Gasketing: Comply with BHMA A156.22.
 - 1. Head and Jamb Type: Encased in retainer.
 - 2. Door Sweep Type: Encased in retainer.

3. Material: Aluminum, with silicone weatherstripping.
4. Provide gasketing for smoke and draft control doors (Indicated as "S" on Drawings) that complies with local codes, requirements of assemblies tested in accordance with UL 1784.
5. Provide frame-applied intumescent gasketing on wood doors that are labeled as smoke and draft control doors (Indicated as "S" on Drawings), unless otherwise indicated.
6. Refer to Section 08 1416 when wood door to frame sealing system is applied by door manufacturer.
7. Provide weatherstripping on each exterior door at head, jambs, and meeting stiles of door pairs, unless otherwise indicated; .
8. Provide door bottom sweep on each exterior door, unless otherwise indicated.
9. Provide sound-rated gasketing and automatic door bottom on doors indicated as "Sound-Rated", "Acoustical", or with "Sound Transmission Class (STC) rating"; fabricate as continuous gasketing, do not cut or notch gasketing material.

2.22 SILENCERS

- A. Manufacturers:
 1. Rockwood; an Assa Abloy Group company; ____: www.assaabloydss.com/#sle.
 2. Ives, an Allegion brand: www.allegion.com/us/#sle.
 3. Trimco: www.trimcohardware.com/#sle.
 4. Substitutions: Not permitted.
- B. Silencers: Provide at equal locations on door frame to mute sound of door's impact upon closing.
 1. Single Door: Provide three on strike jamb of frame.
 2. Pair of Doors: Provide two on head of frame, one for each door at latch side.
 3. Material: Rubber, gray color.

2.23 WIRELESS ACCESS MANAGEMENT SYSTEMS

- A. Manufacturers:
 1. Schlage ENGAGE, an Allegion brand: www.allegion.com/us/#sle.
 2. Best, dormakaba Group: www.bestaccess.com/#sle.
 3. Substitutions: Not permitted.
- B. Wireless Access Management Systems: Comply with guidelines of BHMA A156.25, and including necessary hardware for fully functional system.
 1. Reader Formats: Provide magnetic stripe, proximity, dual validation, or key Fob to activate access system functionality.
 2. Door Locking Hardware: Provide applicable cylindrical locksets, panic hardware, or mortise locksets in compliance with project access control requirements.

2.24 KEY CONTROL SYSTEMS

- A. Manufacturers:
 1. Sargent; an Assa Abloy Group company; ____: www.assaabloydss.com/#sle.
 2. Best, dormakaba Group; ____: www.bestaccess.com/#sle.
 3. Schlage, an Allegion brand; ____: www.allegion.com/us/#sle.
 4. Falcon, an Allegion brand; ____: www.allegion.com/us/#sle.
 5. Yale; an Assa Abloy Group company; ____: www.assaabloydss.com/#sle.
 6. Substitutions: Not permitted.
- B. Key Control Systems: Comply with guidelines of BHMA A156.28.
 1. Provide keying information in compliance with DHI (KSN) standards.
 2. Keying: Master keyed.
 3. Include construction keying and control keying with removable core cylinders.
 4. Key to existing keying system.
 5. Supply keys in following quantities:
 - a. 6 each Master keys.
 - b. 6 each Construction Master keys.
 - c. 12 each Construction keys.
 - d. 3 each Construction Control keys.
 - e. 3 each Control keys if new system.

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6. Key Management System: For each keyed lock on project, provide one set of consecutively numbered duplicate key tags with hanging hole and snap catch.
7. Security Key Tags: For each keyed lock on project, provide one set of matching key tags for permanent attachment to one key of each set.
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 hardware supplier.
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. Owner or Owner's agent install permanent cores and return construction cores to hardware supplier. Construction cores and keys to remain property of hardware supplier.

2.25 FIRE DEPARTMENT LOCK BOX

- A. Manufacturers:
 1. Knox Company; Knox-Box Rapid Entry System, 3200 series: www.knoxbox.com/#sle.
 2. Substitutions: Not permitted.
- B. Fire Department Lock Box:
 1. Heavy-duty, surface mounted, solid stainless-steel box with hinged door and interior gasket seal; single drill resistant lock with dust covers and tamper alarm.
 2. Capacity: Holds 10 keys.
 3. Finish: Manufacturer's standard black.

2.26 POWER SUPPLY

- A. Manufacturers:
 1. Securitron; an Assa Abloy Group company; BPS series: www.assaabloydss.com/#sle.
 2. Von Duprin/Schlage Electronics, an Allegion brand; PS900 series: www.allegion.com/us/#sle.
 3. Precision, dormakaba Group; ELR series: www.precisionhardware.com/#sle.
 4. Substitutions: Not permitted.
- B. Power Supply: Hard wired, with multiple zones providing eight (8) breakers for each output panel with individual control switches and LED's; UL (DIR) Class 2 listed.
 1. Power: 12 VDC / 24 VDC; with 120 VAC power supply.
 2. Operating Temperature: 32 to 110 degrees F.
 3. Provide with emergency release terminals that release devices upon activation of fire alarm system.

2.27 FINISHES

- A. Finishes: Provide door hardware of same finish, unless otherwise indicated.
 1. Primary Finish: 625; bright chromium plated over nickel, with brass or bronze base material (former US equivalent US26); BHMA A156.18.
 2. Secondary Finish: 626; satin chromium plated over nickel, with brass or bronze base material (former US equivalent US26D); BHMA A156.18.
 - a. Use secondary finish in kitchens, bathrooms, and other spaces containing chrome or stainless steel finished appliances, fittings, and equipment; provide primary finish on one side of door and secondary finish on other side if necessary.
 3. Exceptions:
 - a. Where base material metal is specified to be different, provide finish that is an equivalent appearance in accordance with BHMA A156.18.
 - b. Hinges for Fire-Rated Doors: Steel base material with painted finish, in compliance with NFPA 80.
 - c. Hardware for Aluminum Storefront Doors: Finished to match door panel finish, except at hand contact surfaces provide stainless steel with satin finish, unless otherwise indicated.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that doors and frames are ready to receive this work; labeled, fire-rated doors and frames are properly installed, and dimensions are as indicated on shop drawings.
- B. Verify that electric power is available to power operated devices and of correct characteristics.
- C. Field verify existing doors and frames receiving new hardware and existing conditions receiving new openings. Verify that new hardware is compatible with existing door and frame preparations and existing conditions.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and applicable codes.
- B. Install hardware for smoke and draft control doors in accordance with NFPA 105.
- C. Use templates provided by hardware item manufacturer.
- D. Do not install surface mounted items until application of finishes to substrate are fully completed.
- E. Door Hardware Mounting Heights: Distance from finished floor to center line of hardware item. As indicated in following list; unless noted otherwise in Door Hardware Schedule or on drawings.
 - 1. For Steel Doors and Frames: Install in compliance with DHI (LOCS) recommendations.
 - 2. For Steel Doors and Frames: Refer to Section 08 1113.
 - 3. For Steel Door Frames: Refer to Section 08 1213.
 - 4. For Aluminum-Framed Storefront Doors and Frames: Refer to Section 08 4313.
 - 5. For Glazed Aluminum Curtain Wall: Refer to Section 08 4413.
 - 6. For Wood Doors: Install in compliance with DHI WDHS.3 recommendations.
 - 7. Flush Wood Doors: Refer to Section 08 1416.
 - 8. Stile and Rail Wood Doors: Refer to Section 08 1433.
 - 9. Mounting heights in compliance with ADA Standards:
 - a. Locksets: 40-5/16 inch.
 - b. Push Plates/Pull Bars: 42 inch.
 - c. Deadlocks (Deadbolts): 48 inch.
 - d. Exit Devices: 40-5/16 inch.
 - e. Door Viewer: 43 inch; standard height 60 inch.
- F. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
- G. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
- H. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
- I. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- J. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
- K. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- L. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule but not fewer than one intermediate offset pivot per door and one additional intermediate offset pivot for every 30 inches of door height greater than 90 inches.
- M. Lock Cylinders: Install construction cores to secure building and areas during construction period.

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1. Replace construction cores with permanent cores as indicated in keying section.
- N. Lead Protection: Lead wrap hardware penetrating lead-lined doors. Levers and roses to be lead lined. Apply kick and armor plates on lead-lined doors with adhesive as recommended by manufacturer.
- O. Wiring: Coordinate with Division 26, ELECTRICAL sections for:
 1. Conduit, junction boxes and wire pulls.
 2. Connections to and from power supplies to electrified hardware.
 3. Connections to fire/smoke alarm system and smoke evacuation system.
 4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
 5. Testing and labeling wires with Architect's opening number.
- P. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- Q. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.
- R. Closer/Holders: Mount closer/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.
- S. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.
- T. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.
- U. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- V. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- W. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.
- X. Set exterior door thresholds with full-width bead of elastomeric sealant at each point of contact with floor providing a continuous weather seal; anchor thresholds with stainless steel countersunk screws.

3.03 FIELD QUALITY CONTROL

- A. Perform field inspection and testing under provisions of Section 01 4000 - Quality Requirements.
- B. Provide an Architectural Hardware Consultant (AHC) to inspect installation and certify that hardware and installation has been furnished and installed in accordance with manufacturer's instructions and as specified.

3.04 ADJUSTING

- A. Adjust work under provisions of Section 01 7000 - 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.
- 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 01 7000 - Execution and Closeout Requirements.
- B. Do not permit adjacent work to damage hardware or finish.

3.07 SCHEDULE - ATTACHED

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Performance criteria for gypsum board assemblies.
- B. Metal stud wall framing.
- C. Metal channel ceiling framing.
- D. Acoustic insulation.
- E. Cementitious backing board.
- F. Gypsum wallboard.
- G. Joint treatment and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Building framing and sheathing.
- B. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.
- C. Section 07 8400 - Firestopping: Top-of-wall assemblies at fire-resistance-rated walls.
- D. Section 07 9200 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.

1.03 REFERENCE STANDARDS

- A. AISI S100 - North American Specification for the Design of Cold-Formed Steel Structural Members; 2016.
- B. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2010 (Reaffirmed 2016).
- C. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 1999 (Reaffirmed 2016).
- D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- F. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members; 2015.
- G. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.
- H. ASTM C514 - Standard Specification for Nails for the Application of Gypsum Board; 2004 (Reapproved 2014).
- I. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing; 2003 (Reapproved 2009).
- J. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014.
- K. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- L. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2015.
- M. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.
- N. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2015.
- O. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.
- P. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2014a.
- Q. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel; 2013.

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- R. ASTM C1288 - Standard Specification for Discrete Non-Asbestos Fiber-Cement Interior Substrate Sheets; 2014.
- S. ASTM C1325 - Specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units; 2014.
- T. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014.
- U. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.
- V. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).
- W. ASTM E413 - Classification for Rating Sound Insulation; 2016.
- X. GA-216 - Application and Finishing of Gypsum Board; 2013.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Indicate special details associated with acoustic seals.
- C. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.
- D. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
- B. Interior Partitions, Indicated as Acoustic: Provide completed assemblies with the following characteristics:
 - 1. Acoustic Attenuation: STC of 50-54 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

2.02 METAL FRAMING MATERIALS

- A. Manufacturers - Metal Framing, Connectors, and Accessories:
 - 1. ClarkDietrich: www.clarkdietrich.com/#sle.
 - 2. Jaimes Industries: www.jaimesind.com/#sle.
 - 3. Marino: www.marinoware.com/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf.
 - 1. Studs: C-shaped with knurled or embossed faces.
 - 2. Runners: U shaped, sized to match studs.
 - 3. Resilient Furring Channels: Single or double leg configuration; 1/2 inch channel depth.
 - a. Products:
 - 1) Same manufacturer as other framing materials.
- C. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws, and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
 - 1. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code, when evaluated in accordance with AISI S100.
 - 2. Material: ASTM A653/A653M steel sheet, SS Grade 50/340, with G60/Z180 hot-dipped galvanized coating.
 - 3. Provide components UL-listed for use in UL-listed fire-resistance-rated head of partition joint systems indicated on drawings.
- D. Deflection and Firestop Track: Intumescent strip factory-applied to track flanges expands when exposed to heat or flames to provide a perimeter joint seal.
- E. Preformed Top Track Firestop Seal:

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1. Provide components UL-listed for use in UL-listed fire-resistance-rated head of partition joint systems indicated on drawings.
- F. Non-structural Framing Accessories:
 1. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
 2. Partial Height Wall Framing Support: Provides stud reinforcement and anchored connection to floor.
 - a. Materials: ASTM A36/A36M formed sheet steel support member with factory-welded ASTM A1003/A1003M steel plate base.
 - b. Height: 35-3/4 inches.
 - c. Products:
 - 1) ClarkDietrich; Pony Wall (PW): www.clarkdietrich.com/#sle.
 - 2) Substitutions: See Section 01 6000 - Product Requirements.

2.03 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:
 1. CertainTeed Corporation: www.certainteed.com/#sle.
 2. Continental Building Products: www.continental-bp.com/#sle.
 3. Georgia-Pacific Gypsum: www.gpgypsum.com/#sle.
 4. National Gypsum Company: www.nationalgypsum.com/#sle.
 5. USG Corporation: www.usg.com/#sle.
 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
 1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - a. Mold resistant board is required as indicated on drawings.
 3. At Assemblies Indicated with Fire-Resistance Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
 4. Thickness:
 - a. Vertical Surfaces: 5/8 inch.
 - b. Ceilings: 5/8 inch.
 - c. Multi-Layer Assemblies: Thicknesses as indicated on drawings.
- C. Backing Board For Wet Areas: One of the following products:
 1. Application: Surfaces behind tile in wet areas including tub and shower surrounds and shower ceilings.
 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 3. ANSI Cement-Based Board: Non-gypsum-based; aggregated Portland cement panels with glass fiber mesh embedded in front and back surfaces complying with ANSI A118.9 or ASTM C1325.
 - a. Thickness: 1/2 inch.
 4. ASTM Cement-Based Board: Non-gypsum-based, cementitious board complying with ASTM C1288.
 - a. Thickness: 1/2 inch.
 5. Glass Mat Faced Board: Coated glass mat water-resistant gypsum backing panel as defined in ASTM C1178/C1178M.
 - a. Regular Type: Thickness 1/2 inch.
 - b. Fire-Resistance-Rated Type: Type X core, thickness 5/8 inch.
- D. Backing Board For Non-Wet Areas: Water-resistant gypsum backing board as defined in ASTM C1396/C1396M; sizes to minimum joints in place; ends square cut.
 1. Application: Vertical surfaces behind thinset tile, except in wet areas.
 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 3. Type: Regular, in locations indicated.
 4. Regular Board Thickness: 1/2 inch.
 5. Edges: Tapered.
 6. Products:
- E. Ceiling Board: Special sag resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.

SECTION 09 2116 GYPSUM BOARD ASSEMBLIES

1. Application: Ceilings, unless otherwise indicated.
2. Thickness: 1/2 inch.
3. Edges: Tapered.

2.04 GYPSUM WALLBOARD ACCESSORIES

- A. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced. Thickness: 3 inch or as indicated on drawings.
- B. Finishing Accessories: ASTM C1047, galvanized steel sheet ASTM C1047 G90 or rigid plastic, unless noted otherwise.
 1. Special Shapes: In addition to conventional corner bead and control joints, provide U-bead at exposed panel edges.
 2. Products:
 - a. Phillips Manufacturing Co: www.phillipsmfg.com/#sle.
 - b. Trim-tex, Inc: www.trim-tex.com/#sle.
 - c. CertainTeed Corporation: www.certainteed.com/#sle..
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- C. Beads, Joint Accessories, and Other Trim: ASTM C1047, rigid plastic, galvanized steel, or rolled zinc, unless noted otherwise.
- D. Expansion Joints:
 1. Type: V-shaped metal with factory-installed protective tape.
- E. Decorative Metal Trim:
 1. Material: Extruded aluminum alloy 6063-T5 temper.
 2. Finish: Anodized, clear.
 3. Type: Profile as selected from manufacturer's standard range.
 4. Reveals and "L" Trims: See interior elevations for locations and types.
 - a. Manufacture: Fry Reglet.
 - 1) Reveal Shape: # DRM-50-50
 - 2) L-Shape: # DRML-50
 - 3) F-Shape: # DRMF-50-50
- F. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
 1. Paper Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
- G. Plaster repair and wall leveling for paint surface at areas of tile removal: USG, ASTM C475 Durabond 90.
- H. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inches in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion-resistant.
- I. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion-resistant.
- J. Nails for Attachment to Wood Members: ASTM C514.
- K. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.
- L. Adhesive for Attachment to Wood, ASTM C557 and Metal:

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

3.02 FRAMING INSTALLATION

- A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.
- B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
 1. Level ceiling system to a tolerance of 1/1200.
- C. Studs: Space studs at 16 inches on center or as indicated on drawings.
 1. Extend partition framing as indicated in Wall Legend on drawings..

SECTION 09 2116 GYPSUM BOARD ASSEMBLIES

2. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.
- D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.
- E. Standard Wall Furring: Install at concrete walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.
- F. Acoustic Furring: Install resilient channels at maximum 24 inches on center. Locate joints over framing members.
- G. Blocking: Install blocking for support of:
 1. Framed openings.
 2. Wall-mounted cabinets.
 3. Plumbing fixtures.
 4. Toilet partitions.
 5. Toilet accessories.
 6. Wall-mounted door hardware.
 7. Monitors
 8. Cabinets and counters
 9. Lockers

3.03 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Acoustic Sealant: Install in accordance with manufacturer's instructions.
 1. Place two beads continuously on substrate before installation of perimeter framing members.
 2. Place continuous bead at perimeter of each layer of gypsum board.
 3. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.
- C. Sound Barrier Mullion Trim Cap Assembly: Install per manufacturer's recommendations.

3.04 BOARD INSTALLATION

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Single-Layer Nonrated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
 1. Exception: Tapered edges to receive joint treatment at right angles to framing.
- C. Double-Layer, Nonrated: Use gypsum board for first layer, placed parallel to framing or furring members, with ends and edges occurring over firm bearing. Use glass mat faced gypsum board at exterior walls and at other locations as indicated. Place second layer perpendicular to framing or furring members. Offset joints of second layer from joints of first layer.
- D. Exposed Gypsum Board in Interior Wet Areas: Seal joints, cut edges, and holes with water-resistant sealant.
- E. Cementitious Backing Board: Install over steel framing members and plywood substrate where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.
- F. Installation on Metal Framing: Use screws for attachment of gypsum board except face layer of nonrated double-layer assemblies, which may be installed by means of adhesive lamination.
- G. Installation on Wood Framing: For rated assemblies, comply with requirements of listing authority. For nonrated assemblies, install as follows:
 1. Single-Layer Applications: Adhesive application.

3.05 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as follows:
 1. Not more than 30 feet apart on walls and ceilings over 50 feet long.

SECTION 09 2116 GYPSUM BOARD ASSEMBLIES

2. At exterior soffits, not more than 30 feet apart in both directions.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.
- D. Decorative Trim: Install at locations shown on drawings and in accordance with manufacturer's instructions.

3.06 JOINT TREATMENT

- A. Paper Faced Gypsum Board: Use paper joint tape, embed with drying type joint compound and finish with drying type joint compound.
- B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 1. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated.
 2. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
 3. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
 4. Level 1: Fire-resistance-rated wall areas above finished ceilings, whether or not accessible in the completed construction.
 5. Level 0: Surfaces indicated to be finished in later stage of project.
- C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 1. Feather coats of joint compound so that camber is maximum 1/32 inch.
 2. Taping, filling, and sanding are not required at surfaces behind adhesive applied ceramic tile and fixed cabinetry.
- D. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.
- E. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

3.07 EXISTING WALL REPAIR AND FINISH

- A. Finish existing wall to be repaired at locations of wall covering removal to finish level indicated for new work.
- B. Walls with existing textured finish to be evened out and blended to create finish level indicated for new work.

3.08 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
 - 1. Mechanical and Electrical:
 - a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
- D. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
 - 5. Stainless steel, anodized aluminum, bronze, terne-coated stainless steel, and lead items.
 - 6. Marble, granite, slate, and other natural stones.
 - 7. Floors, unless specifically indicated.
 - 8. Ceramic and other tiles.
 - 9. Brick, architectural concrete, cast stone, integrally colored plaster, and stucco.
 - 10. Glass.
 - 11. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

- A. Section 05 5000 - Metal Fabrications: Shop-primed items.
- B. Section 05 5100 - Metal Stairs: Shop-primed items.
- C. Section 09 9113 - Exterior Painting.
- D. Section 09 9300 - Staining and Transparent Finishing: Wood substrates.
- E. Section 09 9600 - High-Performance Coatings.

1.03 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.
- C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition, www.paintinfo.com.
- D. SSPC-SP 1 - Solvent Cleaning; 2015.
- E. SSPC-SP 6 - Commercial Blast Cleaning; 2007.
- F. SSPC-SP 13 - Surface Preparation of Concrete; (Reaffirmed 2015); 2003.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g., "alkyd enamel").
 - 2. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
- C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
 - 1. Where sheen is specified, submit samples in only that sheen.

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2. Where sheen is not specified, discuss sheen options with Architect before preparing samples, to eliminate sheens not required.
- D. Manufacturer's Instructions: Indicate special surface preparation procedures.
- E. Maintenance Data: Submit coating maintenance manual including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 1. See Section 01 6000 - Product Requirements, for additional provisions.
 2. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
 3. Label each container with color in addition to the manufacturer's label.

1.05 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 5 years experience and approved by manufacturer.

1.06 MOCK-UP

- A. See Section 01 4000 - Quality Requirements, for general requirements for mock-up.
- B. Provide panel, 6 feet long by 6 feet wide, illustrating paint color, texture, and finish.
- C. Provide door and frame assembly illustrating paint color, texture, and finish.
- D. Locate where directed by Architect.
- E. Mock-up may remain as part of the work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.08 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply materials when relative humidity exceeds 85 percent, at temperatures less than 5 degrees F above the dew point, or to damp or wet surfaces.
- D. Minimum Application Temperatures for Paints: 50 degrees F for interiors unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
 1. If a single manufacturer cannot provide specified products; minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for substitutions.
- B. Paints:
 1. Behr Process Corporation: www.behr.com/#sle.
 2. PPG Paints: www.ppgpaints.com/#sle.
 3. Sherwin-Williams Company: www.sherwin-williams.com/#sle.
 4. Benjamin Moore: www.benjaminmoore.com.
- C. Primer Sealers: Same manufacturer as top coats.

- D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready-mixed, unless intended to be a field-catalyzed paint.
1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
 3. Supply each paint material in quantity required to complete entire project's work from a single production run.
 4. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Volatile Organic Compound (VOC) Content:
1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- C. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.
- D. Colors: As indicated on drawings.
1. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling under which they are mounted.

2.03 PAINT SYSTEMS - INTERIOR

- A. Paint I-OP - Interior Surfaces to be Painted, Unless Otherwise Indicated.
1. Two top coats and one coat primer.
 2. I-OP-HP - Top Coat(s): High Performance Architectural Interior Latex.
 - a. Application: Higher level of performance compared to conventional latex paints in the areas of scrub and burnish resistance and ease of stain removal. Used for gypsum board, concrete, concrete masonry units, wood, plaster, and shop primed steel.
 - b. Products:
 - 1) Sherwin-Williams Pre-Catalyzed Waterbased Epoxy, Eg-Shel.
 - 2) Substitutions: Section 01 6000 - Product Requirements.
 3. I-OP-C - Top Coat(s): Conventional Interior Latex.
 - a. Application: Used for gypsum board, concrete, concrete masonry units, brick, plaster, and shop primed steel.
 - b. Products:
 - 1) PPG Paints Speedhide Zero Interior Latex, 6-4110XI Series, Flat.
 - 2) PPG Paints Speedhide Zero Interior Latex, 6-4310XI Series, Eggshell.
 - 3) Sherwin-Williams ProMar 200 Zero VOC Interior Latex, Flat.
 - 4) Sherwin-Williams ProMar 200 Zero VOC Interior Latex, Eg-Shel.
 - 5) Substitutions: Section 01 6000 - Product Requirements.
 4. Top Coat Sheen:
 - a. Flat: Use this sheen for ceilings and other overhead surfaces.
 - b. Eggshell: Use this sheen at all locations.
- B. Paint I-OP-MD-DT - Medium Duty Door/Trim: For surfaces subject to frequent contact by occupants, including metals and wood:
1. Medium duty applications include doors, door frames, railings, handrails, guardrails, and balustrades.
 2. Two top coats and one coat primer.
 3. Top Coat(s): Interior Epoxy-Modified Latex.
 - a. Products:

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- 1) PPG Paints Aquapon WB EP Two-Component Waterborne Epoxy Coating, 98E-1/98E-100 Series, Semi-Gloss.
 - 2) Sherwin-Williams Waterbased Catalyzed Epoxy, Semi-Gloss.
 - 3) Substitutions: Section 01 6000 - Product Requirements.
 4. Top Coat(s): Interior Light Industrial Coating, Water Based.
 - a. Application: Doors only. Do not use on handrails.
 - b. Products:
 - 1) PPG Paints Pitt-Tech Plus WB DTM Industrial Enamel. 4216 HP Series, Semi-Gloss.
 - 2) Sherwin-Williams Pro Industrial Acrylic Coating, Semi-Gloss.
 - 3) Substitutions: Section 01 6000 - Product Requirements.
- C. Paint I-OP-MD-WC - Medium Duty Overhead: Including gypsum board, concrete, concrete masonry units, uncoated steel, shop primed steel, galvanized steel, and aluminum.
 1. Two top coats and one coat primer.
 2. Top Coat(s): Interior Epoxy-Modified Latex.
 - a. Application: High Moisture areas, i.e. natatoriums and showers.
 - b. Products:
 - 1) PPG Paints Aquapon WB EP Two-Component Waterborne Epoxy Coating, 98E-1/98E-100 Series, Semi-Gloss.
 - 2) Sherwin-Williams Waterbased Catalyzed Epoxy, Semi-Gloss.
 - 3) Substitutions: Section 01 6000 - Product Requirements.
 3. Top Coat(s): High Performance Architectural Interior Latex.
 - a. Application: Washable, i.e. Public restrooms, kitchens.
 - b. Products:
 - 1) Sherwin-Williams Pro Industrial Pre-Catalyzed Waterbased Epoxy, Eg-Shel.
 - 2) Substitutions: Section 01 6000 - Product Requirements.
 4. Top Coat(s): Interior Latex.
 - a. Application: All areas unless noted otherwise.
 - b. Products:
 - 1) PPG Paints Speedhide Zero Interior Latex, 6-4110XI Series, Flat.
 - 2) Sherwin-Williams ProMar 200 Zero VOC Interior Latex, Flat.
 - 3) Substitutions: Section 01 6000 - Product Requirements.
- D. Paint I-OP-DF - Dry Fall: Metals; exposed structure and overhead-mounted services, including shop primed steel deck, structural steel, metal fabrications, galvanized ducts, galvanized conduit, and galvanized piping.
 1. Shop primer by others.
 2. One top coat.
 3. Top Coat: Latex Dry Fall.
 - a. Products:
 - 1) PPG Paints Speedhide Super Tech Water Based Interior Dry-Fog Latex, 6-725XI Series, Flat.
 - 2) Sherwin-Williams Waterborne Acrylic Dryfall, Flat.
 - 3) Substitutions: Section 01 6000 - Product Requirements.
- E. Paint I-OP-FL - Concrete and Wood Floors to be Painted.
 1. Two top coats without primer.
 2. Top Coat(s): Latex Floor Paint, Low Gloss.
 - a. Products:
 - 1) PPG Paints Break-Through Interior/Exterior Water-Borne Acrylic, V51-410 Series, Satin.
 - 2) Sherwin-Williams Porch and Floor Enamel, satin.
 - 3) Substitutions: Section 01 6000 - Product Requirements.
- F. Paint I-TR-C - Transparent Finish on Concrete Floors.
 1. 2 coats stain.
 2. Stain: Semi-Transparent Stain for Concrete Floors.
 - a. Products:
 - 1) PPG Paints Perma-crete Color Seal Acrylic Waterproofing Sealer.

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- 2) Sherwin-Williams H&C Infusion Waterbased Semi Transparent Decorative Stain.
 - 3) Substitutions: Section 01 6000 - Product Requirements.
 3. Stain: Solid Color Stain for Concrete Floors.
 - a. Products:
 - 1) PPG Paints Perma-Crete Color Seal WB Interior/Exterior Acrylic Concrete Stain, 4-4210XI Series, Satin.
 - 2) Sherwin-Williams H&C Colortop 50 Waterbased Solid Color Stain.
 - 3) Substitutions: Section 01 6000 - Product Requirements.
 4. Sealer: Water Based Sealer for Concrete Floors.
 - a. Products:
 - 1) PPG Paints Perma-Crete Plex-Seal WB Interior/Exterior Clear Sealer, 4-6200XI, Satin.
 - 2) Sherwin-Williams H&C Clarishield Water-Based Wet-Look Concrete Sealer.
 - 3) Substitutions: Section 01 6000 - Product Requirements.
- G. Paint I-TR-DE - Interior Surfaces to be Finished with Dry Erase Coating.
 1. One top coat.
 2. Top Coat(s): Dry Erase Coating, Waterbased Polyurethane.
 - a. Products:
 - 1) Sherwin-Williams Dry Erase Clear Gloss Coating.
 - 2) Substitutions: Section 01 6000 - Product Requirements.
 3. Sheen: Gloss.

2.04 PRIMERS

- A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.
 1. Alkali Resistant Water Based Primer.
 - a. Application: Above grade concrete, masonry, stucco and plaster.
 - b. Products:
 - 1) PPG Paints Perma-Crete Interior/Exterior Alkali Resistant Primer, 4-603XI.
 - 2) Sherwin-Williams Loxon Concrete and Masonry Primer Sealer, LX02W50.
 - 3) Substitutions: Section 01 6000 - Product Requirements.
 2. Interior Primer Sealer.
 - a. Application: Gypsum board and plaster.
 - b. Products:
 - 1) PPG Paints Speedhide Zero Interior Latex Sealer, 6-4900XI.
 - 2) Sherwin-Williams ProMar 200 Zero VOC Interior Latex Primer.
 - 3) Substitutions: Section 01 6000 - Product Requirements.
 3. Interior/Exterior Latex Block Filler.
 - a. Application: Concrete Masonry Units.
 - b. Products:
 - 1) PPG Paints Speedhide Masonry Hi Fill Latex Block Filler, 6-15XI.
 - 2) Sherwin-Williams ConFlex Block Filler.
 - 3) Sherwin-Williams PrepRite Interior/Exterior Block Filler.
 - 4) Substitutions: Section 01 6000 - Product Requirements.
 4. Interior Rust-Inhibitive Water Based Primer.
 - a. Application: Metal (steel, galvanized and aluminum).
 - b. Products:
 - 1) PPG Paints Pitt-Tech Plus Interior/Exterior DTM Waterborne Acrylic Primer/Finish, 4020 PF Series.
 - 2) Sherwin-Williams Pro Industrial Pro Cryl Universal Acrylic Primer.
 - 3) Substitutions: Section 01 6000 - Product Requirements.
 5. Latex Primer for Interior Wood.
 - a. Application: Wood.
 - b. Products:
 - 1) PPG Paints Seal Grip Interior/Exterior Acrylic Universal Primer/Sealer, 17-921XI Series.
 - 2) Sherwin-Williams Premium Wall and Wood Primer.

- 3) Substitutions: Section 01 6000 - Product Requirements.
6. Bonding Primer, Water Based.
 - a. Application: Used on glossy surfaces such as plastics, fiberglass, laminates, cured alkyd finishes, glass and tile.
 - b. Products:
 - 1) PPG Paints Seal Grip Interior/Exterior Acrylic Universal Primer/Sealer, 17-921XI Series.
 - 2) Sherwin-Williams Extreme Bond Primer.
 - 3) Substitutions: Section 01 6000 - Product Requirements.

2.05 ACCESSORY MATERIALS

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin application of paints and finishes until substrates have been adequately prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- E. Test shop-applied primer for compatibility with subsequent cover materials.
- F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces is below the following maximums:
 1. Gypsum Wallboard: 12 percent.
 2. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
 3. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
 4. Concrete Floors and Traffic Surfaces: 8 percent.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Concrete:
 1. Prepare surface as recommended by top coat manufacturer and according to SSPC-SP 13.
- F. Masonry:
 1. Remove efflorescence and chalk. Do not coat surfaces if moisture content, alkalinity of surfaces, or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
 2. Prepare surface as recommended by top coat manufacturer.
- G. Concrete Floors and Traffic Surfaces: Remove contamination, acid etch and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.
- H. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.
- I. Aluminum: Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
- J. Galvanized Surfaces:
 1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.

- K. Ferrous Metal:
 - 1. Solvent clean according to SSPC-SP 1.
 - 2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
 - 3. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.
- L. Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.
- M. Wood Doors to be Field-Finished: Seal wood door top and bottom edge surfaces with tinted primer.
- N. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.03 APPLICATION

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's written instructions.
- C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- D. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- E. Sand wood and metal surfaces lightly between coats to achieve required finish.
- F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- G. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Room and door signs.
- B. Interior directional and informational signs.
- C. Emergency evacuation maps.

1.02 REFERENCE STANDARDS

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
- B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- C. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.
- C. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
 - 1. When room numbers to appear on signs differ from those on drawings, include the drawing room number on schedule.
 - 2. Submit for approval by Owner through Architect prior to fabrication.
- D. Samples: Submit two samples of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.
- E. Verification Samples: Submit samples showing colors specified.
- F. Manufacturer's Installation Instructions: Include installation templates and attachment devices.

1.04 QUALITY ASSURANCE

- A. Supplier: Obtain all products in this section from a single supplier.
- B. Regulatory Requirements: Products shall meet requirements of the Americans With Disabilities Act Accessibility Guidelines (ADAAG) and local amendments and modifications.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Package signs as required to prevent damage before installation.
- B. Package room and door signs in sequential order of installation, labeled by floor.
- C. Store tape adhesive at normal room temperature.

1.06 FIELD CONDITIONS

- A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.
- B. Maintain this minimum temperature during and after installation of signs.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Signs:
 - 1. Basis of Design: Signs of Our Times; Sign Style - Basics: www.signsofourtimes.com
 - 2. Inpro: www.inprocorp.com/#sle.
 - 3. Seton Identification Products: www.seton.com/aec/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 SIGNAGE APPLICATIONS

- A. Accessibility Compliance: Signs are required to comply with ADA Standards and ICC A117.1 and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.

SECTION 10 1400 SIGNAGE

- B. Room and Door Signs: Provide a sign for every doorway, whether it has a door or not, not including corridors, lobbies, and similar open areas.
 - 1. Sign Type: Flat signs with injection molded panel media as specified.
 - 2. Provide "tactile" signage, with letters raised minimum 1/32 inch and Grade II braille.
 - 3. Character Height: 1 inch.
 - 4. Service Rooms: Identify with room names and numbers to be determined later, not those indicated on drawings.
 - 5. Rest Rooms: Identify with pictograms, the names "MEN" and "WOMEN", and braille.
- C. Interior Directional and Informational Signs:
 - 1. Sign Type: Same as room and door signs.
 - 2. Sizes: As indicated in schedule at end of Part 3.
 - 3. Wording of signs is scheduled at end of Part 3.
 - 4. Where suspended, ceiling mounted, or projecting from wall signs are indicated, provide two-sided signs with same information on both sides.
- D. Emergency Evacuation Maps:
 - 1. Allow for one map per elevator lobby.
 - 2. Map content to be provided by Owner.

2.03 SIGN TYPES

- A. Flat Signs: Signage media without frame.
 - 1. Edges: Square.
 - 2. Corners: Square.
 - 3. Wall Mounting of One-Sided Interior Signs: Tape adhesive.
 - 4. Wall and Ceiling Mounting of Two-Sided Signs: Aluminum wall bracket, powder coated, color selected from manufacturer's standard colors, attached with screws in predrilled mounting holes.
- B. Color and Font: Unless otherwise indicated:
 - 1. Character Font: Helvetica, Arial, or other sans serif font.
 - 2. Character Case: Upper case only.
 - 3. Background Color: As scheduled.
 - 4. Character Color: As scheduled.

2.04 TACTILE SIGNAGE MEDIA

- A. Injection Molded Panels: One-piece acrylic plastic, with integral raised letters and braille.
 - 1. Total Thickness: 1/8 inch.

2.05 ACCESSORIES

- A. Tape Adhesive: Double sided tape for flat signs.
- B. Flag sign bracket: manufacture standard with matching color screws.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install neatly, with horizontal edges level.
- C. Locate signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.
- D. Protect from damage until Date of Substantial Completion; repair or replace damaged items.

3.03 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to manufacturer's written instructions.

3.04 INTERIOR SIGN SCHEDULE

- A. Design and colors listed below are based on manufacturer 'Signs of Our Times' and applies to all signs within the selected sign style as follows:
 - 1. Sign Style: Basics
 - 2. Sign Shape: B1 (square corners)
 - 3. Background Color: Parchment
 - 4. Lettering Color: Black
 - 5. Braille: Clear
- B. SN-1 - Toilet Room Signage
 - 1. Size: 8 by 8 inch.
 - 2. Wording: MEN
 - 3. Braille.
 - 4. Pictogram Description: Man Symbol and wheelchair symbol
- C. SN-2 - Toilet Room Signage
 - 1. Size: 8 by 8 inch.
 - 2. Wording: WOMEN
 - 3. Braille.
 - 4. Pictogram Description: Woman Symbol and wheelchair symbol
- D. SN-3 - Toilet Room Signage
 - 1. Size: 8 by 8 inch.
 - 2. Wording: RESTROOM
 - 3. Braille.
 - 4. Pictogram Description: Man/Woman Symbol and wheelchair symbol
- E. SN-4 - Toilet Room Signage
 - 1. Size: 8 by 10 inch.
 - 2. Wording: FAMILY RESTROOM
 - 3. Braille.
 - 4. Pictogram Description: Man/Woman/child Symbol and wheelchair symbol
- F. SN-11 - Evacuation Plan Signage - Evacuation Direction Signage
 - 1. Location: Elevator lobby.
 - 2. Size: 12 by 12 inch.
 - 3. Wording: EVACUTATION PLAN
 - 4. Braille.
 - 5. Pictogram Description: None.
 - 6. Floor Plan with arrowed egress direction behind clear acrylic.

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Above ground piping.
- B. Mechanical couplings.
- C. Pipe hangers and supports.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 21 1300 - Fire-Suppression Sprinkler Systems: Sprinkler systems design.

1.03 REFERENCE STANDARDS

- A. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Qualifications; 2015.
- B. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; 2010.
- C. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2011.
- D. ASME B16.4 - Gray Iron Threaded Fittings: Classes 125 and 250; 2011.
- E. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999 (Reapproved 2014).
- F. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- G. ASTM A135/A135M - Standard Specification for Electric-Resistance-Welded Steel Pipe; 2009 (Reapproved 2014).
- H. ASTM A536 - Standard Specification for Ductile Iron Castings; 1984 (Reapproved 2014).
- I. ASTM A795/A795M - Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use; 2013.
- J. AWWA C606 - Grooved and Shouldered Joints; 2011.
- K. NFPA 13 - Standard for the Installation of Sprinkler Systems; 2016.
- L. UL (DIR) - Online Certifications Directory; Current Edition.
- M. UL 262 - Gate Valves for Fire-Protection Service; Current Edition, Including All Revisions.
- N. UL 312 - Check Valves for Fire-Protection Service; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide manufacturer's catalog information. Indicate valve data and ratings.
- C. Shop Drawings: Indicate pipe materials used, jointing methods, supports, and floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.
- D. Project Record Documents: Record actual locations of components and tag numbering.
- E. Operation and Maintenance Data: Include installation instructions and spare parts lists.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Valve Stem Packings: Two for each type and size of valve.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified in this section.
 - 1. Minimum three years experience.
 - 2. Approved by manufacturer.
- C. Conform to UL (DIR) requirements.

SECTION 21 0500 COMMON WORK RESULTS FOR FIRE SUPPRESSION

- D. Valves: Bear UL (DIR) product listing label or marking. Provide manufacturer's name and pressure rating marked on valve body.
- E. Products Requiring Electrical Connection: Listed and classified as suitable for the purpose specified and indicated.
- F. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.
- G. Grooved couplings and fittings shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store valves in shipping containers, with labeling in place.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Welding Materials and Procedures: Comply with ASME BPVC-IX.
- B. Provide system pipes, fittings, sleeves, escutcheons, seals, and other related accessories.

2.02 ABOVE GROUND PIPING

- A. Steel Pipe: ASTM A53 Schedule 40, ASTM A135/A135M Schedule 10, or ASTM A795 Schedule 40, black.
 - 1. Cast Iron Fittings: ASME B16.1, flanges and flanged fittings and ASME B16.4, threaded fittings.
 - 2. Malleable Iron Fittings: ASME B16.3, threaded fittings and ASTM A47/A47M.
 - 3. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.
 - 4. Mechanical Formed Fittings: Carbon steel housing with integral pipe stop and O-ring pocked and O-ring, uniformly compressed into permanent mechanical engagement onto pipe.

2.03 PIPE HANGERS AND SUPPORTS

- A. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
- B. Hangers for Pipe Sizes 2 inches and Over: Carbon steel, adjustable, clevis.
- C. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
- D. Wall Support for Pipe Sizes to 3 inches: Cast iron hook.
- E. Wall Support for Pipe Sizes 4 inches and Over: Welded steel bracket and wrought steel clamp.
- F. Vertical Support: Steel riser clamp.

2.04 MECHANICAL COUPLINGS

- A. Manufacturers:
 - 1. Victaulic, Company: <<http://www.victaulic.com/en/>>
 - 2. Anvil International: <<http://www.anvilintl.com/>>
 - 3. Tyco Fire Products: <<http://www.tyco-fire.com/>>
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Rigid Mechanical Couplings for Grooved Joints:
 - 1. Dimensions and Testing: Comply with AWWA C606.
 - 2. Minimum Working Pressure: 300 psig.
 - 3. Housing Material: Fabricate of ductile iron complying with ASTM A536.
 - 4. Housing Coating: Factory applied orange enamel.
 - 5. Gasket Material: EPDM suitable for operating temperature range from minus 30 degrees F to 230 degrees F.
 - 6. Bolts and Nuts: Hot-dipped-galvanized or zinc-electroplated steel.

7. Provide stops for direct stab installation without field assembly.

PART 3 EXECUTION**3.01 PREPARATION**

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and foreign material, from inside and outside, before assembly.

3.02 INSTALLATION

- A. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
- B. Install piping to conserve building space, to not interfere with use of space and other work.
- C. Group piping whenever practical at common elevations.
- D. Sleeve pipes passing through partitions, walls, and floors.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- F. Pipe Hangers and Supports:
 1. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 2. Place hangers within 12 inches of each horizontal elbow.
 3. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 4. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
 5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- G. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.
- H. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc-rich primer to welding.
- I. Do not penetrate building structural members unless indicated.
- J. Provide sleeves when penetrating footings, floors, walls, and partitions. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.
- K. Escutcheons:
 1. Install and firmly attach escutcheons at piping penetrations into finished spaces.
 2. Provide escutcheons on both sides of partitions separating finished areas through which piping passes.
 3. Use chrome plated escutcheons in occupied spaces and to conceal openings in construction.
- L. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, unions, and couplings for servicing are consistently provided.
- M. Install valves with stems upright or horizontal, not inverted. Remove protective coatings prior to installation.
- N. Provide drain valves at main shut-off valves, low points of piping and apparatus.
- O. Grooved joints shall be installed in accordance with the manufacturer's latest published instructions.
 1. The gasket style and elastomeric material (grade) shall be verified as suitable for the intended service. Gaskets shall be molded and produced by the grooved coupling manufacturer.
 2. Grooved ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove.
 3. Grooved coupling manufacturer's factory trained field representative shall provide on-site training for contractor's field personnel in the proper use of grooving tools, application of groove, and installation of grooved piping products. Factory trained representative shall

SECTION 21 0500 COMMON WORK RESULTS FOR FIRE SUPPRESSION

periodically visit the jobsite to ensure best practices in grooved product installation are being followed. Remove and replace any improperly installed products.

3.03 CLEANING

- A. Upon completion of work, clean all parts of the installation.
- B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Nameplates.
- B. Tags.
- C. Pipe markers.

1.02 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2007.
- B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2013.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Product Data: Provide manufacturers catalog literature for each product required.
- D. Manufacturer's Installation Instructions: Indicate special procedures, and installation instructions.

PART 2 PRODUCTS**2.01 IDENTIFICATION APPLICATIONS**

- A. Piping: Pipe markers.
- B. Valves: Nameplates and ceiling tacks where above lay-in ceilings.

2.02 NAMEPLATES

- A. Manufacturers:
 - 1. Brimar Industries, Inc: www.pipemarker.com.
 - 2. Kolbi Pipe Marker Company: www.kolbipipemarkers.com.
 - 3. Seton Identification Products, a Tricor Direct Company: www.seton.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: Laminated three-layer plastic with engraved letters.
 - 1. Letter Color: White.
 - 2. Letter Height: 1/4 inch.
 - 3. Background Color: Black.
 - 4. Thickness: 1/8 inch.
 - 5. Plastic: Comply with ASTM D709.

2.03 TAGS

- A. Manufacturers:
 - 1. Advanced Graphic Engraving, LLC: www.advancedgraphicengraving.com.
 - 2. Brady Corporation: www.bradycorp.com.
 - 3. Brimar Industries, Inc: www.pipemarker.com.
 - 4. Kolbi Pipe Marker Company: www.kolbipipemarkers.com.
 - 5. Seton Identification Products, a Tricor Direct Company: www.seton.com.
 - 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.04 PIPE MARKERS

- A. Manufacturers:
 - 1. Brady Corporation: www.bradycorp.com.
 - 2. Brimar Industries, Inc: www.pipemarker.com.
 - 3. Kolbi Pipe Marker Company: www.kolbipipemarkers.com.
 - 4. Seton Identification Products, a Tricor Company: www.seton.com.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Color: Comply with ASME A13.1.

SECTION 21 0553 IDENTIFICATION FOR FIRE SUPPRESSION PIPING AND EQUIPMENT

- C. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- E. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.
- F. Color code as follows:
 - 1. Fire Quenching Fluids: Red with white letters.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Utilize the Owner's color schemes.

3.02 INSTALLATION

- A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Install plastic pipe markers in accordance with manufacturer's instructions.
- D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Wet-pipe sprinkler system.
- B. System design, installation, and certification.
- C. Fire department connections.

1.02 RELATED REQUIREMENTS

- A. Section 21 0500 - Common Work Results for Fire Suppression: Pipe and fittings.
- B. Section 21 0523 - General-Duty Valves for Water-Based Fire-Suppression Piping.
- C. Section 21 0553 - Identification for Fire Suppression Piping and Equipment.
- D. Section 21 1200 - Fire-Suppression Standpipes.
- E. Section 21 3000 - Fire Pumps.
- F. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements; 2012.
- B. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements; 2012.
- C. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2013.
- D. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements; 2013.
- E. ITS (DIR) - Directory of Listed Products; current edition.
- F. NFPA 13 - Standard for the Installation of Sprinkler Systems; 2016.
- G. NFPA 1963 - Standard for Fire Hose Connections; 2014.
- H. UL (DIR) - Online Certifications Directory; Current Edition.
- I. UL 405 - Fire Department Connection Devices; Current Edition; Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate hydraulic calculations, detailed pipe layout, hangers and supports, sprinklers, components, and accessories. Indicate system controls.
 - 2. Submit shop drawings to Authorities Having Jurisdiction for approval. Submit proof of approval to Architect.
- C. Manufacturer's Certificate: Certify that system has been tested and meets or exceeds specified requirements and code requirements.
- D. Operation and Maintenance Data: Include components of system, servicing requirements, record drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements for additional provisions.
 - 2. Extra Sprinklers: Type and size matching those installed in quantity required by referenced NFPA design and installation standard.
 - 3. Sprinkler Wrenches: For each sprinkler type.

1.06 QUALITY ASSURANCE

- A. Comply with UL (DIR) requirements.
- B. Designer Qualifications: Design system under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in Michigan.

SECTION 21 1300 FIRE-SUPPRESSION SPRINKLER SYSTEMS

- C. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- D. Installer Qualifications: Company specializing in performing the work of this section with minimum three years experience and approved by manufacturer.
- E. Equipment and Components: Provide products that bear UL (DIR) label or marking.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store products in shipping containers and maintain in place until installation. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Sprinklers, Valves, and Equipment:
 - 1. Tyco Fire Protection Products, a Tyco Business: www.tyco-fire.com.
 - 2. Viking Corporation: www.vikinggroupinc.com.
 - 3. Globe: www.globesprinkler.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 SPRINKLER SYSTEM

- A. Sprinkler System: Provide coverage for entire building.
- B. Occupancy: Light hazard; comply with NFPA 13.
- C. Water Supply: Determine volume and pressure from water flow test data.
 - 1. Revise design when test data available prior to submittals.
- D. Interface system with building control system.
- E. Provide fire department connections where indicated.
- F. Storage Cabinet for Spare Sprinklers and Tools: Steel, located adjacent to alarm valve.
- G. Pipe Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
 - 1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
 - 2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
 - 3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
 - 4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
 - 5. Concrete Adhesive Type Anchors: Complying with ICC-ES AC308.
 - 6. Other Types: As required.

2.03 SPRINKLERS

- A. Suspended Ceiling Type: Concealed pendant type with matching push on cover plate.
 - 1. Response Type: Quick.
 - 2. Coverage Type: Standard.
 - 3. Cover Plate Finish: Enamel, color white.
 - 4. Fusible Link: Fusible solder link type temperature rated for specific area hazard.
- B. Exposed Area Type: Pendant type with guard.
 - 1. Response Type: Quick.
 - 2. Coverage Type: Standard.
 - 3. Finish: Brass.
 - 4. Fusible Link: Fusible solder link type temperature rated for specific area hazard.
- C. Sidewall Type: Semi-recessed horizontal sidewall type with matching push on escutcheon plate.
 - 1. Response Type: Quick.
 - 2. Coverage Type: Standard.
 - 3. Finish: Brass.
 - 4. Escutcheon Plate Finish: Brass.
 - 5. Fusible Link: Fusible solder link type temperature rated for specific area hazard.
- D. Dry Sprinklers: Concealed pendant type with matching push on escutcheon plate.
 - 1. Response Type: Quick.
 - 2. Coverage Type: Standard.

SECTION 21 1300 FIRE-SUPPRESSION SPRINKLER SYSTEMS

3. Finish: Brass.
4. Cover Plate Finish: Brass.
5. Fusible Link: Fusible solder link type temperature rated for specific area hazard.
- E. Storage Sprinklers: Pendant type with guard.
 1. Response Type: Standard.
 2. Coverage Type: Standard.
 3. Finish: Chrome plated.
 4. Fusible Link: Fusible solder link type temperature rated for specific area hazard.
- F. Guards: Finish to match sprinkler finish.
 1. Escutcheons and guards shall be listed, supplied, and approved for use with the sprinkler by the sprinkler manufacturer.
- G. Spray Nozzles: Brass with solid cone discharge, 30 degrees of arc with blow-off dust cap.
 1. Finish: Brass.
- H. Flexible Drop System: Stainless steel, multiple use, open gate type.
 1. Application: Use to properly locate sprinkler heads.
 2. Include all supports and bracing.
 3. Provide braided type tube as required for the application.
 4. Manufacturers:

2.04 PIPING SPECIALTIES

- A. Wet Pipe Sprinkler Alarm Valve: Check type valve with divided seat ring, rubber-faced clapper to automatically actuate water motor alarm, pressure retard chamber and variable pressure trim with the following additional capabilities and features:
 1. Activate electric alarm.
 2. Test and drain valve.
 3. Replaceable internal components without removing valve from installed position.
 4. Manufacturers:
 - a. Victaulic Company; Series 751 with Series 760 motor alarm: www.victaulic.com/#sle.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- B. Backflow Preventer: Reduced pressure principle valve assembly backflow preventer with drain and OS & Y gate valve on each end.
- C. Universal Manifold Check Assemblies: Ductile iron construction, incorporating a control valve, check valve, flow switch, test & drain assembly, adjustable relief valve, and system gauges in one compact body/footprint, and shall be manufactured for "right" and "left"-hand orientations. The test & drain assemble shall contain an adjustable relief valve, with a range of 175 to 310 psi., and with the following additional capabilities and features:
 1. UL Listed and FM Approved.
 2. Rated for use at the maximum service pressure of 300 psi.
 3. Horizontal or Vertical installation.
 4. Threaded or Grooved End Connections.
 5. Manufacturers:
 - a. Globe: Model UMC; www.globesprinkler.com.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- D. Universal Manifold Assemblies: Ductile iron construction, incorporating a control valve, flow switch, test & drain assembly, adjustable relief valve, and system gauges in one compact body/footprint, and shall be manufactured for "right" and "left"-hand orientations. The test & drain assemble shall contain an adjustable relief valve, with a range of 175 to 310 psi., and with the following additional capabilities and features:
 1. UL Listed and FM Approved.
 2. Rated for use at the maximum service pressure of 300 psi.
 3. Horizontal or Vertical installation.
 4. Threaded or Grooved End Connections.
 5. Manufacturers:
 - a. Globe: Model UM; www.globesprinkler.com.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- E. Test Connections:

SECTION 21 1300 FIRE-SUPPRESSION SPRINKLER SYSTEMS

1. Backflow Preventer Test Connection:
 - a. Provide downstream of the backflow prevention assembly, listed hose valves with 2.5 inch National Standard male hose threads with cap and chain.
 - b. Furnish one valve for each 250 gpm of system demand or fraction thereof.
 - c. Provide permanent sign reading "Test Valve" in accordance with Section 21 0553.
- F. Water Motor Alarm: Hydraulically operated impeller type alarm with aluminum alloy chrome plated gong and motor housing, nylon bearings, and inlet strainer.
- G. Electric Alarm: Electrically operated chrome plated gong with pressure alarm switch.
- H. Water Flow Switch: Vane type switch for mounting horizontal or vertical, with two contacts; rated 10 amp at 125 volt AC and 2.5 amp at 24 volt DC.
- I. Fire Department Connections:
 1. Type: Free standing made of corrosion resistant metal complying with UL 405.
 - a. Inlets: Two way, 2-1/2 inch swivel fittings, internal threaded. Thread size and inlets according to NFPA 1963 or Authority Having Jurisdiction. Brass caps with gaskets, chains, and lugs.
 - b. Outlet: Bottom with pipe threads, 4 NPS.
 - c. Rated Working Pressure: 175 psi.
 - d. Finish: Chrome.
 - e. Sleeve: Brass, 18 inches height.
 - f. Signage: Raised or engraved lettering 1 inch minimum indicating system type.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with referenced NFPA design and installation standard.
- B. Install equipment in accordance with manufacturer's instructions.
- C. Install buried shut-off valves in valve box. Provide post indicator.
- D. Provide approved backflow preventer assembly at sprinkler system water source connection.
- E. Locate fire department connection with sufficient clearance from walls, obstructions, or adjacent siamese connectors to allow full swing of fire department wrench handle.
- F. Locate outside alarm gong on building wall as indicated.
- G. Place pipe runs to minimize obstruction to other work.
- H. Place piping in concealed spaces above finished ceilings.
- I. Center sprinklers in two directions in ceiling tile and provide piping offsets as required.
- J. Apply masking tape or paper cover to ensure concealed sprinklers, cover plates, and sprinkler escutcheons do not receive field paint finish. Remove after painting. Replace painted sprinklers.
- K. Install and connect to fire pump system in accordance with Section 21 3000.
- L. Flush entire piping system of foreign matter.
- M. Install guards on sprinklers where indicated.
- N. Hydrostatically test entire system.
- O. Require test be witnessed by Fire Marshal.

3.02 INTERFACE WITH OTHER PRODUCTS

- A. Ensure required devices are installed and connected as required to fire alarm system.

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Piping insulation.
- B. Jackets and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 09 9123 - Interior Painting: Painting insulation jacket.

1.03 REFERENCE STANDARDS

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
- C. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2013.
- D. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007 (Reapproved 2013).
- E. ASTM C449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement; 2007 (Reapproved 2013).
- F. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2014.
- G. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2015.
- H. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2013).
- I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- J. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- K. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum 3 years of experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.06 FIELD CONDITIONS

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS**2.01 REGULATORY REQUIREMENTS**

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER

- A. Manufacturers:
 - 1. Basis of Design: Knauf Insulation; Earthwool 1000 Degree Pipe Insulation: www.knaufinsulation.com/#sle.
 - 2. CertainTeed Corporation: www.certainteed.com.
 - 3. Johns Manville Corporation: www.jm.com.
 - 4. Owens Corning Corporation; Fiberglas Pipe Insulation ASJ: www.ocbuildingspec.com/#sle.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.

SECTION 22 0719 PLUMBING PIPING INSULATION

- B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
 - 1. K Value: ASTM C177, 0.24 at 75 degrees F.
 - 2. Maximum Service Temperature: 850 degrees F.
 - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- C. Insulation: ASTM C547 and ASTM C795; semi-rigid, noncombustible, end grain adhered to jacket.
 - 1. K Value: ASTM C177, 0.24 at 75 degrees F.
 - 2. Maximum Service Temperature: 650 degrees F.
 - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- D. Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.
- E. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.
- F. Vapor Barrier Lap Adhesive: Compatible with insulation.
- G. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.
- H. Fibrous Glass Fabric:
 - 1. Cloth: Untreated; 9 oz/sq yd weight.
 - 2. Blanket: 1.0 lb/cu ft density.
 - 3. Weave: 5 by 5.
- I. Indoor Vapor Barrier Finish:
 - 1. Cloth: Untreated; 9 oz/sq yd weight.
 - 2. Vinyl emulsion type acrylic, compatible with insulation, black color.
- J. Outdoor Vapor Barrier Mastic: Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.
- K. Outdoor Breather Mastic: Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.
 - 1. Manufacturers:
 - a. Substitutions: See Section 01 6000 - Product Requirements.
- L. Insulating Cement: ASTM C449.
 - 1. Manufacturers:
 - a. Substitutions: See Section 01 6000 - Product Requirements.

2.03 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Manufacturers:
 - 1. Armacell LLC; AP Armaflex: www.armacell.us/#sle.
 - 2. Substitutions: See Section 01 6000 - Product Requirements.
- B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.
 - 1. 'K' value: ASTM C177, 0.25 at 75 degrees F.
 - 2. Minimum Service Temperature: Minus 40 degrees F.
 - 3. Maximum Service Temperature: 220 degrees F.
 - 4. Connection: Waterproof vapor barrier adhesive.
- C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

2.04 JACKETS

- A. PVC Plastic.
 - 1. Manufacturers:
 - a. Johns Manville Corporation: www.jm.com.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
 - a. Minimum Service Temperature: 0 degrees F.
 - b. Maximum Service Temperature: 150 degrees F.
 - c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.

- d. Thickness: 10 mil.
 - e. Connections: Brush on welding adhesive.
 - 3. Covering Adhesive Mastic: Compatible with insulation.
 - a. Manufacturers:
- B. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.
 - 1. Thickness: 0.016 inch sheet.
 - 2. Finish: Smooth.
 - 3. Joining: Longitudinal slip joints and 2 inch laps.
 - 4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
 - 5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with North American Insulation Manufacturers Association (NAIMA) National Insulation Standards.
- C. Exposed Piping: Locate insulation and cover seams in least visible locations.
- D. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
- E. Glass fiber insulated pipes conveying fluids below ambient temperature:
 - 1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
 - 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- F. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
- G. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.
- H. Glass fiber insulated pipes conveying fluids above ambient temperature:
 - 1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
 - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
- I. Inserts and Shields:
 - 1. Application: Piping 1-1/2 inches diameter or larger.
 - 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
 - 3. Insert Location: Between support shield and piping and under the finish jacket.
 - 4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
 - 5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
- J. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 07 8400.
- K. Heat Traced Piping: Insulate fittings, joints, and valves with insulation of like material, thickness, and finish as adjoining pipe. Size large enough to enclose pipe and heat tracer. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

3.03 SCHEDULES

- A. Plumbing Systems:

SECTION 22 0719 PLUMBING PIPING INSULATION

1. Domestic Hot Water (Copper Piping, 105°F-140°F):
 - a. Glass Fiber Insulation:
 - 1) Pipe Size Range: <1 1/2 inch.
 - 2) Thickness: 1 inch.
2. Domestic Hot Water (Copper Piping, 105°F-140°F):
 - a. Glass Fiber Insulation:
 - 1) Pipe Size Range: 1 1/2 to 4 inch.
 - 2) Thickness: 1 1/2 inch.
3. Domestic Hot Water (Copper Piping, 141°F-200°F):
 - a. Glass Fiber Insulation:
 - 1) Pipe Size Range: <1 1/2 inch.
 - 2) Thickness: 1 1/2 inch.
4. Domestic Hot Water (Copper Piping, 141°F-200°F):
 - a. Glass Fiber Insulation:
 - 1) Pipe Size Range: 1 1/2 to 4 inch.
 - 2) Thickness: 2 inch.
5. Domestic Hot Water Supply (PEX Piping, 105°F-140°F):
 - a. Flexible Elastomeric Insulation:
 - 1) Pipe Size Range: <1 1/2 inch.
 - 2) Thickness: 1 inch.
6. Domestic Hot Water Supply (PEX Piping, 105°F-140°F):
 - a. Flexible Elastomeric Insulation:
 - 1) Pipe Size Range: 1 1/2 to 4 inch.
 - 2) Thickness: 1 1/2 inch.
7. Distilled Water Supply:
 - a. Pipe Size Range: All
 - b. Thickness: Not Insulated.
8. Reverse Osmosis Water Supply:
 - a. Pipe Size Range: All
 - b. Thickness: Not Insulated.
9. Domestic Cold Water (Copper Piping):
 - a. Glass Fiber Insulation:
 - 1) Pipe Size Range: <4 inch.
 - 2) Thickness: 1 inch.
10. Domestic Cold Water (PEX Piping):
 - a. Flexible Elastomeric Insulation:
 - 1) Pipe Size Range: <4 inch.
 - 2) Thickness: 1 inch.
11. Roof Drain Bodies:
 - a. Flexible Elastomeric Insulation:
 - 1) Thickness: 1 inch.
12. Roof Drainage Above Grade (Horizontal and Vertical Piping):
 - a. Glass Fiber Insulation:
 - 1) Pipe Size Range: All
 - 2) Thickness: 1 inch.
13. Overflow Roof Drainage Above Grade (Horizontal and Vertical Piping):
 - a. Pipe Size Range: All
 - b. Thickness: Not Insulated.
- B. Other Systems:
 1. High Pressure Water Humidifier Supply Piping:
 - a. Pipe Size Range: All
 - b. Thickness: Not Insulated.
 2. High Pressure Water Humidifier Drainage Piping:
 - a. Pipe Size Range: All
 - b. Thickness: Not Insulated.
 3. Steam Water Humidifier Supply Piping:
 - a. Glass Fiber Insulation:

SECTION 22 0719 PLUMBING PIPING INSULATION

- 1) Pipe Size Range: <4 inch.
 - 2) Thickness: 2 1/2 inch.
4. Steam Water Humidifier Drainage Piping:
 - a. Glass Fiber Insulation:
 - 1) Pipe Size Range: <4 inch.
 - 2) Thickness: 1 inch.

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Pipe, pipe fittings, valves, regulators, and connections for piping systems.
 - 1. Sanitary sewer.
 - 2. Domestic water.
 - 3. Natural gas piping.
 - 4. Flanges, unions, and couplings.
 - 5. Pipe hangers and supports.
 - 6. Manufactured sleeve-seal systems.
 - 7. Ball valves.
 - 8. Butterfly valves.
 - 9. Balancing valves.

1.02 RELATED REQUIREMENTS

- A. Section 22 0516 - Expansion Fittings and Loops for Plumbing Piping.
- B. Section 22 0548 - Vibration and Seismic Controls for Plumbing Piping and Equipment.
- C. Section 22 0553 - Identification for Plumbing Piping and Equipment.
- D. Section 22 0719 - Plumbing Piping Insulation.
- E. Section 31 2316 - Excavation.
- F. Section 33 0110.58 - Disinfection of Water Utility Piping Systems.

1.03 REFERENCE STANDARDS

- A. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2012.
- B. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.
- C. ASME B31.9 - Building Services Piping; 2014.
- D. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Qualifications; 2015.
- E. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings; 2015.
- F. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- G. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).
- H. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2014.
- I. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2013.
- J. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2010.
- K. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2002 (Reapproved 2010).
- L. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2014.
- M. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2012.
- N. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2014.
- O. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2011.
- P. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings; 1996 (Reapproved 2010).
- Q. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2015.
- R. AWWA C651 - Disinfecting Water Mains; 2005.

SECTION 22 1005 PLUMBING PIPING

- S. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications; 2009.
- T. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2011.
- U. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements; 2012.
- V. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements; 2012.
- W. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2013.
- X. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements; 2013.
- Y. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.
- Z. MSS SP-67 - Butterfly Valves; 2011.
- AA. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010.
- AB. NSF 61 - Drinking Water System Components - Health Effects; 2020.
- AC. NSF 372 - Drinking Water System Components - Lead Content; 2020.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- C. Shop Drawings: For non-penetrating rooftop supports, submit detailed layout developed for this project, with design calculations for loadings and spacings.
- D. Project Record Documents: Record actual locations of valves.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Valve Repacking Kits: One for each type and size of valve.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with applicable codes.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.
- C. Welding Materials and Procedures: Comply with ASME BPVC-IX and applicable state labor regulations.
- D. Welder Qualifications: Certified in accordance with ASME BPVC-IX.
- E. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.07 FIELD CONDITIONS

- A. Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.02 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. Cast Iron Pipe: ASTM A74 extra heavy weight.
 - 1. Fittings: Cast iron.
 - 2. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets or lead and oakum.
- B. Cast Iron Pipe: CISPI 301, hubless.
 - 1. Fittings: Cast iron.
 - 2. Joints: CISPI 310, neoprene gasket and stainless steel clamp and shield assemblies.
- C. PVC Pipe: ASTM D2665 or ASTM D3034.
 - 1. Fittings: PVC.
 - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.
 - 3. Foam core piping not allowed.

2.03 SANITARY SEWER PIPING, ABOVE GRADE

- A. Cast Iron Pipe: ASTM A74, service weight.
 - 1. Fittings: Cast iron.
 - 2. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.
- B. Cast Iron Pipe: CISPI 301, hubless, service weight.
 - 1. Fittings: Cast iron.
 - 2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.
- C. PVC Pipe: ASTM D2729.
 - 1. Fittings: PVC.
 - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.
 - 3. Foam core piping not allowed.

2.04 DOMESTIC WATER PIPING, ABOVE GRADE

- A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), Drawn (H).
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
 - 2. Joints: ASTM B32, alloy Sn95 solder.

2.05 FLANGES, UNIONS, AND COUPLINGS

- A. Unions for Pipe Sizes 3 Inches and Under:
 - 1. Ferrous Pipe: Class 150 malleable iron threaded unions.
 - 2. Copper Tube and Pipe: Class 150 bronze unions with soldered joints.
- B. Flanges for Pipe Size Over 1 Inch:
 - 1. Ferrous Pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
 - 2. Copper Tube and Pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.
- C. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.06 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.
 - 1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
 - 2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
 - a. Cold and Hot Pipe Sizes 6 Inches and Over: Double hangers.
 - 3. Trapeze Hangers: Welded steel channel frames attached to structure.
 - 4. Vertical Pipe Support: Steel riser clamp.
 - 5. Floor Supports: Concrete pier or steel pedestal with floor flange; fixture attachment.
 - 6. Rooftop Supports for Low-Slope Roofs: Steel pedestals with bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified; and as follows:
 - a. Bases: High-density polypropylene.
 - b. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.

SECTION 22 1005 PLUMBING PIPING

- c. Steel Components: Stainless steel or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
 - d. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports; corrosion-resistant material.
 - e. Height: Provide minimum clearance of 6 inches under pipe to top of roofing.
 - f. Manufacturers:
 - 1) PHP Systems/Design: www.phpsd.com.
 - 2) Miro, Inc.: www.miroind.com.
 - 3) Substitutions: See Section 01 6000 - Product Requirements.
- B. Plumbing Piping - Drain, Waste, and Vent:
- 1. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
 - 2. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
 - 3. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
 - 4. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
 - 5. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 - 6. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- C. Plumbing Piping - Water:
- 1. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
 - 2. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
 - 3. Hangers for Hot Pipe Sizes 2 Inches to 4 Inches: Carbon steel, adjustable, clevis.
 - 4. Hangers for Hot Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron pipe roll, double hanger.
 - 5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
 - 6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
 - 7. Wall Support for Hot Pipe Sizes 6 Inches and Over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron pipe roll.
 - 8. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 - 9. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, locknut, nipple, floor flange, and concrete pier or steel support.
 - 10. Floor Support for Hot Pipe Sizes 6 Inches and Over: Adjustable cast iron pipe roll and stand, steel screws, and concrete pier or steel support.
 - 11. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- D. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
- 1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
 - 2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
 - 3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
 - 4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
 - 5. Concrete Adhesive Type Anchors: Complying with ICC-ES AC308.
 - 6. Other Types: As required.
 - 7. Manufacturers:
 - a. Powers Fasteners, Inc.: www.powers.com.
 - b. Substitutions: See Section 01 6000 - Product Requirements.

2.07 MANUFACTURED SLEEVE-SEAL SYSTEMS

- A. Manufacturers:
- 1. The Metraflex Company; MetraSeal: www.metraflex.com.
 - 2. Substitutions: See Section 01 6000 - Product Requirements.
- B. Modular/Mechanical Seal:
- 1. Synthetic rubber interlocking links continuously fill annular space between pipe and wall/casing opening.
 - 2. Provide watertight seal between pipe and wall/casing opening.

3. Elastomer element size and material in accordance with manufacturer's recommendations.
4. Glass reinforced plastic pressure end plates.

2.08 BALL VALVES

- A. Manufacturers:
 1. Grinnell Products, a Tyco Business: www.grinnell.com.
 2. Apollo Valves: www.apollovalves.com.
 3. Watts, Inc.: www.watts.com.
 4. Crane Energy: www.craneenergy.com.
 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Construction, 4 Inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze or ductile iron body, 304 stainless steel or chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, solder, threaded, or grooved ends with union.

2.09 BUTTERFLY VALVES

- A. Manufacturers:
 1. Crane Company: www.cranecpe.com.
 2. Grinnell Products; B302: www.grinnell.com.
 3. Apollo Valves: www.apollovalves.com.
 4. Watts, Inc.: www.watts.com.
 5. Crane Energy: www.craneenergy.com.
 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Construction 1-1/2 Inches and Larger: MSS SP-67, 200 psi CWP, cast or ductile iron body, nickel-plated ductile iron disc, resilient replaceable EPDM seat, wafer ends, extended neck, 10 position lever handle.
- C. Provide gear operators for valves 8 inches and larger, and chain-wheel operators for valves mounted over 8 feet above floor.

2.10 BALANCING VALVES

- A. Construction: Class 125, brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet, blowdown/backflush drain.
- B. Calibration: Control flow within five percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 3.5 psi.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. See Section 22 0516.
- G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.

SECTION 22 1005 PLUMBING PIPING

- H. Provide access where valves and fittings are not exposed.
- I. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc-rich primer to welding.
- J. Provide support for utility meters in accordance with requirements of utility companies.
- K. Excavate in accordance with Section 31 2316.
- L. Install bell and spigot pipe with bell end upstream.
- M. Install valves with stems upright or horizontal, not inverted. See Section 22 0523.
- N. Install water piping to ASME B31.9.
- O. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.
- P. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.
- Q. Sleeve pipes passing through partitions, walls, and floors.
- R. Inserts:
 - 1. Provide inserts for placement in concrete formwork.
 - 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
 - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
 - 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.
- S. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.9.
 - 2. Support horizontal piping as indicated.
 - 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 - 4. Place hangers within 12 inches of each horizontal elbow.
 - 5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 - 6. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
 - 7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
 - 8. Provide copper plated hangers and supports for copper piping.
 - 9. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
 - 10. Provide hangers adjacent to motor-driven equipment with vibration isolation; see Section 22 0548.
 - 11. Support cast iron drainage piping at every joint.
- T. Manufactured Sleeve-Seal Systems:
 - 1. Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.
 - 2. Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.
 - 3. Locate piping in center of sleeve or penetration.
 - 4. Install field assembled sleeve-seal system components in annular space between sleeve and piping.
 - 5. Tighten bolting for a watertight seal.
 - 6. Install in accordance with manufacturer's recommendations.

3.04 APPLICATION

- A. Install unions downstream of valves and at equipment or apparatus connections.

- B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.

3.05 TOLERANCES

- A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/4 inch per foot slope.
- B. Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points.

3.06 TESTS

- A. General: Test system either in its entirety or in sections. Submit testing plan to Engineer and AHJ 10 working days prior to test date.
- B. Potable Water System: Test after installation of piping and domestic water heaters, but before piping is concealed, before covering is applied, and before plumbing fixtures are connected. Fill systems with water and maintain hydrostatic pressure of 1-1/2 times the working pressure for 1 hour. No decrease in pressure is allowed. Provide a pressure gage with a shutoff and bleeder valve at the highest point of the piping being tested. Pressure gauge shall have 1 psig increments. Water used for tests shall be obtained from a potable source of supply.
- C. All Other Piping Tests: Test new installed piping under 1-1/2 times actual operating conditions and prove tight for 15 minutes.
- D. The test pressure shall hold for the minimum time duration required by the applicable plumbing code or authority having jurisdiction.

3.07 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Disinfect water distribution system in accordance with Section 33 0110.58.
- B. Prior to starting work, verify system is complete, flushed, and clean.
- C. Ensure acidity (pH) of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
- D. Inject disinfectant, free chlorine in liquid, powder, tablet, or gas form throughout system to obtain 50 to 80 mg/L residual.
- E. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- F. Maintain disinfectant in system for 24 hours.
- G. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- H. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
- I. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.08 SERVICE CONNECTIONS

- A. Provide new sanitary sewer services. Before commencing work, check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.
- B. Provide new water service complete with approved reduced pressure backflow preventer and water meter with by-pass valves, pressure reducing valve, and sand strainer.
 - 1. Provide sleeve in wall for service main and support at wall with reinforced concrete bridge. Calk enlarged sleeve and make watertight with pliable material. Anchor service main inside to concrete wall.
 - 2. Provide 18 gauge, 0.0478-inch galvanized sheet metal sleeve around service main to 6 inch above floor and 6 feet minimum below grade. Size for minimum of 2 inches of loose batt insulation stuffing.

3.09 SCHEDULES

- A. Pipe Hanger Spacing:
 - 1. Metal Piping:
 - a. Pipe Size: 1/2 inches to 1-1/4 inches:
 - 1) Maximum Hanger Spacing: 6.5 ft.
 - 2) Hanger Rod Diameter: 3/8 inches.

SECTION 22 1005 PLUMBING PIPING

- b. Pipe Size: 1-1/2 inches to 2 inches:
 - 1) Maximum Hanger Spacing: 10 ft.
 - 2) Hanger Rod Diameter: 3/8 inch.
 - c. Pipe Size: 2-1/2 inches to 3 inches:
 - 1) Maximum Hanger Spacing: 10 ft.
 - 2) Hanger Rod Diameter: 1/2 inch.
 - d. Pipe Size: 4 inches to 6 inches:
 - 1) Maximum Hanger Spacing: 10 ft.
 - 2) Hanger Rod Diameter: 5/8 inch.
2. Plastic Piping:
- a. All Sizes:
 - 1) Maximum Hanger Spacing: 6 ft.
 - 2) Hanger Rod Diameter: 3/8 inch.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates.
- B. Tags.

1.02 RELATED REQUIREMENTS

- A. Section 09 9123 - Interior Painting: Identification painting.

1.03 REFERENCE STANDARDS

- A. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2013.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

- A. Ductwork: Nameplates.
- B. Small-sized Equipment: Tags.

2.02 MANUFACTURERS

- A. Brady Corporation: www.bradycorp.com.
- B. Champion America, Inc: www.Champion-America.com.
- C. Seton Identification Products: www.seton.com/aec.
- D. Substitutions: See Section 01 6000 - Product Requirements.

2.03 NAMEPLATES

- A. Manufacturers:
 - 1. Advanced Graphic Engraving, LLC: www.advancedgraphicengraving.com.
 - 2. Kolbi Pipe Marker Co.: www.kolbipipemarkers.com.
 - 3. Seton Identification Products, a Tricor Direct Company: www.seton.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: Laminated three-layer plastic with engraved letters.
 - 1. Letter Color: White.
 - 2. Letter Height: 1/4 inch.
 - 3. Background Color: Black.
 - 4. Plastic: Comply with ASTM D709.

2.04 TAGS

- A. Manufacturers:
 - 1. Advanced Graphic Engraving: www.advancedgraphicengraving.com.
 - 2. Brady Corporation: www.bradycorp.com.
 - 3. Kolbi Pipe Marker Co.: www.kolbipipemarkers.com.
 - 4. Seton Identification Products, a Tricor Company: www.seton.com.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.
- C. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Prepare surfaces in accordance with Section 09 9123 for stencil painting.

3.02 INSTALLATION

- A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Apply stencil painting in accordance with Section 09 9123.
- D. Install plastic pipe markers in accordance with manufacturer's instructions.
- E. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- F. Use tags on piping 3/4 inch diameter and smaller.
 - 1. Identify service, flow direction, and pressure.
 - 2. Install in clear view and align with axis of piping.
 - 3. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.
- G. Identify valves in main and branch piping with tags.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Testing, adjustment, and balancing of air systems.
- B. Testing, adjustment, and balancing of hydronic and refrigerating systems.
- C. Measurement of final operating condition of HVAC systems.

1.02 REFERENCE STANDARDS

- A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition; 2016.
- B. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems; 2008.
- C. NEBB (TAB) - Procedural Standards for Testing Adjusting and Balancing of Environmental Systems; 2015, Eighth Edition.
- D. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing; 2002.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Installer Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.
- C. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
 - 1. Revise TAB plan to reflect actual procedures and submit as part of final report.
 - 2. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect and for inclusion in operating and maintenance manuals.
 - 3. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
 - 4. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
 - 5. Units of Measure: Report data in I-P (inch-pound) units only.

1.04 QUALITY ASSURANCE

- A. To avoid conflicts, the Testing and Balancing subcontractor is not to be the controls subcontractor engaged in this project.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Perform total system balance in accordance with one of the following:
 - 1. AABC (NSTSB), AABC National Standards for Total System Balance.
 - 2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
 - 3. SMACNA (TAB).
- B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.
- C. TAB Agency Qualifications:
 - 1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
- D. Pre-Qualified TAB Agencies:
 - 1. Synergy - Engineers.
 - 2. Great Lakes Test and Balance.
 - 3. Mechanical Testing Service..
 - 4. Third Coast Test and Balance.
 - 5. Control Solutions Inc.
 - 6. Substitutions: See Section 01 6000 - Product Requirements.

3.02 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
- B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.
- C. Promptly report abnormal conditions in mechanical systems or conditions that prevent system balance.
- D. If, for design reasons, system cannot be properly balanced, report as soon as observed.
- E. Beginning of work means acceptance of existing conditions.

3.03 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.
- B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
- C. Measure air quantities at air inlets and outlets.
- D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
- E. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.
- F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.
- G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.
- H. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
- I. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.

3.04 SCOPE

- A. Test, adjust, and balance the following:
 - 1. Air Handling Units.
 - 2. Fans.
 - 3. Air Inlets and Outlets.

3.05 MINIMUM DATA TO BE REPORTED

- A. Electric Motors:
 - 1. Manufacturer.
 - 2. Model/Frame.
 - 3. HP/BHP.
 - 4. Phase, voltage, amperage; nameplate, actual, no load.
 - 5. RPM.
- B. Return Air/Outside Air:
 - 1. Design air flow.
 - 2. Actual air flow.
 - 3. Design return air flow.
 - 4. Actual return air flow.
 - 5. Design outside air flow.
 - 6. Actual outside air flow.
- C. Exhaust Fans:
 - 1. Location.
 - 2. Manufacturer.
 - 3. Model number.

SECTION 23 0593 TESTING, ADJUSTING, AND BALANCING FOR HVAC

4. Serial number.
 5. Air flow, specified and actual.
 6. Total static pressure (total external), specified and actual.
 7. Inlet pressure.
 8. Discharge pressure.
 9. Number of Belts/Make/Size.
 10. Fan RPM.
- D. Air Distribution Tests:
1. Air terminal number.
 2. Room number/location.
 3. Terminal type.
 4. Terminal size.
 5. Design velocity.
 6. Design air flow.
 7. Test (final) velocity.
 8. Test (final) air flow.
 9. Percent of design air flow.

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Duct insulation.
- B. Duct liner.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 23 0553 - Identification for HVAC Piping and Equipment.
- C. Section 23 3100 - HVAC Ducts and Casings: Glass fiber ducts.

1.03 REFERENCE STANDARDS

- A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.
- B. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013.
- C. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014.
- D. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material); 2012.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- F. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- G. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.
- H. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Rev. 2009).
- I. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than three years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section and approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.
- B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.07 FIELD CONDITIONS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
- B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS**2.01 REGULATORY REQUIREMENTS**

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER, FLEXIBLE

- A. Manufacturer:
 - 1. CertainTeed Corporation: www.certainteed.com.
 - 2. Johns Manville: www.jm.com.
 - 3. Knauf Insulation: www.knaufinsulation.com.
 - 4. Owens Corning Corporation: www.ocbuildingspec.com.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Insulation: ASTM C553; flexible, noncombustible blanket.
 - 1. K value: 0.36 at 75 degrees F, when tested in accordance with ASTM C518.
 - 2. Maximum Service Temperature: 1200 degrees F.
 - 3. Maximum Water Vapor Absorption: 5.0 percent by weight.
- C. Vapor Barrier Jacket:
 - 1. Kraft paper with glass fiber yarn and bonded to aluminized film.
 - 2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
 - 3. Secure with pressure sensitive tape.
- D. Vapor Barrier Tape:
 - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

2.03 GLASS FIBER, RIGID

- A. Manufacturer:
 - 1. CertainTeed Corporation: www.certainteed.com.
 - 2. Johns Manville: www.jm.com.
 - 3. Knauf Insulation: www.knaufinsulation.com.
 - 4. Owens Corning Corporation: www.ocbuildingspec.com.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Insulation: ASTM C612; rigid, noncombustible blanket.
 - 1. K Value: 0.24 at 75 degrees F, when tested in accordance with ASTM C518.
 - 2. Maximum Service Temperature: 450 degrees F.
 - 3. Maximum Water Vapor Absorption: 5.0 percent.
 - 4. Maximum Density: 8.0 lb/cu ft.
 - 5. Minimum Density: 3.0 lb/cu ft.
- C. Vapor Barrier Jacket:
 - 1. Kraft paper with glass fiber yarn and bonded to aluminized film.
 - 2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
 - 3. Secure with pressure sensitive tape.
- D. Vapor Barrier Tape:
 - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.
- E. Indoor Vapor Barrier Finish:
 - 1. Cloth: Untreated; 9 oz/sq yd weight, glass fabric.
 - 2. Vinyl emulsion type acrylic, compatible with insulation, black color.

2.04 DUCT LINER

- A. Manufacturers:
 - 1. Johns Manville: www.jm.com.
 - 2. Knauf Insulation: www.knaufinsulation.com.
 - 3. Owens Corning Corporation: www.ocbuildingspec.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Glass Fiber Insulation: Non-corrosive, incombustible glass fiber complying with ASTM C1071; flexible blanket, rigid board, and preformed round liner board; impregnated surface and edges coated with poly vinyl acetate polymer, acrylic polymer, or black composite.
 - 1. Fungal Resistance: No growth when tested according to ASTM G21.

SECTION 23 0713 DUCT INSULATION

2. Apparent Thermal Conductivity: Maximum of 0.31 at 75 degrees F.
3. Service Temperature: Up to 250 degrees F.
4. Rated Velocity on Coated Air Side for Air Erosion: 5,000 fpm, minimum.
5. Minimum Noise Reduction Coefficients:
 - a. 1/2 inch Thickness: 0.30.
 - b. 1 inch Thickness: 0.45.
 - c. 1-1/2 inches Thickness: 0.60.
 - d. 2 inch Thickness: 0.70.

C. Liner Fasteners: Galvanized steel, self-adhesive pad with integral head.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Test ductwork for design pressure prior to applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. Insulated Ducts Conveying Air Below Ambient Temperature:
 1. Provide insulation with vapor barrier jackets.
 2. Finish with tape and vapor barrier jacket.
 3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
 4. Insulate entire system, including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.
- D. Insulated Ducts Conveying Air Above Ambient Temperature:
 1. Provide with or without standard vapor barrier jacket.
 2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.
 3. Ducts Exposed in Mechanical Equipment Rooms or Finished Spaces (below 10 feet above finished floor): Finish with canvas jacket sized for finish painting.
 4. Exterior Applications: Provide insulation with vapor barrier jacket. Cover with with calked aluminum jacket with seams located on bottom side of horizontal duct section.
 5. External Duct Insulation Application:
 - a. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
 - b. Secure insulation without vapor barrier with staples, tape, or wires.
 - c. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
 - d. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
 - e. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.
 6. Duct and Plenum Liner Application:
 - a. Adhere insulation with adhesive for 100 percent coverage.
 - b. Secure insulation with mechanical liner fasteners. Refer to SMACNA (DCS) for spacing.
 - c. Seal and smooth joints. Seal and coat transverse joints.
 - d. Seal liner surface penetrations with adhesive.
 - e. Duct dimensions indicated are net inside dimensions required for air-flow. Increase duct size to allow for insulation thickness.
 - f. Ductwork with liner not to be insulated unless indicated otherwise.

3.03 SCHEDULES

- A. Ductwork not insulated:
 1. Internally insulated ductwork
 2. Relief air ducts
 3. Exhaust air ducts and plenums
- B. Ductwork exposed in conditioned spaces:

SECTION 23 0713 DUCT INSULATION

1. Supply and return: Not insulated
- C. Concealed Ductwork:
 1. Supply: Flexible Glass Fiber, 1 1/2 inch thick, faced with FSK.
 2. Return above ceilings at a roof level, unconditioned areas and in chases with external wall: Flexible Glass Fiber, 1 1/2 inch thick, faced with FSK.
 3. Return in other locations: not insulated
- D. Ductwork to be internally lined:
 1. Ductwork downstream of terminal units: Glass Fiber, 1" thick, 10 feet minimum
 2. Transfer ducts and boots: Glass Fiber, 1" thick

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Metal ductwork.

1.02 RELATED REQUIREMENTS**1.03 REFERENCE STANDARDS**

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- C. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- D. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- F. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements; 2012.
- G. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements; 2012.
- H. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2013.
- I. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements; 2013.
- J. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.
- K. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Rev. 2009).
- L. SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual; 2012, 2nd Edition.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience, and approved by manufacturer.
- B. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum five years of documented experience.

1.05 FIELD CONDITIONS

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

PART 2 PRODUCTS**2.01 DUCT ASSEMBLIES**

- A. Regulatory Requirements: Construct ductwork to comply with NFPA 90A standards.
- B. Ducts: Galvanized steel, unless otherwise indicated.
- C. Low Pressure Supply (Heating Systems): 1 inch w.g. pressure class, galvanized steel.
- D. Low Pressure Supply (System with Cooling Coils): 1 inch w.g. pressure class, galvanized steel.
- E. Medium and High Pressure Supply: 2 inch w.g. pressure class, galvanized steel.
- F. Return and Relief: 1 inch w.g. pressure class, galvanized steel.
- G. General Exhaust: 1 inch w.g. pressure class, galvanized steel, aluminum for high humidity areas.

2.02 MATERIALS

- A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.
- B. Aluminum for Ducts: ASTM B209 (ASTM B209M); aluminum sheet, alloy 3003-H14. Aluminum Connectors and Bar Stock: Alloy 6061-T651 or of equivalent strength.

- C. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
 - 1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
 - 2. VOC Content: Not more than 250 g/L, excluding water.
 - 3. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.
 - 4. For Use with Flexible Ducts: UL labeled.
 - 5. Manufacturers:
 - a. Carlisle HVAC Products: www.carlislehvac.com/#sle.
 - b. Design Polymerics: www.designpoly.com/#sle.
 - c. Ductmate Industries, Inc, a DMI Company: www.ductmate.com/#sle.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- D. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.
- E. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
 - 1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
 - 2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
 - 3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
 - 4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
 - 5. Concrete Adhesive Type Anchors: Complying with ICC-ES AC308.
 - 6. Other Types: As required.

2.03 DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA (DCS) and as indicated.
- B. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- C. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide air foil turning vanes of perforated metal with glass fiber insulation.
- D. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- E. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).

2.04 MANUFACTURED DUCTWORK AND FITTINGS

- A. Flat Oval Ducts: Machine made from round spiral lockseam duct.
 - 1. Manufacture in accordance with SMACNA (DCS).
 - 2. Fittings: Manufacture at least two gauges heavier metal than duct.
 - 3. Provide duct material, gauges, reinforcing, and sealing for operating pressures indicated.
 - 4. Manufacturers:
 - a. EHG, a DMI Company: www.ehgduct.com/#sle.
 - b. Linx Industries, Inc a DMI Company: www.li-hvac.com/#sle.
 - c. Eastern Sheet Metal: www.easternsheetmetal.com
 - d. Universal Spiral Air: <http://www.usaduct.com>.
 - e. Advanced Sheet Metal: www.advancedsheetmetal.us/home.html.
 - f. Allied Mechanical Services: www.alliedmechanical.com.
 - g. Substitutions: See Section 01 6000 - Product Requirements.
- B. Spiral Ducts: Round spiral lockseam duct with galvanized steel outer wall.
 - 1. Manufacture in accordance with SMACNA (DCS).
 - 2. Manufacturers:
 - a. EHG, a DMI Company: www.ehgduct.com/#sle.
 - b. GSI, a DMI Company: www.greenseamind.com/#sle.
 - c. Linx Industries, Inc, a DMI Company: www.li-hvac.com/#sle.
 - d. MKT Metal Manufacturing: www.mktduct.com/#sle.
- C. Round Ducts: Round lockseam duct with galvanized steel outer wall.
 - 1. Manufacture in accordance with SMACNA (DCS).

2. Manufacturers:
 - a. Linx Industries, Inc, a DMI Company: www.li-hvac.com/#sle.
 - b. MKT Metal Manufacturing: www.mktduct.com/#sle.
 - c. Advanced Sheet Metal: www.advancedsheetmetal.us/home.html.
 - d. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION**3.01 INSTALLATION**

- A. Install, support, and seal ducts in accordance with SMACNA (DCS).
- B. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- C. Flexible Ducts: Connect to metal ducts with adhesive plus sheet metal screws.
- D. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.
- E. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- F. Connect terminal units to supply ducts directly or with one foot maximum length of flexible duct. Do not use flexible duct to change direction.
- G. Connect diffusers or light troffer boots to low pressure ducts directly or with 5 feet maximum length of flexible duct held in place with strap or clamp.

3.02 SEALING, INSPECTING AND LEAKAGE TESTING

- A. Seal, inspect and test prior to insulating or concealing ductwork. Leak test in accordance with SMACNA (LEAK).
- B. Seal ductwork and plenums with pressure class ratings to SMACNA (LEAK) Seal Class A.
- C. Perform measured leak testing on the following ductwork:
 1. Duct that is designed to operate at static pressures in excess of 3 inch w.g. and outdoor ductwork.
 - a. Test representative sections totaling no less than 25% of the total installed duct area for the designated pressure class.
 2. Maximum permissible leakage rate:
 - a. Round/Oval Metal: SMACNA (LEAK) Leakage Class 3.
 - b. Rectangular Metal: SMACNA (LEAK) Leakage Class 4.

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Volume control dampers.

1.02 RELATED REQUIREMENTS

- A. Section 23 3100 - HVAC Ducts and Casings.

1.03 REFERENCE STANDARDS

- A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.
- B. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Rev. 2009).
- C. ANSI/AMCA 500-D - Laboratory methods of testing dampers for rating.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide for shop fabricated assemblies including volume control dampers. Include electrical characteristics and connection requirements.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect dampers from damage to operating linkages and blades.

PART 2 PRODUCTS**2.01 VOLUME CONTROL DAMPERS**

- A. Manufacturers:
 - 1. Louvers & Dampers, Inc: www.louvers-dampers.com.
 - 2. Nailor Industries Inc: www.nailor.com.
 - 3. Ruskin Company: www.ruskin.com.
 - 4. Greenheck: www.greenheck.com
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Fabricate in accordance with SMACNA (DCS) and as indicated.
- C. Single Blade Dampers:
 - 1. Fabricate for duct sizes up to 6 by 30 inch.
 - 2. Blade: 24 gauge, 0.0239 inch, minimum.
- D. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 by 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
 - 1. Blade: 18 gauge, 0.0478 inch, minimum.
- E. End Bearings: Except in round ducts 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon, thermoplastic elastomer, or sintered bronze bearings.
 - 1. Manufacturers:
 - a. Carlisle HVAC Products; Dynair End Bearing Leak Resistant Sets: www.carlislehvac.com.
 - b. Elgen Manufacturing Company, Inc; Snap-in Bushing: www.elgenmfg.com.
- F. Quadrants:
 - 1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
 - 2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.
 - 3. Where rod lengths exceed 30 inches provide regulator at both ends.
 - 4. Manufacturers:

SECTION 23 3300 AIR DUCT ACCESSORIES

- a. Carlisle HVAC Products; Dynair Double Shear Rattle Free Quadrants 1/2 inch:
www.carlislehvac.com.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 23 3100 for duct construction and pressure class.
- B. Demonstrate re-setting of fire dampers to authorities having jurisdiction and Owner's representative.
- C. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.
- D. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.
- E. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.
- F. Cut or drill temporary test holes in duct as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist on metal caps.
- G. Permanent test holes shall be factory fabricated, airtight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Cabinet exhaust fans.

1.02 RELATED REQUIREMENTS**1.03 REFERENCE STANDARDS**

- A. AMCA (DIR) - [Directory of] Products Licensed Under AMCA International Certified Ratings Program; <http://www.amca.org/certified/search/company.aspx>.
- B. AMCA 99 - Standards Handbook; 2010.
- C. AMCA 204 - Balance Quality and Vibration Levels for Fans; 2005.
- D. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating; 2007.
- E. AMCA 300 - Reverberant Room Method for Sound Testing of Fans; 2014.
- F. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data; 2014.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.
- B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels at rated capacity, and electrical characteristics and connection requirements.
- C. Manufacturer's Instructions: Indicate installation instructions.
- D. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.07 FIELD CONDITIONS

- A. Permanent ventilators may not be used for ventilation during construction.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Carnes, a division of Carnes Company Inc: www.carnes.com.
- B. Greenheck: www.greenheck.com.
- C. Loren Cook Company: www.lorencook.com.
- D. PennBarry: www.pennbarry.com.
- E. Twin City Fan & Blower: www.tcf.com.
- F. Acme Engineering and Manufacturing Corporation: www.acmefan.com.
- G. Substitutions: See Section 01 6000 - Product Requirements.

2.02 POWER VENTILATORS - GENERAL

- A. Static and Dynamically Balanced: AMCA 204 - Balance Quality and Vibration Levels for Fans.
- B. Performance Ratings: Determined in accordance with AMCA 210 and bearing the AMCA Certified Rating Seal.
- C. Sound Ratings: AMCA 301, tested to AMCA 300 and bearing AMCA Certified Sound Rating Seal.
- D. Fabrication: Comply with AMCA 99.

SECTION 23 3423 HVAC POWER VENTILATORS

- E. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

2.03 CABINET EXHAUST FANS

- A. Manufacturers:
- B. Centrifugal Fan Unit: V-belt or direct driven with galvanized steel housing lined with acoustic insulation, resilient mounted motor, gravity backdraft damper in discharge.
- C. Grille: Molded white plastic.
- D. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheaves selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install flexible electrical connections to allow hinged curbs to fully open for maintenance access.
- C. Provide sheaves required for final air balance.

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Diffusers
 - 1. Perforated ceiling diffusers.

1.02 RELATED REQUIREMENTS**1.03 REFERENCE STANDARDS**

- A. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Inlets; 2006 (R2011).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

1.05 QUALITY ASSURANCE

- A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Krueger-HVAC: www.krueger-hvac.com.
- B. Price Industries: www.price-hvac.com.
- C. Titus: www.titus-hvac.com.
- D. Tuttle and Bailey: www.tuttleandbailey.com.
- E. Nailor: www.nailor.com.
- F. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PERFORATED FACE CEILING DIFFUSERS

- A. Type: Perforated face with fully adjustable pattern and removable face.
- B. Frame: Lay-in type.
- C. Fabrication: Steel with steel frame and baked enamel finish.
- D. Color: white.

PART 3 EXECUTION**3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Check location of outlets and inlets and make necessary adjustments in position to comply with architectural features, symmetry, and lighting arrangement.
- C. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.
- D. Diffusers and grilles mounted on side of duct shall be connected with a standoff so that it does not reduce free area of duct.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical demolition.

1.02 RELATED REQUIREMENTS

- A. Section 01 7000 - Execution and Closeout Requirements: Additional requirements for alterations work.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Materials and equipment for patching and extending work: As specified in individual sections.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify field measurements and circuiting arrangements are as indicated.
- B. Verify that abandoned wiring and equipment serve only abandoned facilities.
- C. Demolition drawings are based on casual field observation and existing record documents.
- D. Report discrepancies to Owner before disturbing existing installation.
- E. Report discrepancies to Architect/Engineer before disturbing existing installation.
- F. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

- A. Disconnect electrical systems in walls, floors, and ceilings to be removed.
- B. Coordinate utility service outages with utility company and owner.
- C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.
- D. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.
 - 1. Obtain permission from Owner at minimum (2) weeks prior and provide a reminder 24 hours before partially or completely disabling system.
 - 2. Make temporary connections to maintain service in areas adjacent to work area.
- E. Existing Fire Alarm System: Maintain existing system in service until new system is accepted. Disable system only to make switchovers and connections. Minimize outage duration.
 - 1. Notify Owner minimum (1) weeks prior and provide a reminder 24 hours before partially or completely disabling system.
 - 2. Notify local fire service if applicable.
- F. Existing Telephone System: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.
 - 1. Notify Owner at minimum (1) weeks prior and provide a reminder least 24 hours before partially or completely disabling system.
 - 2. Notify telephone utility company at least 24 hours before partially or completely disabling system.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Remove, relocate, and extend existing installations to accommodate new construction.
- B. Remove abandoned wiring to source of supply.
- C. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
- D. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.

SECTION 26 0505 SELECTIVE DEMOLITION FOR ELECTRICAL

- E. Disconnect and remove abandoned panelboards and distribution equipment.
- F. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
- G. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.
- H. Repair adjacent construction and finishes damaged during demolition and extension work.
- I. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.
- J. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.
- K. Remove exposed abandoned grounding and bonding components, fasteners and supports, and electrical identification components, including abandoned components above accessible ceiling finishes. Cut embedded support elements flush with walls and floors.
- L. Protect and retain power to existing active equipment remaining.
- M. Cap abandoned empty conduit at both ends.
- N. Remove existing cable tray from ceilings to be replaced unless in space with minimal demolition and cable tray is adequate size and routing for new system in new floor plan.

3.04 CLEANING AND REPAIR

- A. Clean and repair existing materials and equipment that remain or that are to be reused.
- B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.
- C. Luminaires: Remove existing luminaires for cleaning. Use mild detergent to clean all exterior and interior surfaces; rinse with clean water and wipe dry. Replace lamps, ballasts and broken electrical parts.

3.05 SALVAGE ITEMS

- A. Remove and protect items to be salvaged and turn over to Owner. In particular the light fixtures are to be carefully removed and turned over to the owner for spare inventory.
- B. Items of salvageable value may be removed as work progresses. Transport salvaged items from site as they are removed.

3.06 REUSABLE ELECTRICAL EQUIPMENT

- A. Carefully remove equipment, materials, or fixtures which are to be reused.
- B. Disconnect, remove, or relocate existing electrical material and equipment interfering with new installation.
- C. Relocate existing lighting fixtures as indicated on Drawings. Clean fixtures and re-lamp. Test fixture to see if it is in good working condition before installation at new location.

3.07 EXISTING PANELBOARDS

- A. Ring out circuits in existing panel affected by the Work. Where additional circuits are needed, reuse circuits available for reuse. Install new breakers.
- B. Tag unused circuits as spare.
- C. Where existing circuits are indicated to be reused, use sensing measuring devices to verify circuits feeding Project area or are not in use.
- D. Remove existing wire no longer in use from panel to equipment.
- E. Provide new type written updated directories where modified or rewired.

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Single conductor building wire.
- B. Underground feeder and branch-circuit cable.
- C. Service entrance cable.
- D. Metal-clad cable.
- E. Variable frequency motor controller cable.
- F. Wiring connectors.
- G. Electrical tape.
- H. Heat shrink tubing.
- I. Wire pulling lubricant.
- J. Cable ties.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 26 0505 - Selective Demolition for Electrical: Disconnection, removal, and/or extension of existing electrical conductors and cables.
- C. Section 26 0526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.
- D. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- E. Section 28 4600 - Fire Detection and Alarm: Fire alarm system conductors and cables.

1.03 REFERENCE STANDARDS

- A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013.
- B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011.
- C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010 (Reapproved 2014).
- D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2014).
- E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2010.
- F. ASTM D4388 - Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes; 2013.
- G. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- H. NECA 120 - Standard for Installing Armored Cable (AC) and Metal-Clad Cable (MC); 2012.
- I. NECA 121 - Standard for Installing Nonmetallic-Sheathed Cable (Type NM-B) and Underground Feeder and Branch-Circuit Cable (Type UF); 2007.
- J. NEMA WC 70 - Nonshielded Power Cable 2000 V or Less for the Distribution of Electrical Energy; 2009.
- K. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.
- L. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- M. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.
- N. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.
- O. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.
- P. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.

- Q. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.
- R. UL 493 - Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables; Current Edition, Including All Revisions.
- S. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.
- T. UL 1277 - Electrical Power and Control Tray Cables with Optional Optical-Fiber Members; Current Edition, Including All Revisions.
- U. UL 1569 - Metal-Clad Cables; Current Edition, Including All Revisions.

1.04 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.06 FIELD CONDITIONS

- A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

PART 2 PRODUCTS**2.01 CONDUCTOR AND CABLE APPLICATIONS**

- A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
- B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.
- C. Nonmetallic-sheathed cable is not permitted.
- D. Metal-clad cable is permitted only as follows:
 - 1. Where not otherwise restricted, may be used:
 - a. Where concealed above accessible ceilings for final connections from junction boxes to luminaires.
 - 1) Maximum Length: 6 feet.
 - b. Where concealed in hollow stud walls, above accessible ceilings, and under raised floors for branch circuits up to 20 A.
 - 1) Exception: Provide single conductor building wire in raceway for circuit homerun from first outlet to panelboard.
 - 2. In addition to other applicable restrictions, may not be used:
 - a. Unless approved by Owner.
 - b. Where not approved for use by the authority having jurisdiction.
 - c. Where exposed to damage.
 - d. For damp, wet, or corrosive locations, unless provided with a PVC jacket listed as suitable for those locations.
- E. Variable frequency motor controller cable for use between variable frequency motor controllers and motors.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

- D. Comply with NEMA WC 70.
- E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- G. Conductor Material:
 - 1. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
 - 2. Tinned Copper Conductors: Comply with ASTM B33.
- H. Minimum Conductor Size:
 - 1. Branch Circuits: 12 AWG.
 - a. Exceptions:
 - 1) 20 A, 120 V circuits longer than 75 feet: 10 AWG, for voltage drop.
 - 2) 20 A, 120 V circuits longer than 150 feet: 8 AWG, for voltage drop.
 - 3) 20 A, 277 V circuits longer than 150 feet: 10 AWG, for voltage drop.
- I. Conductor Color Coding:
 - 1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
 - 2. Color Coding Method: Integrally colored insulation.
 - a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape but it would be preferred to have wiring with solid insulation color throughout the wiring.
 - 3. Color Code:
 - a. 480Y/277 V, 3 Phase, 4 Wire System:
 - 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.
 - 4) Neutral/Grounded: Gray.
 - b. 208Y/120 V, 3 Phase, 4 Wire System:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - 4) Neutral/Grounded: White.
 - c. Equipment Ground, All Systems: Green.
 - d. Travelers for 3-Way and 4-Way Switching: Pink.
 - e. For modifications or additions to existing wiring systems, comply with existing color code when existing code complies with NFPA 70 and is approved by the authority having jurisdiction.

2.03 SINGLE CONDUCTOR BUILDING WIRE

- A. Manufacturers:
 - 1. Copper Building Wire:
 - a. Cerro Wire LLC: www.cerrowire.com/#sle.
 - b. Encore Wire Corporation: www.encorewire.com/#sle.
 - c. General Cable Technologies Corporation; _____: www.generalcable.com/#sle.
 - d. Southwire Company: www.southwire.com/#sle.
 - 2. Aluminum Building Wire (only where specifically indicated or permitted for substitution):
 - a. Encore Wire Corporation: www.encorewire.com/#sle.
 - b. Southwire Company: www.southwire.com/#sle.
 - c. Stabiloy, a brand of General Cable Technologies Corporation: www.stabiloy.com/#sle.
- B. Description: Single conductor insulated wire.
- C. Conductor Stranding:
 - 1. Feeders and Branch Circuits:
 - a. Size 10 AWG and Smaller: Solid.
 - b. Size 8 AWG and Larger: Stranded.
 - 2. Control Circuits: Stranded.

- D. Insulation Voltage Rating: 600 V.
- E. Insulation:
 - 1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.
 - a. Size 4 AWG and Larger: Type XHHW-2.
 - b. Installed Underground: Type XHHW-2.

2.04 UNDERGROUND FEEDER AND BRANCH-CIRCUIT CABLE

- A. Manufacturers:
 - 1. Cerro Wire LLC: www.cerrowire.com/#sle.
 - 2. Encore Wire Corporation: www.encorewire.com/#sle.
 - 3. Southwire Company: www.southwire.com/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: NFPA 70, Type UF multiple-conductor cable listed and labeled as complying with UL 493, Type UF-B.
- C. Provide equipment grounding conductor unless otherwise indicated.
- D. Conductor Stranding:
 - 1. Size 10 AWG and Smaller: Solid.
 - 2. Size 8 AWG and Larger: Stranded.
- E. Insulation Voltage Rating: 600 V.

2.05 SERVICE ENTRANCE CABLE

- A. Manufacturers:
 - 1. Copper Service Entrance Cable:
 - a. Cerro Wire LLC: www.cerrowire.com/#sle.
 - b. Encore Wire Corporation: www.encorewire.com/#sle.
 - c. Southwire Company: www.southwire.com/#sle.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- B. Conductor Stranding: Stranded.
- C. Insulation Voltage Rating: 600 V.

2.06 METAL-CLAD CABLE

- A. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.
- B. Conductor Stranding:
 - 1. Size 10 AWG and Smaller: Solid.
 - 2. Size 8 AWG and Larger: Stranded.
- C. Insulation Voltage Rating: 600 V.
- D. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.
- E. Provide dedicated neutral conductor for each phase conductor where indicated or required.
- F. Grounding: Full-size integral equipment grounding conductor.
 - 1. Provide additional isolated/insulated grounding conductor where indicated or required.
- G. Armor: Steel, interlocked tape.
- H. Provide PVC jacket applied over cable armor where indicated or required for environment of installed location.

2.07 VARIABLE FREQUENCY MOTOR CONTROLLER CABLE

- A. Manufacturers:
 - 1. General Cable Technologies Corporation: www.generalcable.com
 - 2. Belden Cable: www.belden.com
 - 3. Southwire Company: www.southwire.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: NFPA 70, Type TC-ER cable listed and labeled as complying with UL 1277.
- C. Conductor Stranding: Stranded.

- D. Insulation Voltage Rating: 600 V.
- E. Insulation: Flame retardant cross-linked polyethylene, Type XLPE.
- F. Grounding: Three symmetrically placed annealed bare copper conductors in direct contact with shield.
- G. Jacket: Lead-free, flame retardant, sunlight-resistant polyvinyl chloride PVC.
- H. Shielding: Overall 5 mil annealed bare copper tape shield with 50 percent overlap.

2.08 WIRING CONNECTORS

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.
- B. Wiring Connectors for Splices and Taps:
 - 1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
 - 2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.
- C. Wiring Connectors for Terminations:
 - 1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
 - 2. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
 - 3. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
 - 4. Stranded Conductors Size 10 AWG and Smaller: Use crimped terminals for connections to terminal screws.
- D. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.
- E. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
- F. Push-in Wire Connectors: Rated 600 V, 221 degrees F.
- G. Mechanical Connectors: Provide bolted type or set-screw type.
- H. Compression Connectors: Provide circumferential type or hex type crimp configuration.
- I. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.

2.09 ACCESSORIES

- A. Electrical Tape:
 - 1. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F.
 - 2. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.
 - 3. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil; suitable for continuous temperature environment up to 194 degrees F and short-term 266 degrees F overload service.
 - 4. Electrical Filler Tape: Rubber-based insulating moldable putty, minimum thickness of 125 mil; suitable for continuous temperature environment up to 176 degrees F.
 - 5. Varnished Cambric Electrical Tape: Cotton cambric fabric tape, with or without adhesive, oil-primed and coated with high-grade insulating varnish; minimum thickness of 7 mil; suitable for continuous temperature environment up to 221 degrees F.
 - 6. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil.

- B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.
- C. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.
- D. Cable Ties: Material and tensile strength rating suitable for application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that interior of building has been protected from weather.
- B. Verify that work likely to damage wire and cable has been completed.
- C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.
- D. Verify that field measurements are as indicated.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

- A. Circuiting Requirements:
 - 1. Unless dimensioned, circuit routing indicated is diagrammatic.
 - 2. When circuit destination is indicated without specific routing, determine exact routing required.
 - 3. Arrange circuiting to minimize splices.
 - 4. Include circuit lengths required to install connected devices within 10 ft of location indicated.
 - 5. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
 - 6. Maintain separation of wiring for emergency systems in accordance with NFPA 70.
 - 7. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are indicated as separate, combining them together in a single raceway is permitted, under the following conditions:
 - a. Provide no more than six current-carrying conductors in a single raceway. Dedicated neutral conductors are considered current-carrying conductors.
 - b. Increase size of conductors as required to account for ampacity derating.
 - c. Size raceways, boxes, etc. to accommodate conductors.
 - 8. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is permitted where not otherwise prohibited, except for the following:
 - a. Branch circuits fed from ground fault circuit interrupter (GFCI) circuit breakers.
 - b. Branch circuits fed from feed-through protection of GFI receptacles.
 - c. Branch circuits with dimming controls.
 - d. Branch circuits with isolated grounding conductor.
- B. Install products in accordance with manufacturer's instructions.
- C. Perform work in accordance with NECA 1 (general workmanship).
- D. Install underground feeder and branch-circuit cable (Type UF-B) in accordance with NECA 121.
- E. Install metal-clad cable (Type MC) in accordance with NECA 120.
- F. Installation in Raceway:
 - 1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
 - 2. Pull all conductors and cables together into raceway at same time.
 - 3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
 - 4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.

- G. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
- H. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
- I. Terminate cables using suitable fittings.
 - 1. Metal-Clad Cable (Type MC):
 - a. Use listed fittings.
 - b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.
- J. Install conductors with a minimum of 12 inches of slack at each outlet.
- K. Where conductors are installed in enclosures for future termination by others, provide a minimum of 5 feet of slack.
- L. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- M. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
- N. Make wiring connections using specified wiring connectors.
 - 1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
 - 2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
 - 3. Do not remove conductor strands to facilitate insertion into connector.
 - 4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
 - 5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 - 6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- O. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
 - 1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
 - a. For taped connections, first apply adequate amount of rubber splicing electrical tape or electrical filler tape, followed by outer covering of vinyl insulating electrical tape.
 - b. For taped connections likely to require re-entering, including motor leads, first apply varnished cambric electrical tape, followed by adequate amount of rubber splicing electrical tape, followed by outer covering of vinyl insulating electrical tape.
 - 2. Damp Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
 - a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.
 - b. For taped connections, follow same procedure as for dry locations but apply outer covering of moisture sealing electrical tape.
 - 3. Wet Locations: Use heat shrink tubing.
- P. Insulate ends of spare conductors using vinyl insulating electrical tape.
- Q. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.
- R. Identify conductors and cables in accordance with Section 26 0553.
- S. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.

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- T. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.
- D. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 26 0533.13 - Conduit for Electrical Systems: Additional support and attachment requirements for conduits.

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2013.
- D. MFMA-4 - Metal Framing Standards Publication; 2004.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
 - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
 - 4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 - 5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 03 3000.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, non-penetrating rooftop supports, and post-installed concrete and masonry anchors.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- D. Shop Drawings: Indicate system layout for cable tray with location and detail of trapeze hangers.
- E. Product Data:
 - 1. Hangers and Supports: Submit manufacturers catalog data including load capacity.
 - 2. Firestopping: Submit data on product characteristics, performance and limitation criteria.
- F. Firestopping Schedule: Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance rating of adjacent assembly.

- G. Engineering Judgements: For conditions not covered by UL or WH listed designs, submit judgements by licensed professional engineer suitable for presentation to authority having jurisdiction for acceptance as meeting code fire protection requirements.

1.06 QUALITY ASSURANCE

- A. Comply with NFPA 70.
B. Comply with applicable building code.

PART 2 PRODUCTS**2.01 SUPPORT AND ATTACHMENT COMPONENTS**

- A. General Requirements:
1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
 2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
 3. 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 with a minimum safety factor of _____. Include consideration for vibration, equipment operation, and shock loads where applicable.
 4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
 5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
 - a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
 2. Conduit Clamps: Bolted type unless otherwise indicated.
- C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.
- D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
1. Comply with MFMA-4.
- E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
- F. Anchors and Fasteners:
1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

2.02 MANUFACTURERS

- A. Thomas & Betts Corporation: www.tnb.com.
B. Threaded Rod Company: www.threadedrod.com.
C. Substitutions: See Section 01 6000 - Product Requirements.

2.03 MATERIALS

- A. Hangers, Supports, Anchors, and Fasteners - General: Corrosion-resistant materials of size and type adequate to carry the loads of equipment and conduit, including weight of wire in conduit.
- B. Supports: Fabricated of structural steel or formed steel members; galvanized.
- C. Anchors and Fasteners:
1. Do not use powder-actuated anchors.
 2. Concrete Structural Elements: Use precast inserts or expansion anchors.
 3. Steel Structural Elements: Use beam clamps or steel spring clips.
 4. Concrete Surfaces: Use self-drilling anchors or expansion anchors.

5. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts or hollow wall fasteners.
 6. Solid Masonry Walls: Use expansion anchors.
 7. Sheet Metal: Use sheet metal screws.
 8. Wood Elements: Use wood screws.
- D. Firestopping (Through-Penetration Protection System): Sealing or stuffing material or assembly placed in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat, and hot gases through fire rated construction.
1. SYSTEM DESCRIPTION
 - a. Firestopping Materials: UL 263 and UL 1479 to achieve fire ratings as noted on Drawings for adjacent construction, but not less than 1 hour fire rating.
 - b. Surface Burning: ASTM E84 and UL 723 with maximum flame spread / smoke developed rating of 25/450.
 - c. Firestop interruptions to fire rated assemblies, materials, and components.
 2. Mechanical Firestopping Sleeve
 - a. Manufacturers:
 - 1) Specified Technologies (EZ-Path)
 - 2) Substitutions: Section 01 60 00 - Product Requirements.
 - b. Product Description: Different types of products by multiple manufacturers are acceptable as required to meet specified system description and performance requirements; provide only one type for each similar application.
 3. FIRESTOPPING ACCESSORIES
 - a. Primer: Type recommended by firestopping manufacturer for specific substrate surfaces and suitable for required fire ratings.
 - b. Dam Material: Permanent:
 - 1) Plywood or particle board.
 - c. Installation Accessories: Provide clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.
 - d. General:
 - 1) Furnish UL listed products or products tested by independent testing laboratory.
 - 2) Select products with rating not less than rating of wall or floor being penetrated.
 - e. Non-Rated Surfaces:
 - 1) Stamped steel, chrome plated, hinged, split ring escutcheons or floor plates or ceiling plates for covering openings in occupied areas where conduit is exposed.
 - 2) For exterior wall openings below grade, furnish modular mechanical type seal consisting of interlocking synthetic rubber links shaped to continuously fill annular space between conduit and cored opening or water-stop type wall sleeve.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- G. Equipment Support and Attachment:
 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.

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3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- H. Secure fasteners according to manufacturer's recommended torque settings.
- I. Remove temporary supports.

3.02 FIRESTOPPING

- A. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping, ductwork, conduit and other items, requiring firestopping.
- B. Apply primer where recommended by manufacturer for type of firestopping material and substrate involved, and as required for compliance with required fire ratings.
- C. Apply firestopping material in sufficient thickness to achieve required fire and smoke rating, to uniform density and texture.
- D. Remove dam material after firestopping material has cured.
- E. Fire Rated Surface:
 1. Seal opening at floor, wall, and roof as follows:
 - a. Install sleeve through opening and extending beyond minimum of 2 inches on both sides of building element.
 - b. Size sleeve allowing minimum of 1 inch void between sleeve and building element.
 - c. Pack void with backing material.
 - d. Seal ends of sleeve with UL listed fire resistive silicone compound to meet fire rating of structure penetrated.
 2. Where cable tray and conduit penetrates fire rated surface, install firestopping product in accordance with manufacturer's instructions. Coordinate with Architectural drawings for fire rated walls.
- F. Non-Rated Surfaces:
 1. Seal opening through non-fire rated floor and roof opening as follows:
 - a. Install sleeve through opening and extending beyond minimum of 2 inches on both sides of building element.
 - b. Size sleeve allowing minimum of 1 inch void between sleeve and building element.
 - c. Install type of firestopping material recommended by manufacturer.
 2. Install escutcheons floor plates or ceiling plates where conduit, penetrates non-fire rated surfaces in occupied spaces. Occupied spaces include rooms with finished ceilings and where penetration occurs below finished ceiling.
 3. Exterior wall openings below grade: Assemble rubber links of mechanical seal to size of conduit and tighten in place, in accordance with manufacturer's instructions.
 4. Interior partitions: Seal pipe penetrations at telecommunication rooms and data rooms. Apply sealant to both sides of penetration to completely fill annular space between sleeve and conduit.

3.03 INSTALLATION - EQUIPMENT BASES AND SUPPORTS

- A. Provide housekeeping pads of concrete, minimum 4 inches thick and extending 6 inches beyond supported equipment. Refer to Section 03 30 00.
- B. Using templates furnished with equipment, install anchor bolts, and accessories for mounting and anchoring equipment.
- C. Construct supports of steel members. Brace and fasten with flanges bolted to structure.

3.04 INSTALLATION - SLEEVES

- A. Exterior watertight entries: Seal with adjustable interlocking rubber links.
- B. Conduit penetrations not required to be watertight: Sleeve and fill with silicon foam.
- C. Set sleeves in position in forms. Provide reinforcing around sleeves.
- D. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- E. Extend sleeves through floors minimum of 2 inches above finished floor level. Caulk sleeves.

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- F. Where conduit or raceway penetrates floor, ceiling, or wall, close off space between conduit or raceway and adjacent work with stuffing fire stopping insulation and caulk airtight. Provide close fitting metal collar or escutcheon covers at both sides of penetration. Also furnish 10% extra sleeves for future.
- G. Install stainless steel escutcheons at finished surfaces.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Galvanized steel rigid metal conduit (RMC).
- B. Intermediate metal conduit (IMC).
- C. Flexible metal conduit (FMC).
- D. Liquidtight flexible metal conduit (LFMC).
- E. Electrical metallic tubing (EMT).
- F. Conduit fittings.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- C. Section 26 0529 - Hangers and Supports for Electrical Systems.
- D. Section 26 0533.16 - Boxes for Electrical Systems.
- E. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2005.
- B. ANSI C80.3 - American National Standard for Steel Electrical Metallic Tubing (EMT); 2005.
- C. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit (EIMC); 2005.
- D. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- E. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2013.
- F. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2012.
- G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.
- I. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.
- J. UL 360 - Liquid-Tight Flexible Steel Conduit; Current Edition, Including All Revisions.
- K. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.
- L. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.
- M. UL 1242 - Electrical Intermediate Metal Conduit-Steel; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittals procedures.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.

- B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.

2.02 CONDUIT REQUIREMENTS

- A. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- B. Fittings:
 - 1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.
 - 3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.04 INTERMEDIATE METAL CONDUIT (IMC)

- A. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.
- B. Fittings:
 - 1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.
 - 3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.05 FLEXIBLE METAL CONDUIT (FMC)

- A. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.
- B. Fittings:
 - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.

2.06 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

- A. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.
- B. Fittings:
 - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.

2.07 ELECTRICAL METALLIC TUBING (EMT)

- A. Manufacturers:
- B. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- C. Fittings:
 - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.
 - 3. Connectors and Couplings: Use compression (gland) or set-screw type.
 - a. Do not use indenter type connectors and couplings.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive conduits.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- D. Install intermediate metal conduit (IMC) in accordance with NECA 101.
- E. Conduit Routing:
 - 1. Unless dimensioned, conduit routing indicated is diagrammatic.
 - 2. When conduit destination is indicated without specific routing, determine exact routing required.
 - 3. Conceal all conduits unless specifically indicated to be exposed.
 - 4. Conduits in the following areas may be exposed, unless otherwise indicated:
 - a. Electrical rooms.
 - b. Mechanical equipment rooms.
 - c. Within joists in areas with no ceiling.
 - 5. Unless otherwise approved, do not route conduits exposed:
 - a. Across floors.
 - b. Across roofs.
 - c. Across top of parapet walls.
 - d. Across building exterior surfaces.
 - 6. Arrange conduit to maintain adequate headroom, clearances, and access.
 - 7. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.
- F. Conduit Support:
 - 1. Secure and support conduits in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
 - 2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- G. Connections and Terminations:
 - 1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
 - 2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
 - 3. Use suitable adapters where required to transition from one type of conduit to another.
 - 4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
 - 5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
 - 6. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
 - 7. Secure joints and connections to provide maximum mechanical strength and electrical continuity.
- H. Penetrations:
 - 1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
 - 2. Make penetrations perpendicular to surfaces unless otherwise indicated.
 - 3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
 - 4. Conceal bends for conduit risers emerging above ground.

SECTION 26 0533.13 CONDUIT FOR ELECTRICAL SYSTEMS

5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
 6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
 7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.
 8. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.
- I. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
 2. Where conduits are subject to earth movement by settlement or frost.
- J. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
1. Where conduits pass from outdoors into conditioned interior spaces.
 2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
 3. Where conduits penetrate coolers or freezers.
- K. Provide grounding and bonding in accordance with Section 26 0526.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- C. Correct deficiencies and replace damaged or defective conduits.

3.04 CLEANING

- A. Clean interior of conduits to remove moisture and foreign matter.

3.05 PROTECTION

- A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.
- B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 26 0529 - Hangers and Supports for Electrical Systems.
- C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 26 2726 - Wiring Devices:
 - 1. Wall plates.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.
- C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2012.
- D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013.
- E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- H. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- I. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.
- J. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Project Record Documents: Record actual locations for outlet and device boxes, pull boxes, cabinets and enclosures, floor boxes, and underground boxes/enclosures.

PART 2 PRODUCTS**2.01 BOXES**

- A. General Requirements:
 - 1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
 - 2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
 - 3. Provide products listed, classified, and labeled as suitable for the purpose intended.
 - 4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
 - 5. Provide grounding terminals within boxes where equipment grounding conductors terminate.
- B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
 - 1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
 - 2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
 - 3. Use suitable concrete type boxes where flush-mounted in concrete.
 - 4. Use suitable masonry type boxes where flush-mounted in masonry walls.

5. Use raised covers suitable for the type of wall construction and device configuration where required.
 6. Use shallow boxes where required by the type of wall construction.
 7. Do not use "through-wall" boxes designed for access from both sides of wall.
 8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
 9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
 10. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
 11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
 12. Wall Plates: Comply with Section 26 2726.
- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
 2. NEMA 250 Environment Type, Unless Otherwise Indicated:
 3. Junction and Pull Boxes Larger Than 100 cubic inches:
 - a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
- D. Low Voltage Boxes: 5-Square telecommunications outlet boxes (5 in. square x 2.875 in deep with cable management) shall be used for all low voltage applications. 5-square box shall support categories 5e, 6, augmented 6, 7, and optical fiber cables. Low voltage boxes shall support integral cable management by allowing slack cable to be wound internally while maintaining minimum bend radius requirements. 5-Square boxes shall also be used for all fire alarm applications.

2.02 MANUFACTURERS

- A. Appleton Electric; Model _____: www.appletonelec.com.
- B. Arc-Co./Division of Arcade Technology; Model _____: www.arc-co.com.
- C. Unity Manufacturing; Model _____: www.unitymfg.com.
- D. Thomas & Betts Corp / A Member of the ABB Group: www.tnb.com
- E. Substitutions: See Section 01 6000 - Product Requirements.

2.03 OUTLET BOXES

- A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
 1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2 inch male fixture studs where required.
 2. Concrete Ceiling Boxes: Concrete type.
- B. Wall Plates for Finished Areas: As specified in Section 26 2726.

2.04 PULL AND JUNCTION BOXES

- A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.
- B. Hinged Enclosures: As specified in Section 26 2716.
- C. Surface Mounted Cast Metal Box: NEMA 250, Type 4; flat-flanged, surface mounted junction box:
 1. Material: Cast aluminum.
 2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive boxes.
- C. Verify that conditions are satisfactory for installation prior to starting work.
- D. Verify locations of floor boxes and outlets in offices and work areas prior to rough-in.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Box Supports:
 - 1. Secure and support boxes in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
 - 2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
- E. Install boxes plumb and level.
- F. Flush-Mounted Boxes:
 - 1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
 - 2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
 - 3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.
- G. Install boxes as required to preserve insulation integrity.
- H. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- I. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.
- J. Close unused box openings.
- K. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- L. Provide grounding and bonding in accordance with Section 26 0526.
- M. Install boxes securely, in a neat and workmanlike manner, as specified in NECA 1.
- N. Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and as required by NFPA 70.
- O. Coordinate installation of outlet boxes for equipment connected under Section 26 2717.
- P. Set wall mounted boxes at elevations to accommodate mounting heights indicated.
- Q. Electrical boxes are shown on Drawings in approximate locations unless dimensioned.
 - 1. Adjust box locations up to 6 feet if required to accommodate intended purpose.
- R. Orient boxes to accommodate wiring devices oriented as specified in Section 26 2726.
- S. Maintain headroom and present neat mechanical appearance.
- T. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- U. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.
- V. Install boxes to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.
- W. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
- X. Provide separate boxes for emergency power and normal power systems.

SECTION 26 0533.16 BOXES FOR ELECTRICAL SYSTEMS

- Y. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.
- Z. Locate outlet boxes so that wall plates do not span different building finishes.
- AA. Locate outlet boxes so that wall plates do not cross masonry joints.
- AB. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- AC. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- AD. Support boxes independently of conduit, except cast box that is connected to two rigid metal conduits both supported within 12 inches of box.
- AE. Use gang box where more than one device is mounted together. Do not use sectional box.

3.03 ADJUSTING

- A. Install knockout closures in unused box openings.

3.04 CLEANING

- A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Electrical connections to equipment.

1.02 RELATED REQUIREMENTS

- A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables.
- B. Section 26 0533.13 - Conduit for Electrical Systems.
- C. Section 26 0533.16 - Boxes for Electrical Systems.
- D. Section 26 2726 - Wiring Devices.
- E. Section 26 2816.16 - Enclosed Switches.

1.03 REFERENCE STANDARDS

- A. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (R 2010).
- B. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2012.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
 - 2. Determine connection locations and requirements.
- B. Sequencing:
 - 1. Install rough-in of electrical connections before installation of equipment is required.
 - 2. Make electrical connections before required start-up of equipment.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide wiring device manufacturer's catalog information showing dimensions, configurations, and construction.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.

PART 2 PRODUCTS**2.01 MATERIALS**

- A. Cords and Caps: NEMA WD 6; match receptacle configuration at outlet provided for equipment.
 - 1. Colors: Comply with NEMA WD 1.
 - 2. Cord Construction: NFPA 70, Type SO, multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
 - 3. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.
- B. Disconnect Switches: As specified in Section 26 2816.16 and in individual equipment sections.
- C. Wiring Devices: As specified in Section 26 2726.
- D. Flexible Conduit: As specified in Section 26 0533.13.
- E. Wire and Cable: As specified in Section 26 0519.
- F. Boxes: As specified in Section 26 0533.16.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.02 ELECTRICAL CONNECTIONS

- A. Make electrical connections in accordance with equipment manufacturer's instructions.
- B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.
- C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
- D. Provide receptacle outlet to accommodate connection with attachment plug.
- E. Provide cord and cap where field-supplied attachment plug is required.
- F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
- G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
- H. Install terminal block jumpers to complete equipment wiring requirements.
- I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Occupancy sensors.
- B. Time switches.
- C. In-wall time switches.
- D. In-wall interval timers.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- B. Section 26 0529 - Hangers and Supports for Electrical Systems.
- C. Section 26 0533.16 - Boxes for Electrical Systems.
- D. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- E. Section 26 2726 - Wiring Devices: Devices for manual control of lighting, including wall switches, wall dimmers, and fan speed controllers.
- F. Section 26 5100 - Interior Lighting.

1.03 REFERENCE STANDARDS

- A. 47 CFR 15 - Radio Frequency Devices; current edition.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 916 - Energy Management Equipment; Current Edition, Including All Revisions.
- G. UL 917 - Clock-Operated Switches; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the placement of lighting control devices with millwork, furniture, equipment, etc. installed under other sections or by others.
 - 2. Coordinate the placement of wall switch occupancy sensors with actual installed door swings.
 - 3. Coordinate the placement of occupancy sensors with millwork, furniture, equipment or other potential obstructions to motion detection coverage installed under other sections or by others.
 - 4. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
- C. Shop Drawings:
 - 1. Occupancy Sensors: Provide lighting plan indicating location, model number, and orientation of each occupancy sensor and associated system component.
- D. Samples:
 - 1. In-Wall Time Switches: One for each type and color specified.
- E. Field Quality Control Reports.
- F. Manufacturer's Installation Instructions: Include application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

SECTION 26 0923 LIGHTING CONTROL DEVICES

- G. Operation and Maintenance Data: Include detailed information on device programming and setup.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Store products in a clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation.

1.08 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.09 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for all occupancy sensors.
- C. Provide two year manufacturer warranty for all daylighting controls.

PART 2 PRODUCTS

2.01 LIGHTING CONTROL DEVICES - GENERAL REQUIREMENTS

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless specifically indicated to be excluded, provide all required conduit, wiring, connectors, hardware, components, accessories, etc. as required for a complete operating system.

2.02 OCCUPANCY SENSORS

- A. Manufacturers:
 - 1. Hubbell Incorporated: www.hubbell.com/#sle.
 - 2. Steinel, Professional: www.steinell.net
 - 3. Lutron Electronics Company, Inc: www.lutron.com/#sle.
 - 4. Sensor Switch Inc: www.sensorswitch.com/#sle.
 - 5. WattStopper: www.wattstopper.com/#sle.
 - 6. Substitutions: See Section 01 6000 - Product Requirements.
 - 7. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.
- B. All Occupancy Sensors:
 - 1. Description: Factory-assembled commercial specification grade devices for indoor use capable of sensing both major motion, such as walking, and minor motion, such as small desktop level movements, according to published coverage areas, for automatic control of load indicated.
 - 2. Sensor Technology:
 - a. Passive Infrared (PIR) Occupancy Sensors: Designed to detect occupancy by sensing movement of thermal energy between zones.
 - b. Ultrasonic Occupancy Sensors: Designed to detect occupancy by sensing frequency shifts in emitted and reflected inaudible sound waves.
 - c. Passive Infrared/Ultrasonic Dual Technology Occupancy Sensors: Designed to detect occupancy using a combination of both passive infrared and ultrasonic technologies.
 - d. Passive Infrared/Acoustic Dual Technology Occupancy Sensors: Designed to detect occupancy using a combination of both passive infrared and audible sound sensing technologies.
 - 3. Provide LED to visually indicate motion detection with separate color LEDs for each sensor type in dual technology units.
 - 4. Operation: Unless otherwise indicated, occupancy sensor to turn load on when occupant presence is detected and to turn load off when no occupant presence is detected during an adjustable turn-off delay time interval.

5. Dual Technology Occupancy Sensors: Field configurable turn-on and hold-on activation with settings for activation by either or both sensing technologies.
 6. Passive Infrared Lens Field of View: Field customizable by addition of factory masking material, adjustment of integral blinders, or similar means to block motion detection in selected areas.
 7. Turn-Off Delay: Field adjustable, with time delay settings up to 30 minutes.
 8. Sensitivity: Field adjustable.
 9. Adaptive Technology: Field selectable; capable of self-adjusting sensitivity and time delay according to conditions.
 10. Integral Photocell: For field selectable and adjustable inhibition of automatic turn-on of load when ambient lighting is above the selected level.
 11. Compatibility (Non-Dimming Sensors): Suitable for controlling incandescent lighting, low-voltage lighting with electronic and magnetic transformers, fluorescent lighting with electronic and magnetic ballasts, and fractional motor loads, with no minimum load requirements.
 12. Load Rating for Line Voltage Occupancy Sensors: As required to control the load indicated on drawings.
 13. Isolated Relay for Low Voltage Occupancy Sensors: SPDT dry contacts, ratings as required for interface with system indicated.
 14. Where wired sensors are indicated, wireless sensors are acceptable provided that all components and wiring modifications necessary for proper operation are included.
 15. Wireless Sensors:
 - a. RF Range: 30 feet through typical construction materials.
 - b. Electromagnetic Interference/Radio Frequency Interference (EMI/RFI) Limits: Comply with FCC requirements of 47 CFR 15, for Class B application.
 - c. Power: Battery-operated with minimum ten-year battery life.
- C. Power Packs for Wireless Occupancy Sensors:
1. Description: Plenum rated, self-contained relay compatible with specified wireless occupancy sensors for switching of line voltage loads.
 2. Input Supply Voltage: Dual rated for 120/277 V ac.

2.03 IN-WALL INTERVAL TIMERS

- A. Manufacturers:
1. Intermatic, Inc; EI210W: www.intermatic.com/#sle.
 2. Steinel Professional: www.steinel.net
 3. Tork, a division of NSI Industries LLC: www.tork.com/#sle.
 4. Leviton; www.leviton.com
 5. Hubbell; www.hubbell.com
 6. Wattstopper; www.wallstopper.com
 7. Cooper Industries; www.cooperindustries.com
 8. Arrow Hart; www.cooperindustries.com
 9. Substitutions: See Section 01 6000 - Product Requirements.
 10. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.
- B. Digital Electronic In-Wall Interval Timers:
1. Description: Factory-assembled solid state programmable controller with LCD display, suitable for mounting in standard wall box, and listed and labeled as complying with UL 916 or UL 917.
 2. Program Capability: Designed to turn load off at end of preset time interval.
 3. Time Interval: Field selectable range of presets available up to 12 hours.
 4. Provide field selectable audible and visual indication to warn that end of interval operation is about to turn off load.
 5. Provide power outage backup to retain programming and maintain clock.
 6. Manual override: Capable of both turning load off and resetting timer to original preset time interval.
 7. Switch Configuration: Suitable for use in either SPST or 3-way application.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that openings for outlet boxes are neatly cut and will be completely covered by devices or wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to lighting control devices.
- F. Verify that the service voltage and ratings of lighting control devices are appropriate for the service voltage and load requirements at the location to be installed.
- G. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

- A. Install lighting control devices in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 26 0533.16 as required for installation of lighting control devices provided under this section.
 - 1. Mounting Heights: Unless otherwise indicated, as follows:
 - a. In-Wall Time Switches: 42 inches above finished floor.
 - 2. Orient outlet boxes for vertical installation of lighting control devices unless otherwise indicated.
- C. Install lighting control devices in accordance with manufacturer's instructions.
- D. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- E. Install lighting control devices plumb and level, and held securely in place.
- F. Where required and not furnished with lighting control device, provide wall plate in accordance with Section 26 2726.
- G. Provide required supports in accordance with Section 26 0529.
- H. Where applicable, install lighting control devices and associated wall plates to fit completely flush to mounting surface with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect each lighting control device for damage and defects.
- C. Test occupancy sensors to verify proper operation, including time delays and ambient light thresholds where applicable. Verify optimal coverage for entire room or area. Record test results in written report to be included with submittals.
- D. Test time switches to verify proper operation.
- E. Correct wiring deficiencies and replace damaged or defective lighting control devices.

3.05 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.
- B. Adjust occupancy sensor settings to minimize undesired activations while optimizing energy savings, and to achieve desired function as indicated or as directed by Architect.

3.06 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.07 COMMISSIONING

- A. See Section 01 9113 - General Commissioning Requirements for commissioning requirements.

3.08 CLOSEOUT ACTIVITIES

- A. See Section 01 7800 - Closeout Submittals, for closeout submittals.
- B. Demonstration: Demonstrate proper operation of lighting control devices to Architect, and correct deficiencies or make adjustments as directed.

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Power distribution panelboards.
- B. Lighting and appliance panelboards.
- C. Overcurrent protective devices for panelboards.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- B. Section 26 0529 - Hangers and Supports for Electrical Systems.
- C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 26 4300 - Surge Protective Devices.

1.03 REFERENCE STANDARDS

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service; Federal Specification; Revision E, 2013.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NECA 407 - Standard for Installing and Maintaining Panelboards; 2009.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- E. NEMA PB 1 - Panelboards; 2011.
- F. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less; 2013.
- G. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.
- H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- J. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- K. UL 67 - Panelboards; Current Edition, Including All Revisions.
- L. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.
- M. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.
- C. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
- D. Source Quality Control Test Reports: Include reports for tests designated in NEMA PB 1 as routine tests.
- E. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- F. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.
- G. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Panelboard Keys: Two of each different key.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.
- B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

1.07 FIELD CONDITIONS

- A. Maintain ambient temperature within the following limits during and after installation of panelboards:
 - 1. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Eaton Corporation: www.eaton.com/#sle.
- B. Square D: (only approved manufacturer per owner request)
- C. Siemens Industry, Inc: www.usa.siemens.com/#sle.
- D. Substitutions: See Section 01 6000 - Product Requirements.
- E. Source Limitations: Furnish panelboards and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 PANELBOARDS - GENERAL REQUIREMENTS

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
 - 1. Altitude: Less than 6,600 feet.
 - 2. Ambient Temperature:
 - a. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.
- C. Short Circuit Current Rating:
 - 1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
- D. Panelboards Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.
- E. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.
- F. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.
- G. Bussing: Sized in accordance with UL 67 temperature rise requirements.
 - 1. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
- H. Conductor Terminations: Suitable for use with the conductors to be installed.
- I. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
 - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - 2. Boxes: Galvanized steel unless otherwise indicated.

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- a. Provide wiring gutters sized to accommodate the conductors to be installed.
- 3. Fronts:
 - a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
 - b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.
- 4. Lockable Doors: All locks keyed alike unless otherwise indicated.
- J. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.
- K. Surge Protective Devices: Where factory-installed, internally mounted surge protective devices are provided in accordance with Section 26 4300, list and label panelboards as a complete assembly including surge protective device.
- L. Arc Flash Energy-Reducing Maintenance Switching: For circuit breakers rated 1200 A or higher, provide a local accessory switch with status indicator light that permits selection of a maintenance mode with alternate electronic trip unit settings for reduced fault clearing time.

2.03 LIGHTING AND APPLIANCE PANELBOARDS

- A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
- B. Conductor Terminations:
 - 1. Main and Neutral Lug Material: Copper, suitable for terminating copper conductors only.
 - 2. Main and Neutral Lug Type: Mechanical.
- C. Bussing:
 - 1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
 - 2. Phase and Neutral Bus Material: Copper.
 - 3. Ground Bus Material: Copper.
- D. Molded Case Circuit Breakers: Thermal magnetic trip circuit breakers, bolt-on type, with common trip handle for all poles; UL listed.
 - 1. Type SWD for lighting circuits.
 - 2. Type HACR for air conditioning equipment circuits.
 - 3. Class A ground fault interrupter circuit breakers where scheduled.
 - 4. Do not use tandem circuit breakers.
- E. Enclosures:
 - 1. Provide surface-mounted or flush-mounted enclosures as indicated.
 - 2. Fronts: Provide lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
 - 3. Provide clear plastic circuit directory holder mounted on inside of door.
- F. Each panel shall have 20 percent additional space for future use.

2.04 OVERCURRENT PROTECTIVE DEVICES

- A. Molded Case Circuit Breakers:
 - 1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
 - 2. Interrupting Capacity:
 - a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
 - b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
 - 3. Conductor Terminations:
 - a. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 - 4. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.

PART 3 EXECUTION**3.01 INSTALLATION**

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.
- D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- E. Provide required support and attachment in accordance with Section 26 0529.
- F. Install panelboards plumb.
- G. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.
- H. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.
- I. Provide minimum of six spare 1 inch trade size conduits out of each flush-mounted panelboard stubbed into accessible space above ceiling and below floor.
- J. Provide grounding and bonding in accordance with Section 26 0526.
- K. Install all field-installed branch devices, components, and accessories.
- L. Provide filler plates to cover unused spaces in panelboards.
- M. Identify panelboards in accordance with Section 26 0553.

3.02 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for all main circuit breakers and circuit breakers larger than _____ amperes. Tests listed as optional are not required.
- D. Correct deficiencies and replace damaged or defective panelboards or associated components.

3.03 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
- B. Adjust alignment of panelboard fronts.

3.04 CLEANING

- A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Wall switches.
- B. Receptacles.
- C. Wall plates.
- D. Floor box service fittings.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- B. Section 26 0533.16 - Boxes for Electrical Systems.
- C. Section 26 0533.23 - Surface Raceways for Electrical Systems: Surface raceway systems, including multioutlet assemblies.
- D. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- E. Section 26 0923 - Lighting Control Devices: Devices for automatic control of lighting, including occupancy sensors, in-wall time switches, and in-wall interval timers.

1.03 REFERENCE STANDARDS

- A. FS W-C-596 - Connector, Electrical, Power, General Specification for; Federal Specification; Revision G, 2001.
- B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush-mounted (General Specification); Federal Specification; Revision F, 1999.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- D. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.
- E. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (R 2010).
- F. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2012.
- G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.
- I. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.
- J. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.
- K. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.
- L. UL 1449 - Standard for Surge Protective Devices; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
 - 2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
 - 3. Coordinate the placement of outlet boxes for wall switches with actual installed door swings.
 - 4. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
 - 5. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

- C. Certificates for Surge Protection Receptacles: Manufacturer's documentation of listing for compliance with UL 1449.
- D. Project Record Documents: Record actual installed locations of wiring devices.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Wall Plates: Two of each style, size, and finish.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Products: Listed, classified, and labeled as suitable for the purpose intended.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

PART 2 PRODUCTS**2.01 WIRING DEVICE APPLICATIONS**

- A. Provide wiring devices suitable for intended use and with ratings adequate for load served.
- B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.
- C. Provide weather resistant GFI receptacles with specified weatherproof covers for all receptacles installed outdoors or in damp or wet locations.
- D. Provide GFCI protection for receptacles installed within 6 feet of sinks.
- E. Provide GFCI protection for receptacles serving electric drinking fountains.
- F. Unless noted otherwise, do not use combination switch/receptacle devices.

2.02 WIRING DEVICE FINISHES

- A. Provide wiring device finishes as described below unless otherwise indicated.
- B. Wiring Devices, Unless Otherwise Indicated: White with white nylon wall plate.

2.03 WALL SWITCHES

- A. Manufacturers:
 - 1. Hubbell Incorporated: www.hubbell.com/#sle.
 - 2. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
 - 3. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.
- B. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.
- C. Standard Wall Switches: Industrial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

2.04 RECEPTACLES

- A. Manufacturers:
 - 1. Hubbell Incorporated: www.hubbell.com/#sle.
 - 2. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
 - 3. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.
- B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.

2. NEMA configurations specified are according to NEMA WD 6.
- C. Convenience Receptacles:
 1. Standard Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
 2. Automatically Controlled Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R; controlled receptacle marking on device face per NFPA 70; single or duplex as indicated on the drawings.
- D. GFCI Receptacles:
 1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
 - a. Provide test and reset buttons of same color as device.
 2. Standard GFCI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.

2.05 WALL PLATES

- A. Manufacturers:
 1. Hubbell Incorporated: www.hubbell-wiring.com/#sle.
 2. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
 3. Lutron Electronics Company, Inc: www.lutron.com/#sle.
 4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.
 5. Substitutions: See Section 01 6000 - Product Requirements.
 6. Source Limitations: Where wall controls are furnished as part of lighting control system, provide accessory matching receptacles and wallplates by the same manufacturer in locations indicated.
- B. Wall Plates: Comply with UL 514D.
 1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
 2. Size: Standard.
 3. Screws: Metal with slotted heads finished to match wall plate finish.
- C. Nylon Wall Plates: Smooth finish, high-impact thermoplastic.

2.06 FLOOR BOX SERVICE FITTINGS

- A. Manufacturers:
 1. Hubbell Incorporated; _____: www.hubbell.com/#sle.
 2. Thomas & Betts Corporation; _____: www.tnb.com/#sle.
 3. Wiremold, a brand of Legrand North America, Inc; _____: www.legrand.us/#sle.
 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: Service fittings compatible with floor boxes provided under Section 26 0533.16 with components, adapters, and trims required for complete installation.
- C. Flush Floor Service Fittings:
 1. Single Service Flush Convenience Receptacles:
 - a. Cover: Rectangular.
 - b. Configuration: One standard convenience duplex receptacle(s) with duplex flap opening(s).
 2. Single Service Flush Communications Outlets:
 - a. Cover: Rectangular.
 3. Single Service Flush Furniture Feed:
 - a. Cover: Rectangular.
 - b. Configuration: One 2-1/8 inch by 3/4 inch combination threaded opening(s).
 4. Dual Service Flush Combination Outlets:
 - a. Cover: Rectangular.
 - b. Configuration:
 - 1) Power: One standard convenience duplex receptacle(s) with duplex flap opening(s).
 - 2) Communications: _____.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- F. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 26 0533.16 as required for installation of wiring devices provided under this section.
 - 1. Mounting Heights: As indicated on the drawings.
 - 2. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
 - 3. Where multiple receptacles, wall switches, or wall dimmers are installed at the same location and at the same mounting height, gang devices together under a common wall plate.
 - 4. Locate wall switches on strike side of door with edge of wall plate 3 inches from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.
 - 5. Locate receptacles for electric drinking fountains concealed behind drinking fountain according to manufacturer's instructions.
- C. Install wiring devices in accordance with manufacturer's instructions.
- D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- E. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.
- F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
- G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- H. Unless otherwise indicated, GFCI receptacles may be connected to provide feed-through protection to downstream devices. Label such devices to indicate they are protected by upstream GFCI protection.
- I. Install wiring devices plumb and level with mounting yoke held rigidly in place.
- J. Install wall switches with OFF position down.
- K. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.
- L. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- M. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect each wiring device for damage and defects.
- C. Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.
- D. Test each receptacle to verify operation and proper polarity.
- E. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
- F. Inspect each surge protection receptacle to verify surge protection is active.
- G. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.05 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.
- B. Adjust presets for wall dimmers according to manufacturer's instructions as directed by Architect.

3.06 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Interior luminaires.
- B. Emergency lighting units.
- C. Exit signs.
- D. Ballasts and drivers.

1.02 RELATED REQUIREMENTS

- A. Section 23 3600 - Air Terminal Units: Air distribution accessories for air handling luminaires.
- B. Section 26 0529 - Hangers and Supports for Electrical Systems.
- C. Section 26 0533.16 - Boxes for Electrical Systems.
- D. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. IES LM-79 - Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products; 2008.
- B. IES LM-80 - Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules; Illuminating Engineering Society; 2015.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- D. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; 2006.
- E. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; 2006.
- F. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility; 2012.
- G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. NFPA 101 - Life Safety Code; 2015.
- I. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.
- J. UL 1598 - Luminaires; Current Edition, Including All Revisions.
- K. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
 - 2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
 - 3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.
 - 4. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.
 - 5. Submission of "equal" fixtures from alternate manufacturers is required to be a minimum of 10 days prior to bid. This submission should be done via a substitution request submitted through the bidding process.
 - 6. Coordinate the placement of emergency battery packs in locations where accessible along with test switches. If fixtures are accessible from above or via the fixture opening then batteries can be located at the fixtures. In locations where batteries aren't readily accessible via the fixture opening, remote batteries are to be located above accessible ceilings nearby. As a last resort, access panels are to be installed (style and exact locations are to be confirmed by architect & engineer) for ease of access.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
 - 2. Provide photometric calculations where luminaires are proposed for substitution upon request.
- C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
 - 1. LED Luminaires:
 - a. Include estimated useful life, calculated based on IES LM-80 test data.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- E. Operation and Maintenance Data: Instructions for each product including information on replacement parts.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Lamps: Ten percent of total quantity installed for each type, but not less than two of each type.
 - 3. Extra Ballasts: Two percent of total quantity installed for each type, but not less than one of each type.
- G. Project Record Documents: Record actual connections and locations of luminaires and any associated remote components.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting), NECA/IESNA 502 (industrial lighting), and manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.08 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.09 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide two year manufacturer warranty for linear fluorescent ballasts.
- C. Provide five year pro-rata warranty for batteries for emergency lighting units.

PART 2 PRODUCTS**2.01 LUMINAIRES**

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.
- D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.
- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- G. Recessed Luminaires:
 - 1. Ceiling Compatibility: Comply with NEMA LE 4.
 - 2. Luminaires Recessed in Insulated Ceilings: Listed and labeled as IC-rated, suitable for direct contact with insulation and combustible materials.
 - 3. Luminaires Recessed in Sloped Ceilings: Provide suitable sloped ceiling adapters.
 - 4. Air-Handling Recessed Fluorescent Luminaires: Suitable for air supply/return, heat removal, or combination as indicated.
- H. LED Luminaires:
 - 1. Components: UL 8750 recognized or listed as applicable.
 - 2. Tested in accordance with IES LM-79 and IES LM-80.
 - 3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.
- I. LED Tape Lighting Systems: Provide all power supplies, drivers, cables, connectors, channels, covers, mounting accessories, and interfaces as necessary to complete installation.
 - 1. LED Tape - General Requirements:
 - a. Listed.
 - b. Designed for field cutting in accordance with listing.
- J. Track Lighting Systems: Provide track compatible with specified track heads, with all connectors, power feed fittings, dead ends, hangers and canopies as necessary to complete installation.
- K. Luminaires Mounted in Continuous Rows: Provide quantity of units required for length indicated, with all accessories required for joining and aligning.

2.02 EMERGENCY LIGHTING UNITS

- A. Description: Emergency lighting units complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
- B. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
- C. Battery:
 - 1. Sealed maintenance-free lead calcium unless otherwise indicated.
 - 2. Size battery to supply all connected lamps, including emergency remote heads where indicated.
- D. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
- E. Provide low-voltage disconnect to prevent battery damage from deep discharge.
- F. Accessories:
 - 1. Provide compatible accessory mounting brackets where indicated or required to complete installation.

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2. Provide compatible accessory high impact polycarbonate vandal shields where indicated.

2.03 EXIT SIGNS

- A. Description: Exit signs complying with NFPA 101 and applicable state and local codes, and listed and labeled as complying with UL 924.
 1. Number of Faces: Single- or double-face as indicated or as required for installed location.
 2. Directional Arrows: As indicated or as required for installed location.

2.04 BALLASTS AND DRIVERS

2.05 LAMPS

- A. Manufacturers:
 1. General Electric Company/GE Lighting: www.gelighting.com/#sle.
 2. Philips Lighting North America Corporation; www.usa.lighting.philips.com/#sle.
 3. Substitutions: See Section 01 6000 - Product Requirements.
- B. Lamps - General Requirements:
 1. Unless explicitly excluded, provide new, compatible, operable lamps in each luminaire.
 2. Verify compatibility of specified lamps with luminaires to be installed. Where lamps are not specified, provide lamps per luminaire manufacturer's recommendations.
 3. Minimum Efficiency: Provide lamps complying with all current applicable federal and state lamp efficiency standards.
 4. Color Temperature Consistency: Unless otherwise indicated, for each type of lamp furnish products which are consistent in perceived color temperature. Replace lamps that are determined by the Architect to be inconsistent in perceived color temperature.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 26 0533.16 as required for installation of luminaires provided under this section.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install products in accordance with manufacturer's instructions.
- D. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).
- E. Provide required support and attachment in accordance with Section 26 0529.
- F. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- G. Recessed Luminaires:
 1. Install trims tight to mounting surface with no visible light leakage.
 2. Non-IC Rated Luminaires: Maintain required separation from insulation and combustible materials according to listing.
 3. Luminaires Recessed in Fire-Rated Ceilings: Install using accessories and firestopping materials to meet regulatory requirements for fire rating.
- H. Suspended Luminaires:
 1. Unless otherwise indicated, specified mounting heights are to bottom of luminaire.
 2. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
- I. Install accessories furnished with each luminaire.

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- J. Bond products and metal accessories to branch circuit equipment grounding conductor.
- K. Air Handling Luminaires: Interface with air handling accessories furnished and installed under Section 23 3600.
- L. Emergency Lighting Units:
 - 1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
 - 2. Coordinate the placement of emergency battery packs in locations where accessible along with test switches. If fixtures are accessible from above or via the fixture opening then batteries can be located at the fixtures. In locations where batteries aren't readily accessible via the fixture opening, remote batteries are to be located above accessible ceilings nearby. As a last resort, access panels are to be installed (style and exact locations are to be confirmed by architect & engineer) for ease of access.
- M. Exit Signs:
 - 1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
- N. Remote Driver/Ballasts: Install in accessible location as indicated or as required to complete installation, using conductors per manufacturer's recommendations not exceeding manufacturer's recommended maximum conductor length to luminaire.
- O. Identify luminaires connected to emergency power system in accordance with Section 26 0553.
- P. Install lamps in each luminaire.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect each product for damage and defects.
- C. Operate each luminaire after installation and connection to verify proper operation.
- D. Test self-powered exit signs, emergency lighting units, and fluorescent emergency power supply units to verify proper operation upon loss of normal power supply.
- E. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

3.04 ADJUSTING

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.
- B. Aim and position adjustable emergency lighting unit lamps to achieve optimum illumination of egress path as required or as directed by Architect or authority having jurisdiction.
- C. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Architect or authority having jurisdiction.

3.05 CLEANING

- A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.06 CLOSEOUT ACTIVITIES

- A. See Section 01 7800 - Closeout Submittals, for closeout submittals.
- B. Just prior to Substantial Completion, replace all lamps that have failed.

3.07 PROTECTION

- A. Protect installed luminaires from subsequent construction operations.

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Exterior luminaires.
- B. Lamps.
- C. Poles and accessories.
- D. Luminaire accessories.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Materials and installation requirements for concrete bases for poles.
- B. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- C. Section 26 0529 - Hangers and Supports for Electrical Systems.
- D. Section 26 0533.16 - Boxes for Electrical Systems.

1.03 UNIT PRICES

- A. See Section 01 2200 - Unit Prices, for additional unit price requirements.
- B. Exterior Lighting Unit:
 - 1. Basis of Payment: Includes concrete foundation, pole, and luminaire(s) with lamps and accessories.

1.04 REFERENCE STANDARDS

- A. ANSI O5.1 - American National Standard for Wood Poles -- Specifications and Dimensions; 2015.
- B. IEEE C2 - National Electrical Safety Code; 2012.
- C. IES LM-63 - IESNA Standard File Format for Electronic Transfer of Photometric Data and Related Information; 2002 (Reaffirmed 2008).
- D. IES LM-79 - Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products; 2008.
- E. IES LM-80 - Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules; Illuminating Engineering Society; 2015.
- F. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- G. NECA/IESNA 501 - Standard for Installing Exterior Lighting Systems; 2006.
- H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 844 - Luminaires for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.
- J. UL 1598 - Luminaires; Current Edition, Including All Revisions.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate placement of poles and associated foundations with utilities, curbs, sidewalks, trees, walls, fences, striping, etc. installed under other sections or by others. Coordinate elevation to obtain specified foundation height.
 - 2. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.
 - 3. Submission of "equal" fixtures from alternate manufacturers is required to be a minimum of 10 days prior to bid. This submission should be done via a substitution request submitted through the bidding process.

1.06 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.

SECTION 26 5600 EXTERIOR LIGHTING

2. Provide structural calculations for each pole proposed for substitution.
- C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.
 1. LED Luminaires:
 - a. Include estimated useful life, calculated based on IES LM-80 test data.
 - b. Include IES LM-79 test report upon request.
 2. Provide electronic files of photometric data certified by a National Voluntary Laboratory Accreditation Program (NVLAP) lab or independent testing agency in IES LM-63 standard format upon request.
 3. Lamps: Include rated life and initial and mean lumen output.
 4. Poles: Include information on maximum supported effective projected area (EPA) and weight for the design wind speed.
- D. Sustainable Design Documentation: Submit manufacturer's product data on lamp mercury content and rated lamp life, showing compliance with specified requirements.
- E. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
- F. Operation and Maintenance Data: Instructions for each product including information on replacement parts.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 1. See Section 01 6000 - Product Requirements, for additional provisions.
 2. Extra Lamps: Ten percent of total quantity installed for each type, but not less than two of each type.
 3. Touch-Up Paint: 2 gallons, to match color of pole finish.

1.07 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Receive, handle, and store products according to NECA/IESNA 501 and manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.
- C. Receive, handle, and store wood poles in accordance with ANSI O5.1.

1.09 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide three year manufacturer warranty for all LED luminaires, including drivers.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

- A. Furnish products as indicated in luminaire schedule included on the drawings.

2.02 LUMINAIRES

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.

SECTION 26 5600 EXTERIOR LIGHTING

- C. Provide products listed, classified, and labeled as suitable for the purpose intended.
- D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.
- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

2.03 LAMPS

- A. Manufacturers:
 - 1. General Electric Company/GE Lighting: www.gelighting.com/#sle.
 - 2. Philips Lighting North America Corporation; www.usa.lighting.philips.com/#sle.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.
 - 4. Manufacturer Limitations: Where possible, provide lamps produced by a single manufacturer.
- B. Lamps - General Requirements:
 - 1. Unless explicitly excluded, provide new, compatible, operable lamps in each luminaire.
 - 2. Verify compatibility of specified lamps with luminaires to be installed. Where lamps are not specified, provide lamps per luminaire manufacturer's recommendations.
 - 3. Minimum Efficiency: Provide lamps complying with all current applicable federal and state lamp efficiency standards.
 - 4. Color Temperature Consistency: Unless otherwise indicated, for each type of lamp furnish products which are consistent in perceived color temperature. Replace lamps that are determined by the Architect to be inconsistent in perceived color temperature.

2.04 POLES

- A. All Poles:
 - 1. Provide poles and associated support components suitable for the luminaire(s) and associated supports and accessories to be installed.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 26 0533.16 as required for installation of luminaires provided under this section.
- B. Install products in accordance with manufacturer's instructions.
- C. Install luminaires in accordance with NECA/IESNA 501.
- D. Provide required support and attachment in accordance with Section 26 0529.
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F. Recessed Luminaires:
 - 1. Install trims tight to mounting surface with no visible light leakage.
 - 2. Luminaires Recessed in Fire-Rated Ceilings: Install using accessories and firestopping materials to meet regulatory requirements for fire rating.
- G. Suspended Luminaires:
 - 1. Unless otherwise indicated, specified mounting heights are to bottom of luminaire.

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2. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
 3. Provide minimum of two supports for each luminaire equal to or exceeding 4 feet in length, with no more than 4 feet between supports.
- H. Pole-Mounted Luminaires:
1. Foundation-Mounted Poles:
 - a. Provide cast-in-place concrete foundations for poles as indicated, in accordance with Section 03 3000.
 - 1) Install anchor bolts plumb per template furnished by pole manufacturer.
 - 2) Position conduits to enter pole shaft.
 - b. Install foundations plumb.
 - c. Install poles plumb, using leveling nuts or shims as required to adjust to plumb.
 - d. Tighten anchor bolt nuts to manufacturer's recommended torque.
 - e. Install non-shrink grout between pole anchor base and concrete foundation, leaving small channel for condensation drainage.
 - f. Install anchor base covers or anchor bolt covers as indicated.
 2. Grounding:
 - a. Bond luminaires, metal accessories, metal poles, and foundation reinforcement to branch circuit equipment grounding conductor.
 3. Install separate service conductors, 12 AWG copper, from each luminaire down to handhole for connection to branch circuit conductors.
- I. Install accessories furnished with each luminaire.
- J. Bond products and metal accessories to branch circuit equipment grounding conductor.
- K. Install lamps in each luminaire.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect each product for damage and defects.
- C. Operate each luminaire after installation and connection to verify proper operation.
- D. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect/Engineer.

3.04 ADJUSTING

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.
- B. Luminaires with Field-Rotatable Optics: Position optics according to manufacturer's instructions to achieve lighting distribution as indicated or as directed by Architect/Engineer.

3.05 CLEANING

- A. Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.06 CLOSEOUT ACTIVITIES

3.07 ATTACHMENTS

- A. Luminaire schedule included on the drawings.

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Fire alarm system design and installation, including all components, wiring, and conduit.
- B. Transmitters for communication with supervising station.
- C. Circuits from protected premises to supervising station, including conduit.
- D. Replacement and removal of existing fire alarm system components, wiring, and conduit indicated.
- E. Maintenance of fire alarm system under contract for specified warranty period.

1.02 RELATED REQUIREMENTS**1.03 REFERENCE STANDARDS**

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. IEEE C62.41.2 - Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits; 2002 (Cor 1, 2012).
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. NFPA 72 - National Fire Alarm and Signaling Code; 2016.
- E. NFPA 101 - Life Safety Code; 2015.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Drawings must be prepared using AutoCAD software or as reproducible drawings.
- C. Evidence of designer qualifications.
- D. Design Documents: Submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, riser diagrams, and description of operation:
 - 1. Copy (if any) of list of data required by authority having jurisdiction.
 - 2. NFPA 72 "Record of Completion", filled out to the extent known at the time.
 - 3. Clear and concise description of operation, with input/output matrix similar to that shown in NFPA 72 Appendix A-7-5-2.2(9), and complete listing of software required.
 - 4. System zone boundaries and interfaces to fire safety systems.
 - 5. Location of all components, circuits, and raceways; mark components with identifiers used in control unit programming.
 - 6. Circuit layouts; number, size, and type of raceways and conductors; conduit fill calculations; spare capacity calculations; notification appliance circuit voltage drop calculations.
 - 7. List of all devices on each signaling line circuit, with spare capacity indicated.
 - 8. Manufacturer's detailed data sheet for each component, including wiring diagrams, installation instructions, and circuit length limitations.
 - 9. Description of power supplies; if secondary power is by battery include calculations demonstrating adequate battery power.
 - 10. Certification by either the manufacturer of the control unit or by the manufacturer of each other component that the components are compatible with the control unit.
 - 11. Certification by the manufacturer of the control unit that the system design complies with Contract Documents.
 - 12. Certification by Contractor that the system design complies with Contract Documents.
 - 13. Do not show existing components to be removed.
- E. Evidence of installer qualifications.
- F. Evidence of maintenance contractor qualifications, if different from installer.
- G. Inspection and Test Reports:
 - 1. Submit inspection and test plan prior to closeout demonstration.
 - 2. Submit documentation of satisfactory inspections and tests.
 - 3. Submit NFPA 72 "Inspection and Test Form," filled out.

SECTION 28 4600 FIRE DETECTION AND ALARM

- H. Operating and Maintenance Data: See Section 01 7800 for additional requirements; revise and resubmit until acceptable; have one set available during closeout demonstration:
 - 1. Original copy of NFPA 72 with portions that are not relevant to this project neatly crossed out by hand; label with project name and date.
 - 2. Complete set of specified design documents, as approved by authority having jurisdiction.
 - 3. Additional printed set of project record documents and closeout documents, bound or filed in same manuals.
 - 4. Contact information for firm that will be providing contract maintenance and trouble call-back service.
 - 5. List of recommended spare parts, tools, and instruments for testing.
 - 6. Replacement parts list with current prices, and source of supply.
 - 7. Detailed troubleshooting guide and large scale input/output matrix.
 - 8. Preventive maintenance, inspection, and testing schedule complying with NFPA 72; provide printed copy and computer format acceptable to Owner.
 - 9. Detailed but easy to read explanation of procedures to be taken by non-technical administrative personnel in the event of system trouble, when routine testing is being conducted, for fire drills, and when entering into contracts for remodeling.
- I. Project Record Documents: See Section 01 7800 for additional requirements; have one set available during closeout demonstration:
 - 1. Complete set of floor plans showing actual installed locations of components, conduit, and zones.
 - 2. "As installed" wiring and schematic diagrams, with final terminal identifications.
 - 3. "As programmed" operating sequences, including control events by device, updated input/output chart, and voice messages by event.
- J. Closeout Documents:
 - 1. Certification by manufacturer that the system has been installed in compliance with manufacturer's installation requirements, is complete, and is in satisfactory operating condition.
 - 2. NFPA 72 "Record of Completion", filled out completely and signed by installer and authorized representative of authority having jurisdiction.
- K. Maintenance Materials, Tools, and Software: Furnish the following for Owner's use in maintenance of project.
 - 1. Furnish spare parts of same manufacturer and model as those installed; deliver in original packaging, labeled in same manner as in operating and maintenance data and place in spare parts cabinet.

1.05 QUALITY ASSURANCE

- A. Designer Qualifications: NICET Level III or IV (3 or 4) certified fire alarm technician or registered fire protection engineer, employed by fire alarm control panel manufacturer, Contractor, or installer, with experience designing fire alarm systems in the jurisdictional area of the authorities having jurisdiction.
- B. Installer Qualifications: Firm with minimum 3 years documented experience installing fire alarm systems of the specified type and providing contract maintenance service as a regular part of their business.
 - 1. Authorized representative of control unit manufacturer; submit manufacturer's certification that installer is authorized; include name and title of manufacturer's representative making certification.
 - 2. Installer Personnel: At least 2 years of experience installing fire alarm systems.
 - 3. Supervisor: NICET level III or IV (3 or 4) certified fire alarm technician; furnish name and address.
- C. Maintenance Contractor Qualifications: Same entity as installer or different entity with specified qualifications.

1.06 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide control panel manufacturer's warranty that system components other than wire and conduit are free from defects and will remain so for 1 year after date of Substantial Completion.

- C. Provide installer's warranty that the installation is free from defects and will remain so for 1 year after date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fire Alarm Control Units and Accessories - Basis of Design: _____.
- B. Fire Alarm Control Units and Accessories - Other Acceptable Manufacturers:
 - 1. Provide control units made by the same manufacturer.
- C. Initiating Devices and Notification Appliances:
 - 1. Same manufacturer as control units.
 - 2. Provide initiating devices and notification appliances made by the same manufacturer, where possible.
- D. Substitutions: See Section 01 6000 - Product Requirements.
 - 1. For other acceptable manufacturers of control units specified, submit product data showing equivalent features and compliance with Contract Documents.
 - 2. For substitution of products by manufacturers not listed, submit product data showing features and certification by Contractor that the design will comply with Contract Documents.

2.02 FIRE ALARM SYSTEM

- A. Fire Alarm System: Provide modifications and extensions to the existing automatic fire detection and alarm system:
 - 1. Provide all components necessary, regardless of whether shown in Contract Documents or not.
 - 2. Protected Premises: Entire building shown on drawings.
 - 3. Comply with the following; where requirements conflict, order of precedence of requirements is as listed:
 - a. ADA Standards.
 - b. The requirements of the State Fire Marshal.
 - c. The requirements of the local authority having jurisdiction .
 - d. Applicable local codes.
 - e. Contract Documents (drawings and specifications).
 - f. NFPA 101.
 - g. NFPA 72; where the word "should" is used consider that provision mandatory; where conflicts between requirements require deviation from NFPA 72, identify deviations clearly on design documents.
 - 4. Evacuation Alarm: Multiple smoke zones; allow for evacuation notification of any individual zone or combination of zones, in addition to general evacuation of entire premises.
 - 5. Voice Notification: Provide emergency voice/alarm communications with multichannel capability; digital.
 - 6. General Evacuation Zones: Each smoke zone is considered a general evacuation zone unless otherwise indicated, with alarm notification in all zones on the same floor, on the floor above, and the floor below.
 - 7. Program notification zones and voice messages as directed by Owner.
 - 8. Hearing Impaired Occupants: Provide visible notification devices in all public areas and in dwelling units.
 - 9. Fire Command Center: Location indicated on drawings.
 - 10. Fire Alarm Control Unit: New, located at fire command center.
- B. Supervising Stations and Fire Department Connections:
 - 1. Public Fire Department Notification: By on-premises supervising station.
 - 2. On-Premises Supervising Station: New proprietary station operated by Owner, located at _____.
 - 3. Means of Transmission to On-Premises Supervising Station: Directly connected noncoded system.
- C. Circuits:
 - 1. Initiating Device Circuits (IDC): Class B, Style A.
 - 2. Signaling Line Circuits (SLC) Within Single Building: Class B, Style 0.5.

3. Notification Appliance Circuits (NAC): Class B, Style W.
- D. Power Sources:
 1. Primary: Dedicated branch circuits of the facility power distribution system.
 2. Secondary: Storage batteries.
 3. Capacity: Sufficient to operate entire system for period specified by NFPA 72.
 4. Each Computer System: Provide uninterruptible power supply (UPS).

2.03 EXISTING COMPONENTS

- A. Existing Fire Alarm System: Remove existing system completely after new system is fully operational and tested.
- B. Clearly label components that are "Not In Service."
- C. Remove unused existing components and materials from site and dispose of properly.

2.04 FIRE SAFETY SYSTEMS INTERFACES

- A. Supervision: Provide supervisory signals in accordance with NFPA 72 for the following:
- B. Alarm: Provide alarm initiation in accordance with NFPA 72 for the following:

2.05 COMPONENTS

- A. General:
 1. Provide flush mounted units where installed in finish areas; in unfinished areas, surface mounted unit are acceptable.
 2. Provide legible, permanent labels for each control device, using identification used in operation and maintenance data.
- B. Fire Alarm Control Units: Analog, addressable type; listed, classified, and labeled as suitable for the purpose intended.
- C. Master Control Unit: As specified for Basis of Design above, or equivalent.
- D. Initiating Devices:
 1. Addressable Systems:
 - a. Addressable Devices: Individually identifiable by addressable fire alarm control unit.
 - b. Provide suitable addressable interface modules as indicated or as required for connection to conventional (non-addressable) devices and other components that provide a dry closure output.
- E. Notification Appliances:
 1. Audio Strobes: _____.
- F. Circuit Conductors: Copper or optical fiber; provide 200 feet extra; color code and label.
- G. Surge Protection: In accordance with IEEE C62.41.2 category B combination waveform and NFPA 70; except for optical fiber conductors.
- H. Locks and Keys: Deliver keys to Owner.
- I. Instruction Charts: Printed instruction chart for operators, showing steps to be taken when a signal is received (normal, alarm, supervisory, and trouble); easily readable from normal operator's station.
 1. Frame: Stainless steel or aluminum with polycarbonate or glass cover.
 2. Provide one for each control unit where operations are to be performed.
 3. Obtain approval of Owner prior to mounting; mount in location acceptable to Owner.
 4. Provide extra copy with operation and maintenance data submittal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with applicable codes, NFPA 72, NFPA 70, and Contract Documents.
- B. Conceal all wiring, conduit, boxes, and supports where installed in finished areas.
- C. Obtain Owner's approval of locations of devices, before installation.
- D. Install instruction cards and labels.

3.02 INSPECTION AND TESTING FOR COMPLETION

- A. Notify Owner 14 prior to beginning completion inspections and tests.

- B. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.
- C. Provide the services of the installer's supervisor or person with equivalent qualifications to supervise inspection and testing, correction, and adjustments.
- D. Prepare for testing by ensuring that all work is complete and correct; perform preliminary tests as required.
- E. Provide all tools, software, and supplies required to accomplish inspection and testing.
- F. Perform inspection and testing in accordance with NFPA 72 and requirements of local authorities; document each inspection and test.
- G. Correct defective work, adjust for proper operation, and retest until entire system complies with Contract Documents.

3.03 CLOSEOUT

- A. Closeout Demonstration: Demonstrate proper operation of all functions to Owner.
 - 1. Be prepared to conduct any of the required tests.
 - 2. Have at least one copy of operation and maintenance data, preliminary copy of project record drawings, input/output matrix, and operator instruction chart(s) available during demonstration.
 - 3. Have authorized technical representative of control unit manufacturer present during demonstration.
 - 4. Demonstration may be combined with inspection and testing required by authority having jurisdiction; notify authority having jurisdiction in time to schedule demonstration.
 - 5. Repeat demonstration until successful.

3.04 MAINTENANCE

- A. See Section 01 7000 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.
- B. Provide to Owner, a proposal as an alternate to the base bid, for a maintenance contract for entire warranty period, to include the work described below; include the total cost of contract, proposal to be valid at least until 30 days after date of Substantial Completion.
- C. Perform routine inspection, testing, and preventive maintenance required by NFPA 72, including:
 - 1. Maintenance of fire safety interface and supervisory devices connected to fire alarm system.
 - 2. Repairs required, unless due to improper use, accidents, or negligence beyond the control of the maintenance contractor.
 - 3. Record keeping required by NFPA 72 and authorities having jurisdiction.
- D. Provide trouble call-back service upon notification by Owner:
 - 1. Provide on-site response within 2 hours of notification.
 - 2. Include allowance for call-back service during normal working hours at no extra cost to Owner.
 - 3. Owner will pay for call-back service outside of normal working hours on an hourly basis, based on actual time spent at site and not including travel time; include hourly rate and definition of normal working hours in maintenance contract.
- E. Provide a complete description of preventive maintenance, systematic examination, adjustment, cleaning, inspection, and testing, with a detailed schedule.
- F. Maintain a log at each fire alarm control unit, listing the date and time of each inspection and call-back visit, the condition of the system, nature of the trouble, correction performed, and parts replaced. Submit duplicate of each log entry to Owner's representative upon completion of site visit.
- G. Comply with Owner's requirements for access to facility and security.

END OF SECTION

KINEXUS

BRIDGE ACADEMY RENOVATION

499 West Main St, Benton Harbor, MI 49022

BID ALTERNATE DRAWING INDEX
A101A BID ALTERNATE PLANS & DETAILS
FP101A FIRST FLOOR FIRE PROTECTION PLAN ALTERNATE
MH101A FIRST FLOOR HVAC PLAN
E101A FIRST FLOOR ALTERNATE LIGHTING & POWER PLANS

DRAWING INDEX

GENERAL
TD001 TITLE DRAWING
G101 CODE COMPLIANCE PLAN
G201 TYPICAL MOUNTING HEIGHTS AND ACCESSIBILITY DETAILS

ARCHITECTURAL
A001 ARCHITECTURAL SITE PLAN
A101 FLOOR PLAN
A111 REFLECTED CEILING PLAN, DOOR SCHEDULE, AND DETAILS

EQUIPMENT
FP001 GENERAL FIRE PROTECTION INFORMATION
FP101 FIRST FLOOR FIRE PROTECTION PLAN

FIRE PROTECTION
P001 GENERAL PLUMBING INFORMATION

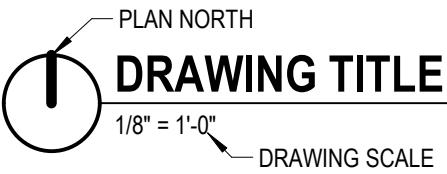
MECHANICAL
M001 GENERAL MECHANICAL INFORMATION
MH101 FIRST FLOOR HVAC PLAN

ELECTRICAL
E001 ELECTRICAL NOTES AND ABBREVIATIONS
ED101 FIRST FLOOR DEMOLITION PLAN
EE101 FIRST FLOOR LIGHTING & POWER PLANS
E601 ELECTRICAL SCHEDULES

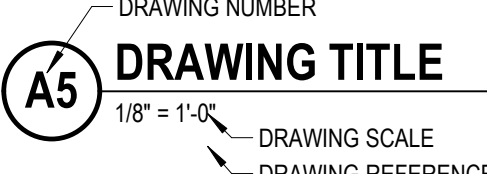
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DRAWING TITLES

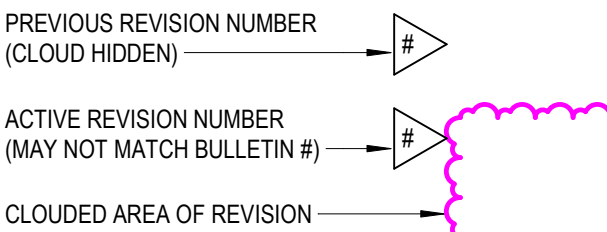
PLAN TITLE



PLAN CALLOUT / SECTION / ELEVATION TITLE



REVISION SYMBOLS



LOCATION SYMBOLS

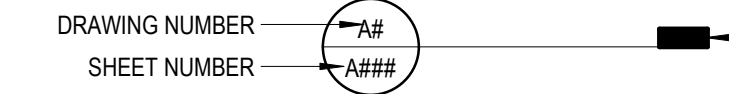
BUILDING SECTION



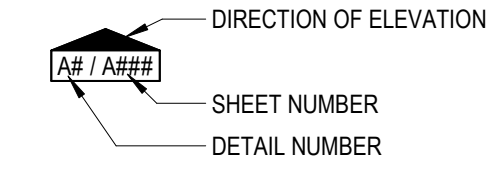
WALL SECTION



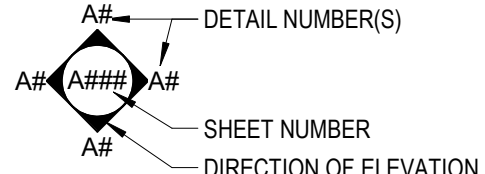
DETAIL SECTION



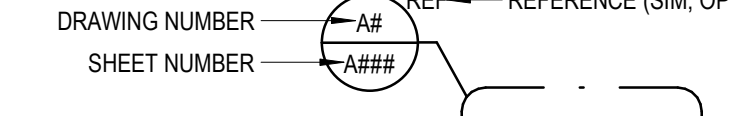
EXTERIOR ELEVATION



INTERIOR ELEVATION



CALLOUT REFERENCE



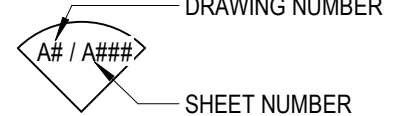
DRAWING EXTENTS



MATCHLINE

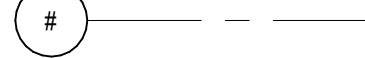


3D VIEW REFERENCE



DATUM SYMBOLS

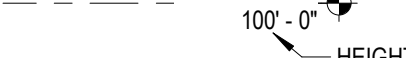
NEW COLUMN GRID



EXISTING COLUMN GRID



LEVEL

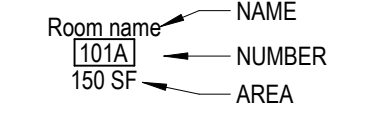


SPOT ELEVATION

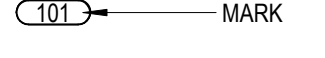


TAGS

ROOM TAG



DOOR TAG



RESTROOM ACCESSORY TAG



WINDOW TAG

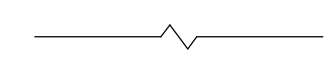


CEILING TAG



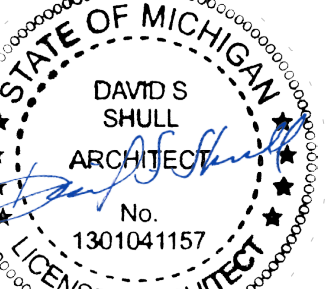
SYMBOLS

BREAK LINE



progressive | ae

BRIDGE ACADEMY RENOVATION



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05/26/2021

ISSUANCE

FOR CONSTRUCTION

5/26/2021

REVISIONS

NO. DATE DESCRIPTION

FILE NUMBER 85710002
PROJECT MANAGER B.JY
PROFESSIONAL
DRAWN BY
CHECKED BY

TITLE DRAWING
TD001

ARCHITECT/ ENGINEER:

OWNER:

progressive | ae

kinexus group

PROGRESSIVE ARCHITECTURE ENGINEERING, PC
1811 4 Mile Rd NE | Grand Rapids, MI 49525 | 616.361.2664 | www.progressiveae.com

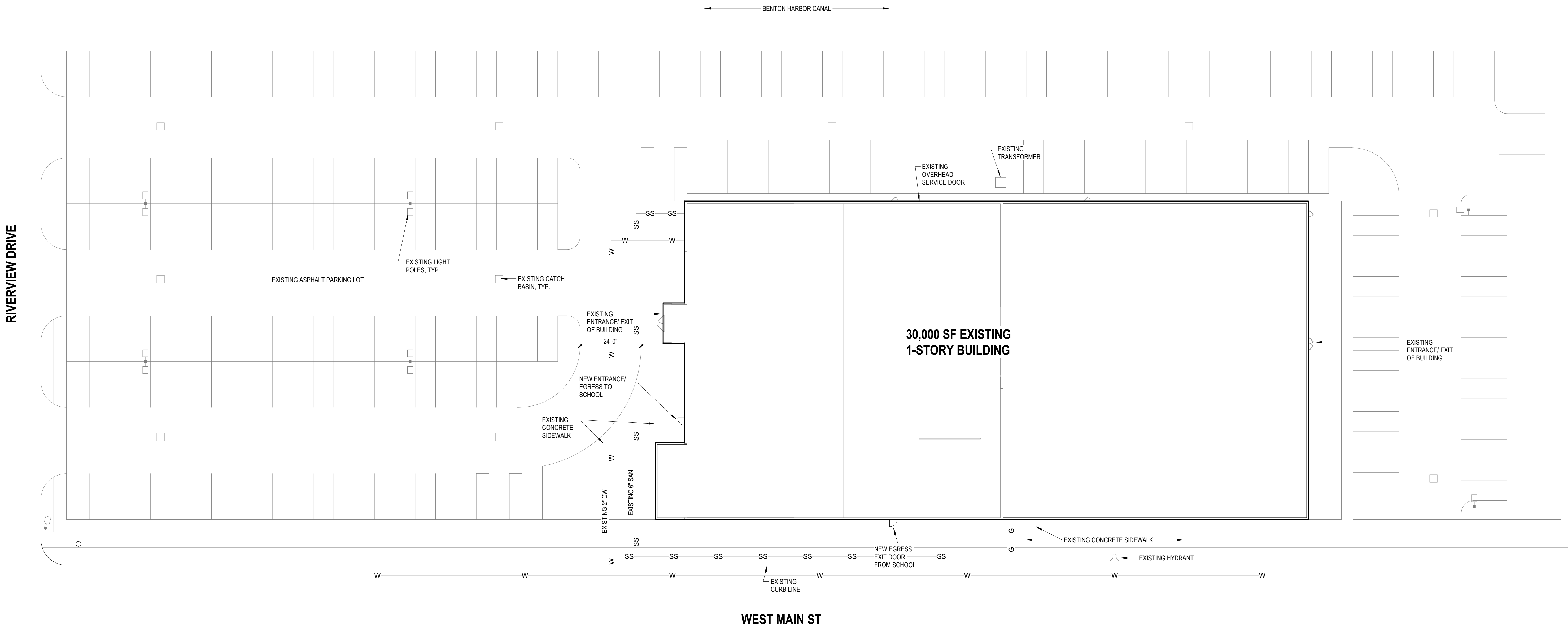
Kinexus Group
330 West Main Street | Suite 110 | Benton Harbor, MI | 49022
www.kinexus.org

VICINITY MAP

NOT TO SCALE

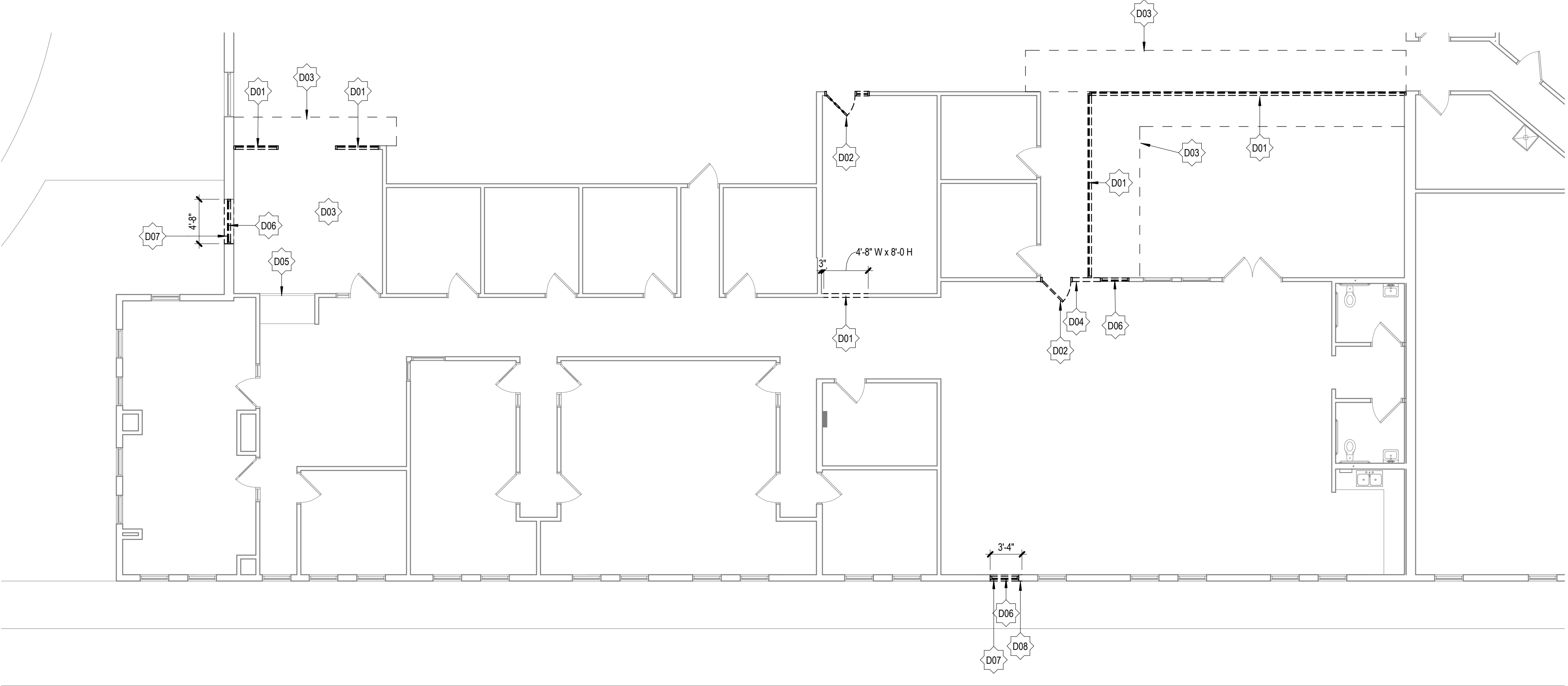


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1811 4 Mile Rd NE | Grand Rapids, MI 49525 | 616.361.2664 | www.progressiveae.com
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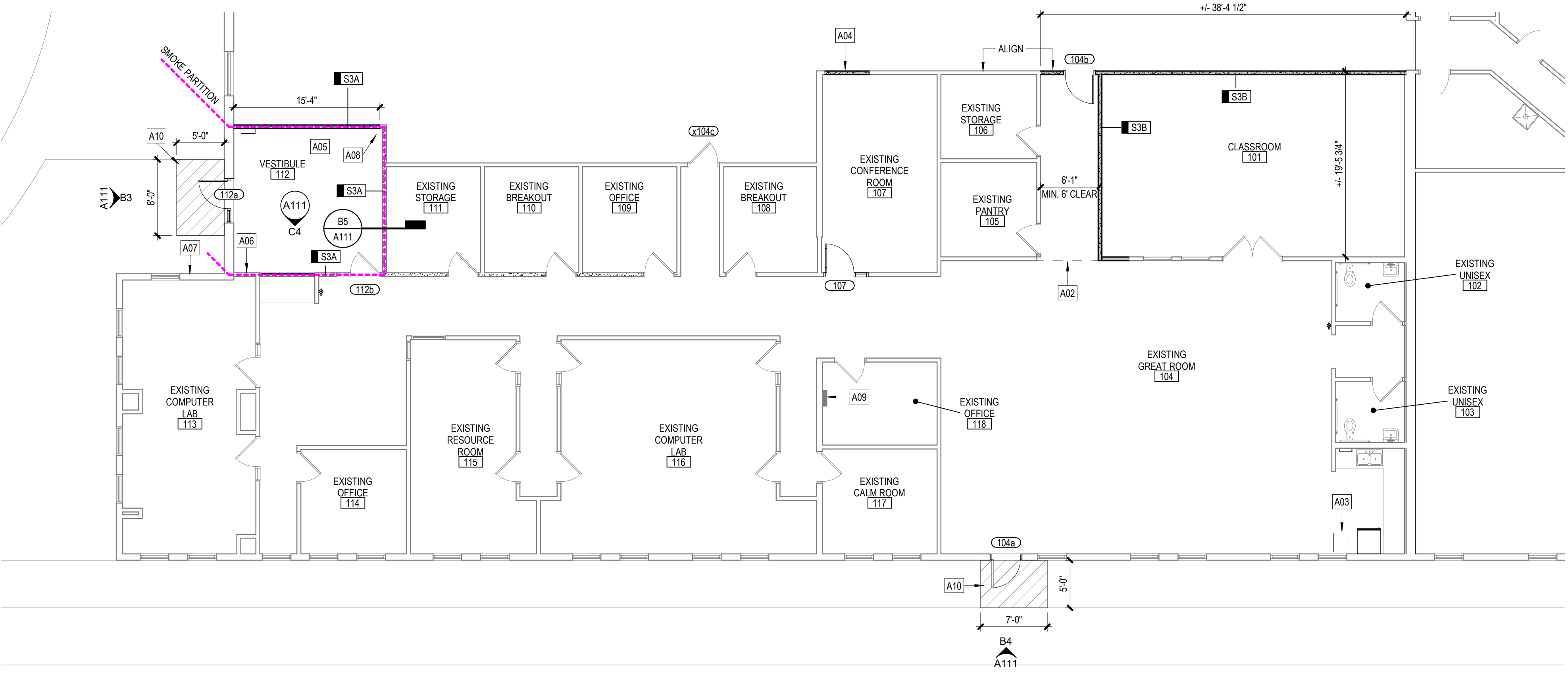


NOTE:
SITE PLAN SHOWN FOR REFERENCE. PROJECT SCOPE OF
WORK DOES NOT INCLUDE ANY EXTERIOR SITE
IMPROVEMENTS BESIDES TWO NEW EXTERIOR DOORS
TO THE SCHOOL AS NOTED.

5/26/2021 2:51:20 PM
A:01
35
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FIRST FLOOR DEMOLITION PLAN
1/8" = 1'-0"



FIRST FLOOR PLAN
1/8" = 1'-0"

DEMOLITION NOTES AND LEGEND

1. EXISTING BUILDING CONDITION BASED ON OWNER PROVIDED DRAWINGS AND LIMITED FIELD VERIFICATION. VERIFY EXACT CONDITIONS IN FIELD. SHOULD DISCREPANCIES OCCUR, NOTIFY ARCHITECT FOR CLARIFICATIONS.
2. BEGINNING WORK INDICATES THAT THE CONTRACTOR HAS ACCEPTED AND VERIFIED EXISTING CONDITIONS.
3. COORDINATE DEMOLITION WITH ALL CONTRACTORS WORKING IN AREAS BEING RENOVATED.
4. DURING DEMOLITION, PROTECT ALL ADJACENT CONSTRUCTION TO REMAIN.
5. ANY ASBESTOS CONTAINING MATERIALS THAT ARE ENCOUNTERED ARE TO BE REMOVED BY THE OWNER.
6. REFER TO MECHANICAL AND ELECTRICAL DRAWINGS FOR ITEMS TO BE REMOVED NOT SHOWN HERE.
7. COORDINATE THE RETURN AND STORAGE OF ALL ITEMS DESIGNATED AS SALVAGE WITH OWNER.
8. PROVIDE TEMPORARY SHORING AND/OR STAGING OF THE DEMOLITION WORK.
9. MANY OF THE MASONRY WALLS OF THIS BUILDING ARE LOAD-BEARING. COORDINATE DEMOLITION OF ALL WALLS OR PORTIONS OF WALLS FOR NEW OPENINGS WITH STRUCTURAL DOCUMENTS AND EXISTING CONDITIONS. CONTRACTOR IS RESPONSIBLE FOR SHORING ALL STRUCTURE SUPPORTED BY BEARING WALLS PRIOR TO REMOVAL.
10. COORDINATE CONSTRUCTION BARRIER LOCATIONS, NOISY DEMOLITION / CONSTRUCTION, AND WORK NOTED "INTERMITTENT" WITH OWNER.

- ===== EXISTING CONSTRUCTION TO REMAIN
----- EXISTING CONSTRUCTION TO BE REMOVED

GENERAL NOTES

1. DO NOT SCALE DRAWINGS.
2. FINISH FLOOR ELEVATION = 100'-0". REFER TO CIVIL DRAWINGS FOR SITE DATUM ELEVATION EQUIVALENT.
3. EXISTING BUILDING CONDITIONS BASED ON OWNER PROVIDED DRAWINGS AND LIMITED FIELD VERIFICATION. VERIFY EXACT CONDITIONS IN FIELD. SHOULD DISCREPANCIES OCCUR, NOTIFY ARCHITECT FOR CLARIFICATIONS.
4. BEGINNING WORK INDICATES THAT THE CONTRACTOR HAS ACCEPTED AND VERIFIED EXISTING CONDITIONS.
5. REFER TO CODE COMPLIANCE DRAWING(S) FOR LOCATIONS OF RATED ASSEMBLIES AND CODE SUMMARY.
6. ABBREVIATIONS, TYPICAL MOUNTING DIMENSIONS, AND ANNOTATION SYMBOLS ARE SHOWN ON GENERAL INFORMATION DRAWINGS.
7. WALL DIMENSIONS ARE TO FACE OF MASONRY, FACE OF CONCRETE, FACE OF STUDS, COLUMN CENTERLINE AS SHOWN OR EXISTING CONSTRUCTION UNLESS OTHERWISE NOTED.
8. ALL DIMENSIONS ARE PERPENDICULAR AND PARALLEL, UNLESS NOTED OTHERWISE.
9. PATCH ALL DISTURBED SURFACES WITH MATERIALS TO MATCH ADJACENT SURFACE CONSTRUCTION.
10. PROVIDE APPROVED SMOKE/FIRESTOPPING ASSEMBLIES AT ALL MECHANICAL AND ELECTRICAL PENETRATIONS THROUGH SMOKE RESISTANT PARTITIONS IDENTIFIED ON CODE COMPLIANCE DRAWINGS.
11. REFER TO SPECIFICATION SECTION 10 1400 FOR REQUIRED LOCATIONS OF CODE REQUIRED SIGNAGE.

INTERIOR PARTITION GENERAL NOTES

- ===== EXISTING WALL CONSTRUCTION
===== NEW STUD WALL CONSTRUCTION
1. CONSTRUCT ALL WALLS TIGHT TO DECK ABOVE AND EXTEND INTO DECK FLUTES AND WEBS OF STEEL MEMBERS UNLESS OTHERWISE NOTED.
 2. PROVIDE DEFLECTION TRACK AT THE TOP OF ALL INTERIOR NON-BEARING METAL STUD WALLS CAPABLE OF ACCOMMODATING 1" ROOF-FLOOR DEFLECTION. REFER TO DETAILS FOR HEAD OF WALL CONDITION.
 3. REFER TO CODE COMPLIANCE PLAN FOR RATED WALL LOCATIONS. SMOKE RESISTANT ASSEMBLIES SHALL BE CONTINUOUS WITH OTHER PARTITIONS ABUTTING THEM.
 4. PROVIDE FIRESTOPPING/ SMOKE SEALANT AT ALL PENETRATIONS THROUGH SMOKE RESISTANT ASSEMBLIES, CORRIDORS, AND FLOORS WITH OCCUPIABLE SPACES ABOVE AND BELOW.
 5. PROVIDE ACOUSTICAL SEALANT AT ALL WALLS WITH ACOUSTICAL INSULATION.
 6. PROVIDE 5/8" WATER RESISTANT GYPSUM WALLBOARD AT ALL WALLS OF TOILET ROOMS, WALLS RECEIVING TILE, AND WALLS BEHIND AND ADJACENT TO SINKS.
 7. ALL WALLS ARE TYPE S3A UNLESS NOTED OTHERWISE.

INTERIOR PARTITION TAG LEGEND

CORE MATERIAL	CORE SIZE (NOMINAL)
S - STEEL STUDS	S
	0 7/8"
	1 1 5/8"
	2 2 1/2"
	3 3 5/8"
	4 4"
	5 6"
	6 8" CFMF
	7 8"
	8 8"
	9 8"
	10 8"
	11 8"
	12 8"

ACOUSTICAL INSULATION - PROVIDE ACOUSTICAL INSULATION AT TAGGED LOCATIONS

PARTITION TYPE SUFFIX - REFER TO SCHEDULE BELOW

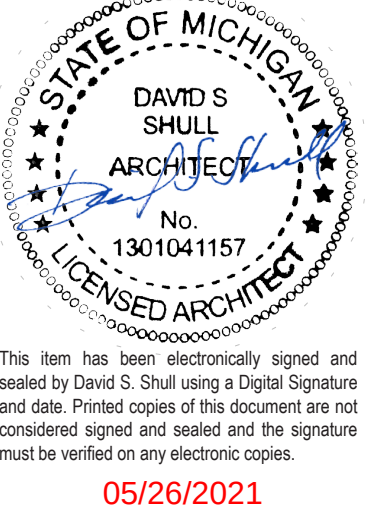
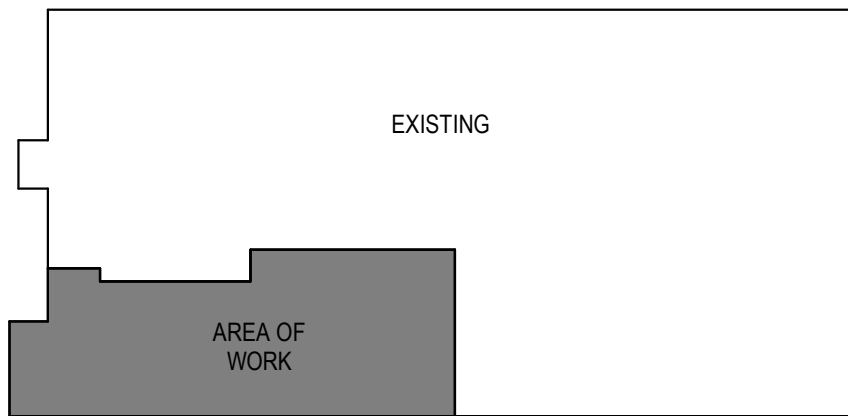
INTERIOR PARTITION TYPE SUFFIXES

A	5/8" GYPSUM BOARD ON BOTH SIDES WITH ACOUSTICAL BATT INSULATION; EXTEND TO DECK
B	5/8" GYPSUM BOARD ON BOTH SIDES WITH ACOUSTICAL BATT INSULATION; EXTEND TO 6" ABOVE CEILING

KEYNOTES

NUMBER	NOTE
A02	PATCH FLOOR FINISH AS NEEDED TO MATCH EXISTING - COORDINATE USE OF ATTIC STOCK WITH OWNER
A03	EXISTING ELECTRIC WATER DISPENSER
A04	INFILL OPENING WITH METAL STUDS AND GYP. BD. EACH SIDE, PAINT TO MATCH EXISTING FINISH
A05	EXTEND ALL (3) VESTIBULE WALLS TO ROOF DECK TO FORM SMOKE TIGHT PARTITION. RE: HEAD OF WALL DETAIL
A06	PHONE INTERCOM WIRED TO RECEPTION DESK
A07	SURFACE MOUNTED KNOX BOX, COORDINATE WITH OWNER
A08	TV MONITOR - REFER TO ELECTRICAL
A09	EXISTING ELECTRICAL PANEL
A10	REMOVE WALL OR PORTION OF WALL AS SHOWN
D01	SALVAGE DOOR AND RELOCATE PER PLANS
D02	REMOVE AND SALVAGE SUSPENDED CEILING PANELS AND GRID AS REQUIRED FOR CONSTRUCTION OF NEW WALLS. EXISTING CEILING TO REMAIN INTACT DURING CONSTRUCTION
D04	EXISTING WALL TO BE REMOVED. PATCH CONCRETE FLOOR UNDER WALLS AND PREP FOR NEW WALL COVERING
D05	REMOVE SLIDING GLASS WINDOW AND FRAME
D06	REMOVE GLASS WINDOW AND FRAME
D07	SAWCUT EXISTING WALL BELOW AND PREP FOR NEW DOOR AND FRAME
D08	SAWCUT AND WIDEN OPENING TO MINIMUM 3'-4" FOR INSTALLATION OF NEW DOOR AND FRAME

KEY PLAN

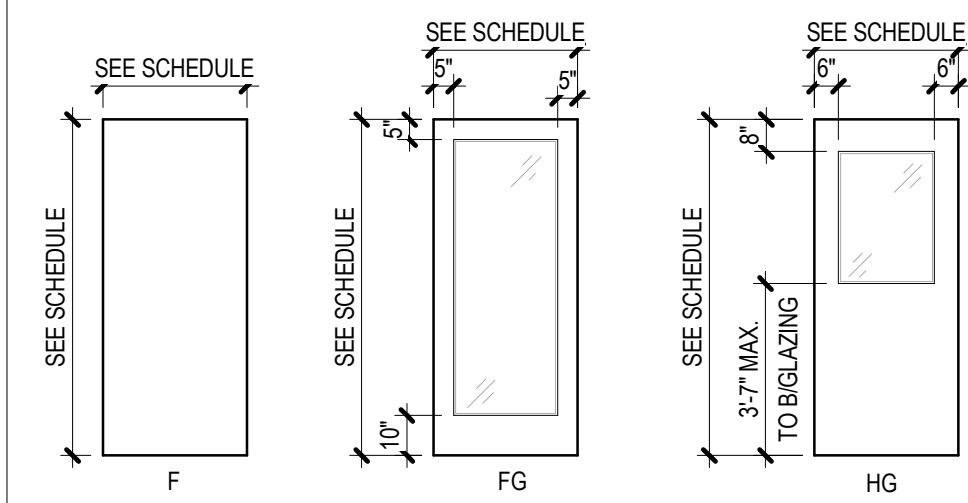


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5/26/2021

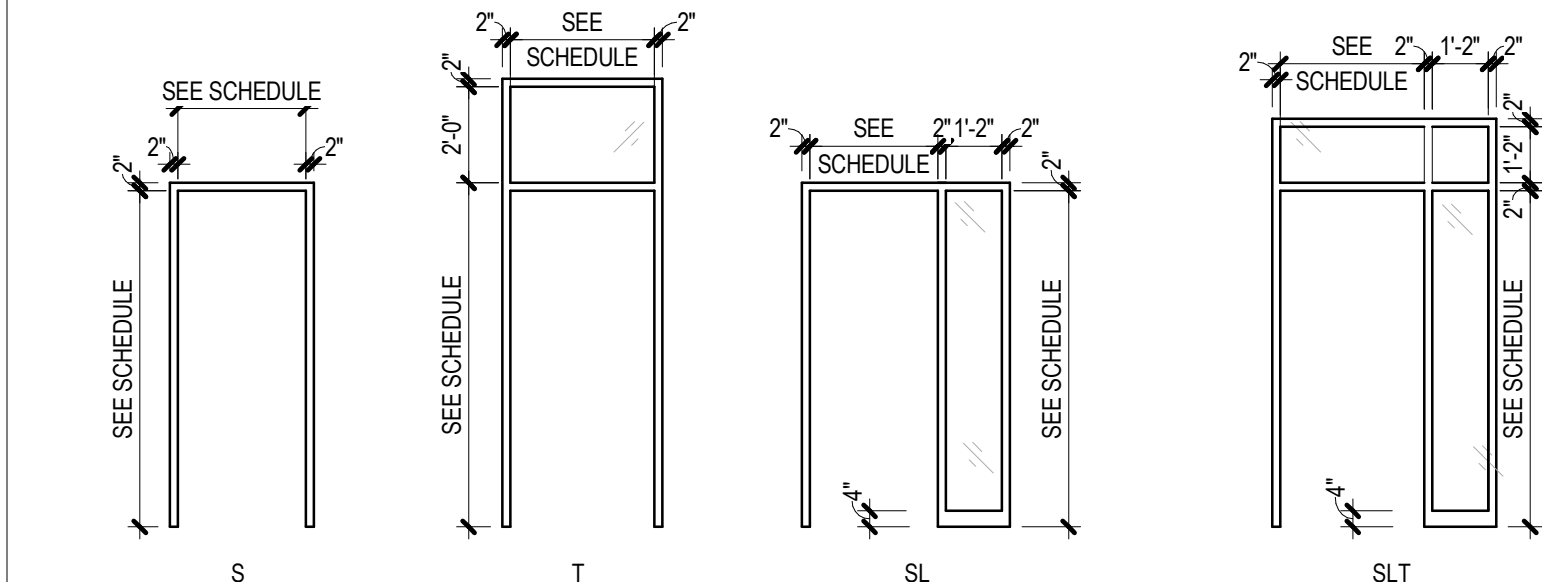
REVISIONS
NO. DATE DESCRIPTION

FILE NUMBER 85710002
PROJECT MANAGER BJY
PROFESSIONAL
DRAWN BY
CHECKED BY

DOOR TYPES

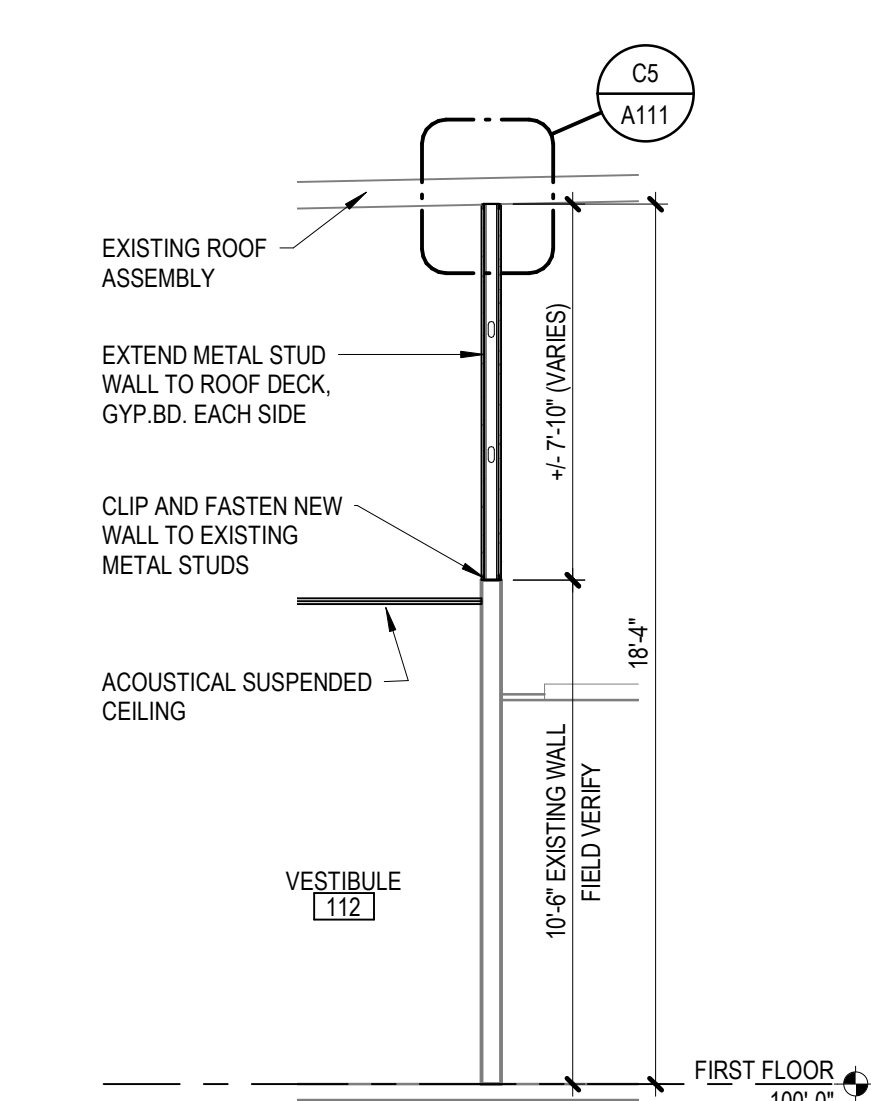


FRAME TYPES

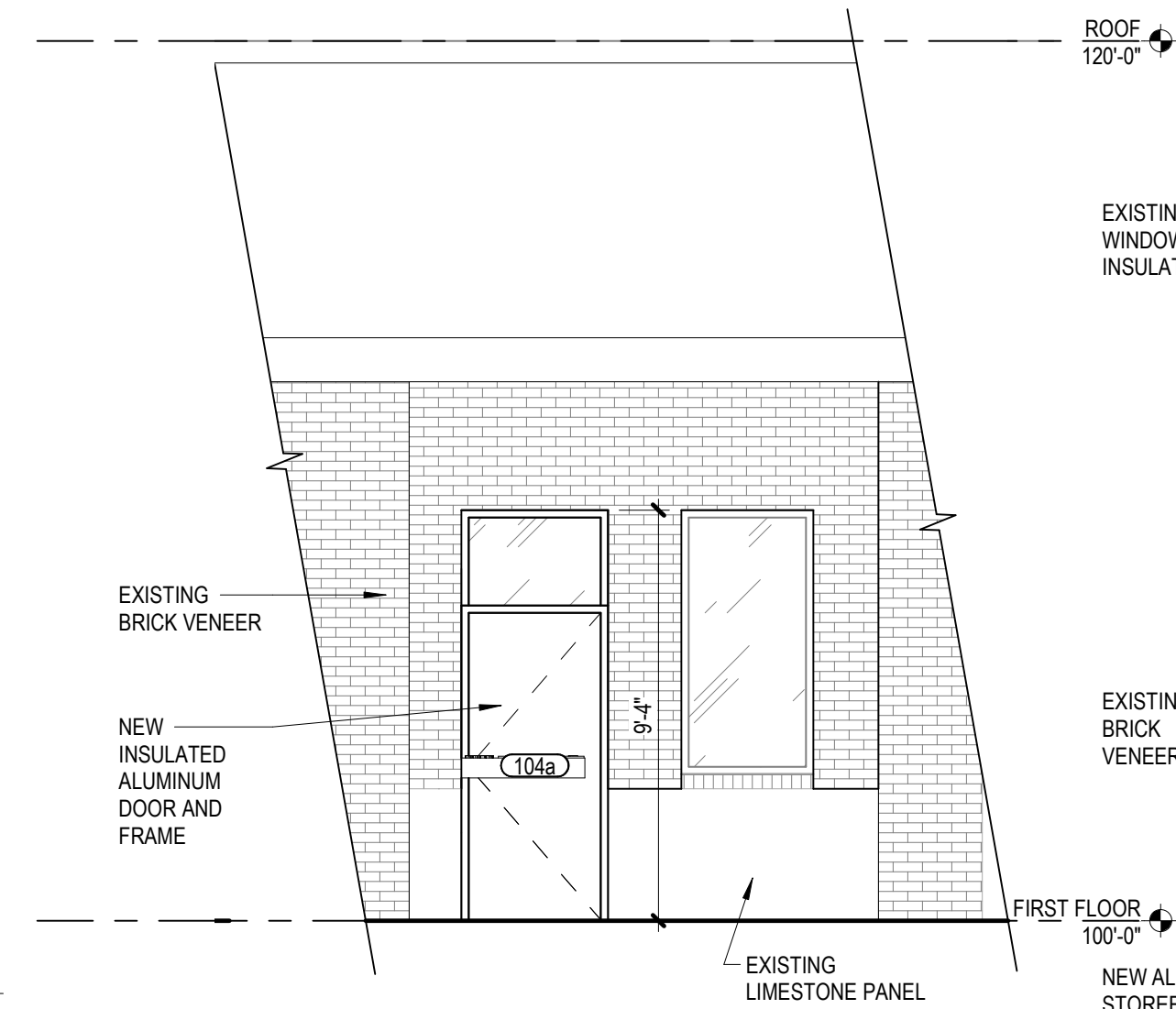


DOOR SCHEDULE

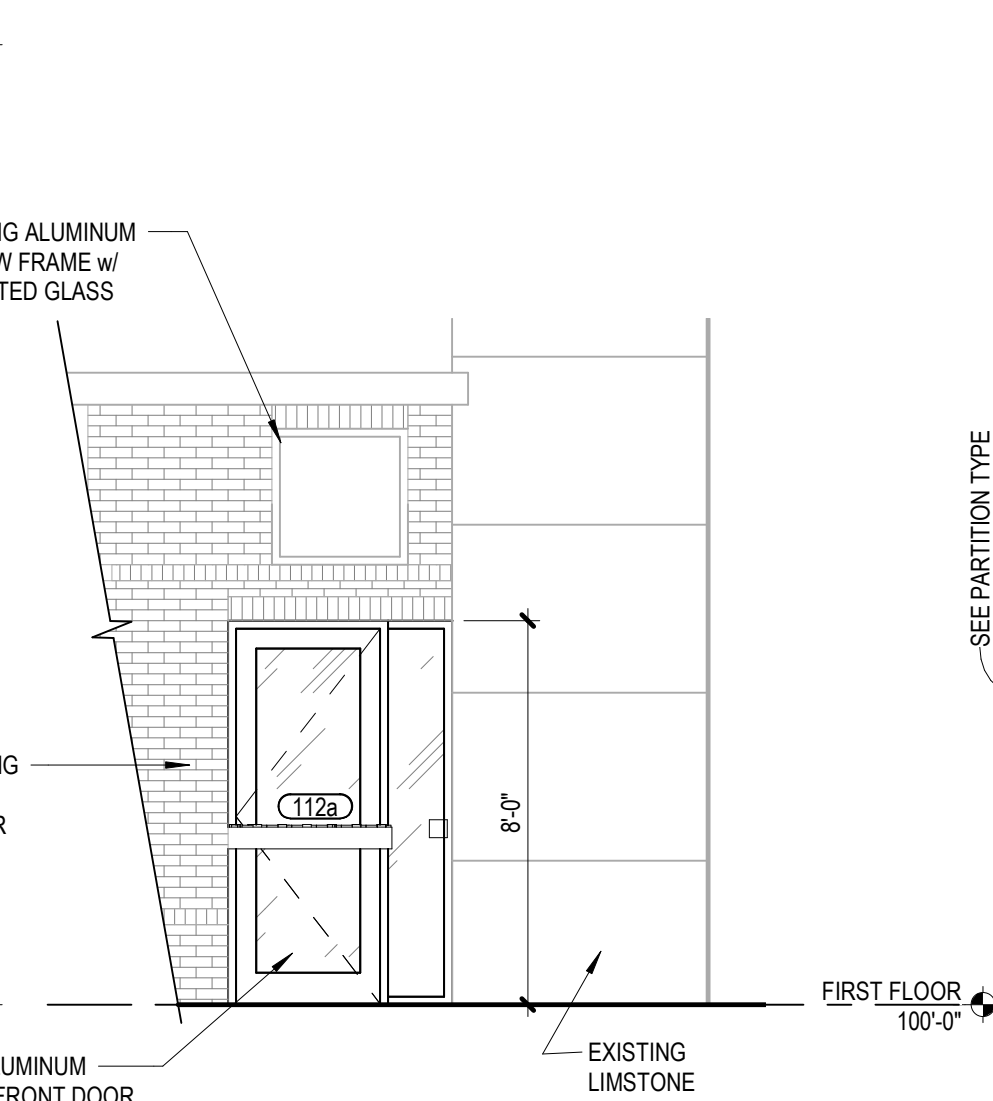
MARK	ROOM	DOOR			FRAME				DETAILS			FUNCTION				CLOSURE										GLAZING	NOTES											
	NAME	WIDTH	HEIGHT	TYPE	MATERIAL	TYPE	MATERIAL		RATING	HEAD	JAMB	SILL	CYLINDER ONLY	PASSAGE LOCKSET		STOREROOM LOCKSET	PRIVACY LOCKSET	PANIC DEVICE	WALL STOP	HINGES	NO HOLD OPEN	HOLD OPEN	ELECTROMAGNETIC LOCK	KICK PLATE	ELECTRIC STRIKE	DOOR CONTACT		CARD READER	REMOTE OPERATOR	FLUSH BOLT	THRESHOLD	WEATHER STRIP	SWEEP	SMOKE SEAL	1 1/4" CLEAR TEMPERED	1" CLEAR INSULATED TEMPERED	1" LAMINATED GLAZING	
FIRST FLOOR																																						
104a	EXISTING GREAT ROOM	3'-0"	7'-0"	F	HM	T	HM	-	C3/A111	C3/A111																											EXTERIOR HARDWARE TO BE ONLY: KEY LOCK, VANDAL PULL	
104b	EXISTING GREAT ROOM	3'-0"	7'-0"	HG	WD	S	HM	-	B2/A111	B2/A111																											REUSE SALVAGED DOOR AND HARDWARE	
107	EXISTING CONFERENCE ROOM	3'-0"	7'-0"	HG	WD	SLT	HM	-	B2/A111	B2/A111																											REUSE SALVAGED DOOR AND HARDWARE	
112a	VESTIBULE	3'-0"	7'-10"	FG	ALUM	SL	ALUM	-	C3/A111	C3/A111																											COORDINATE KEYING/ LOCKSET WITH OWNER	
112b	EXISTING GREAT ROOM	3'-0"	7'-0"	EXIST.	EXIST.	EXIST.	EXIST.	-	-	-																											EXISTING DOOR AND FRAME	



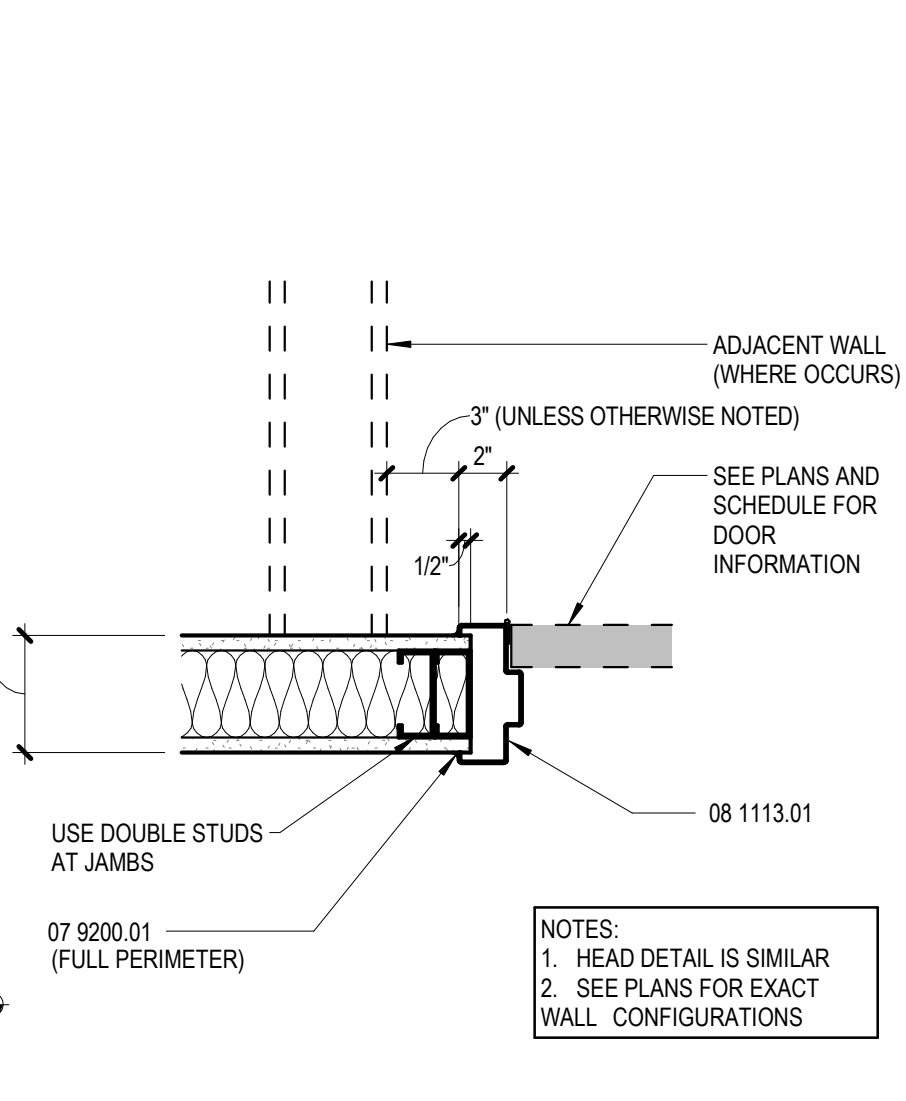
B5 WALL DETAIL
1/4" = 1'-0"



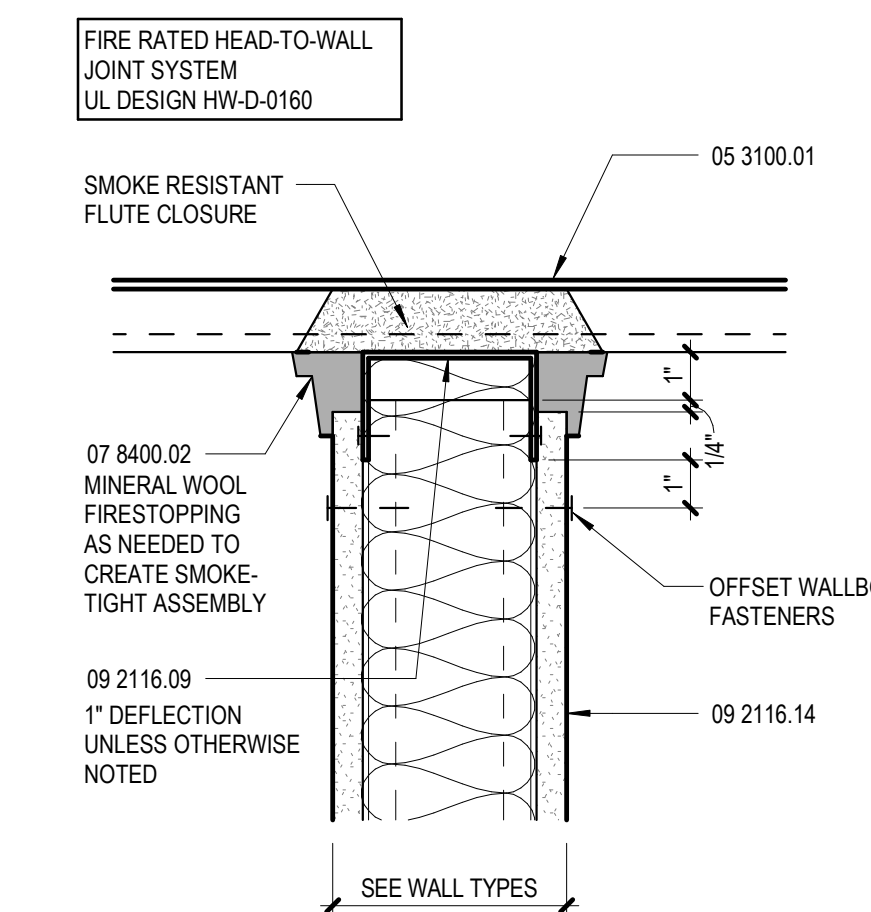
B4 PARTIAL EXTERIOR ELEVATION
1/4" = 1'-0"



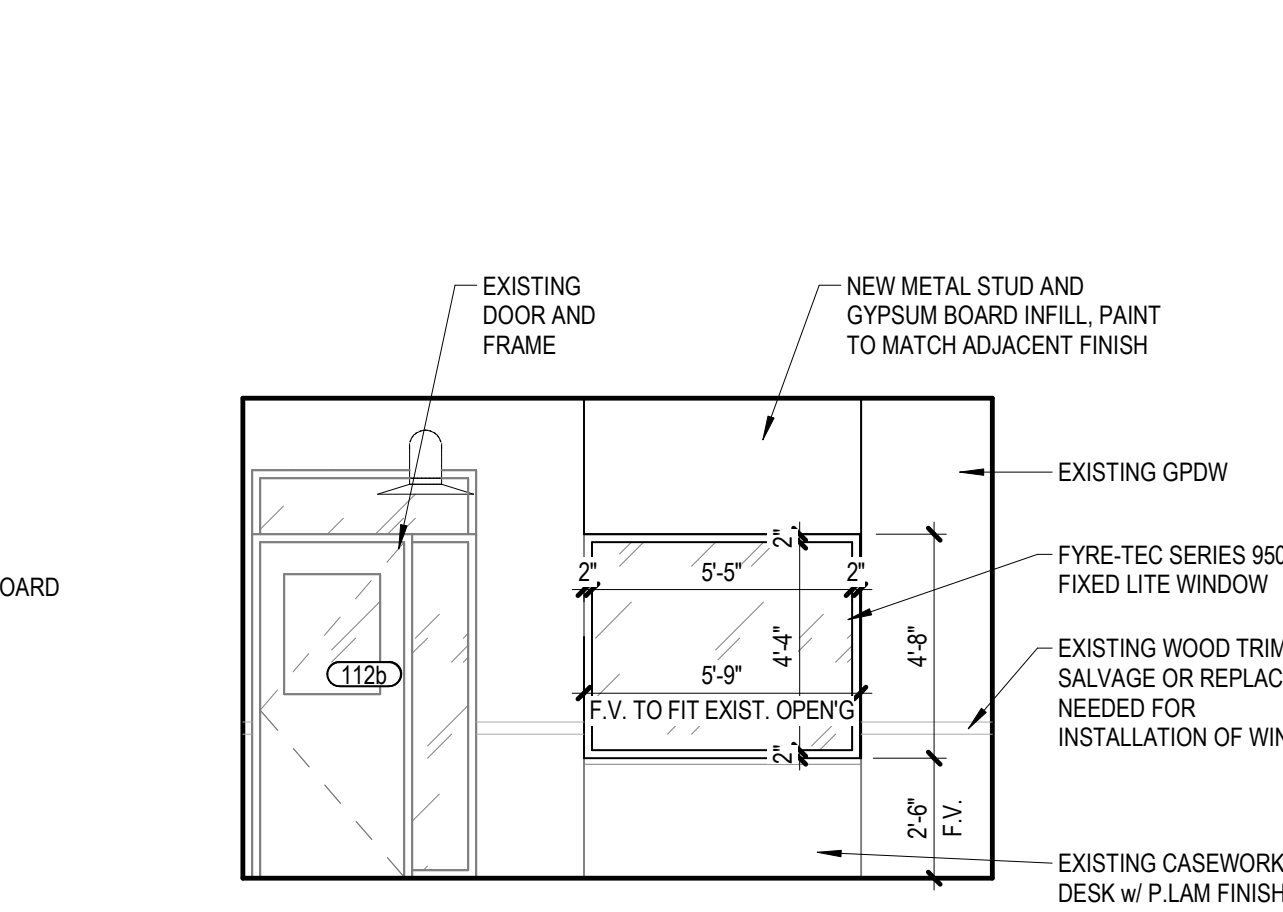
B3 PARTIAL EXTERIOR ELEVATION
1/4" = 1'-0"



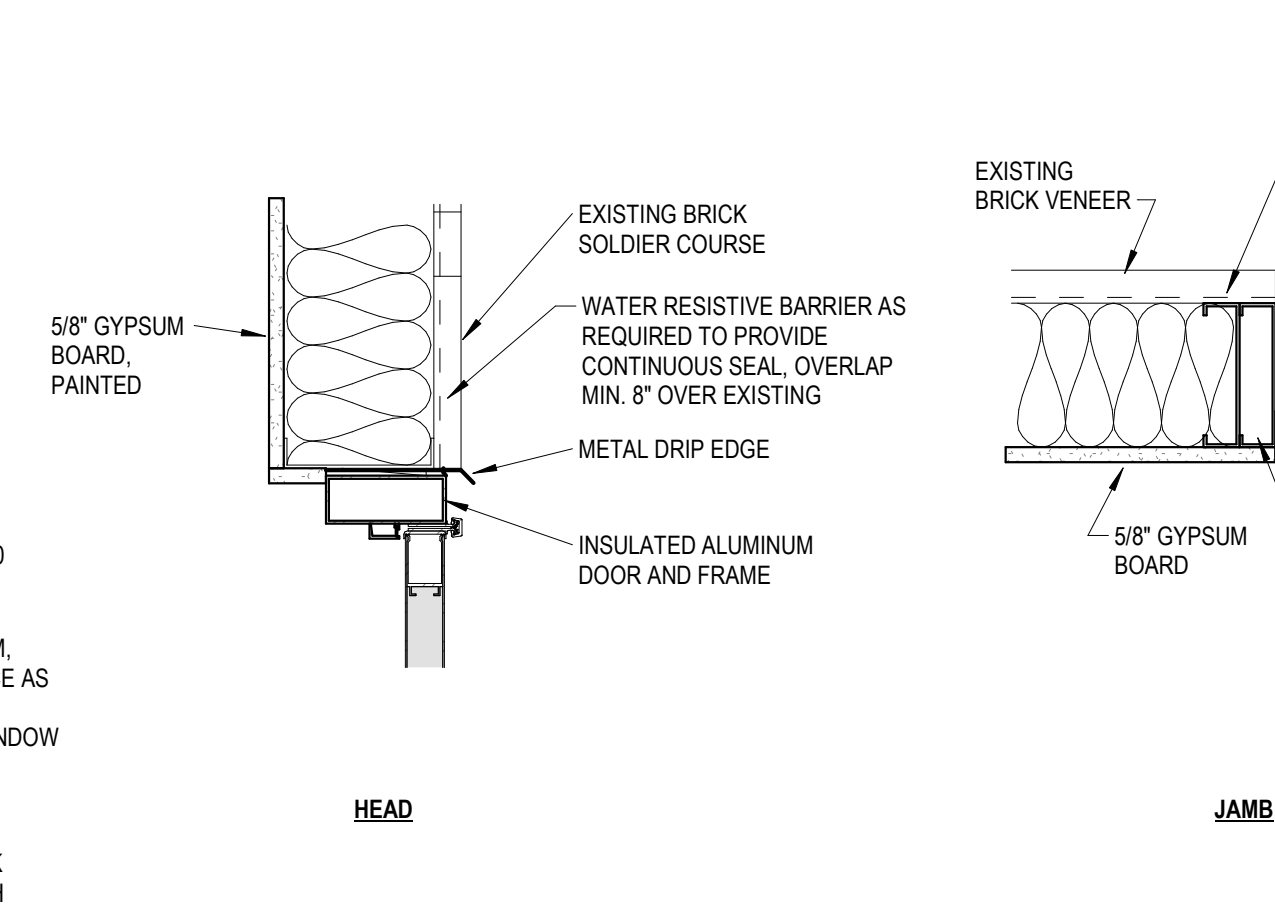
B2 INTERIOR HOLLOW METAL FRAME
1 1/2" = 1'-0"



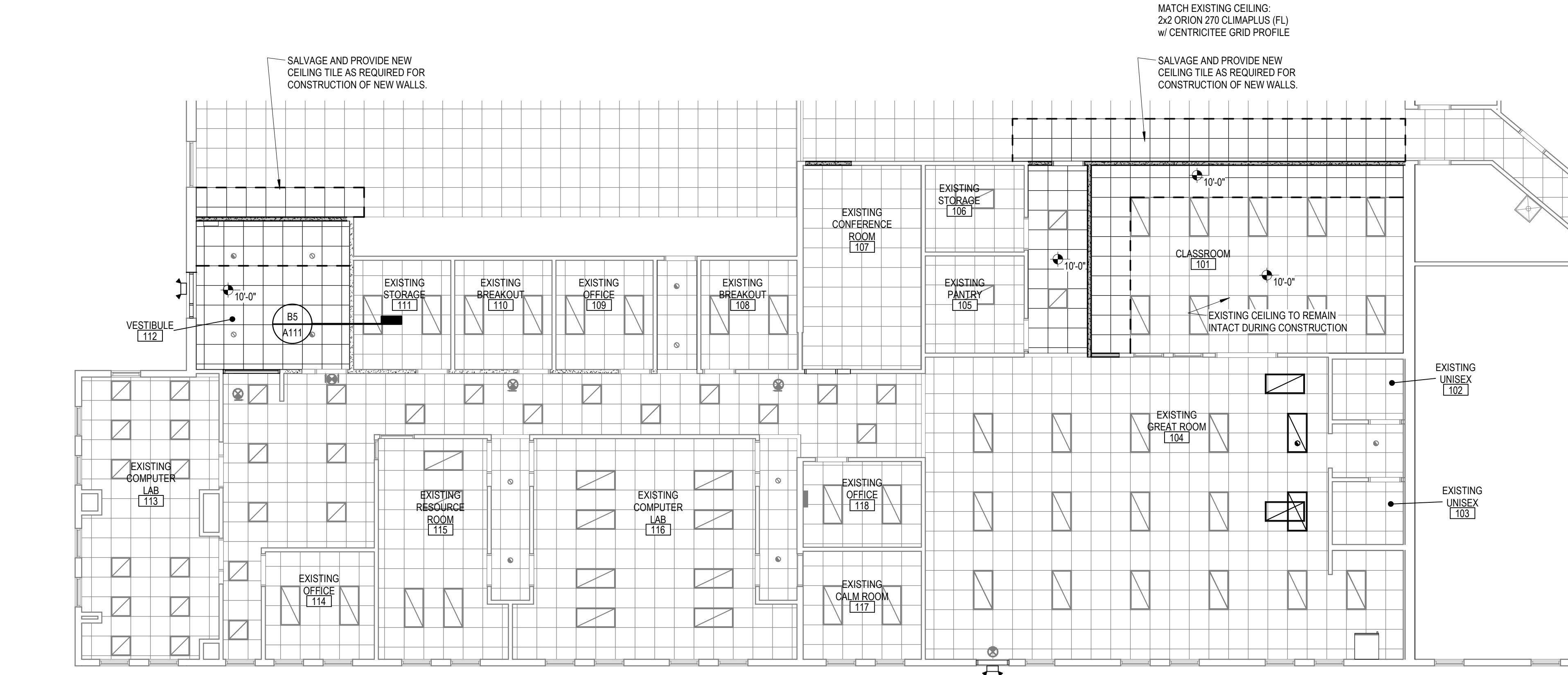
C5 HEAD OF WALL DETAIL
3" = 1'-0"



C4 INTERIOR ELEVATION
1/4" = 1'-0"



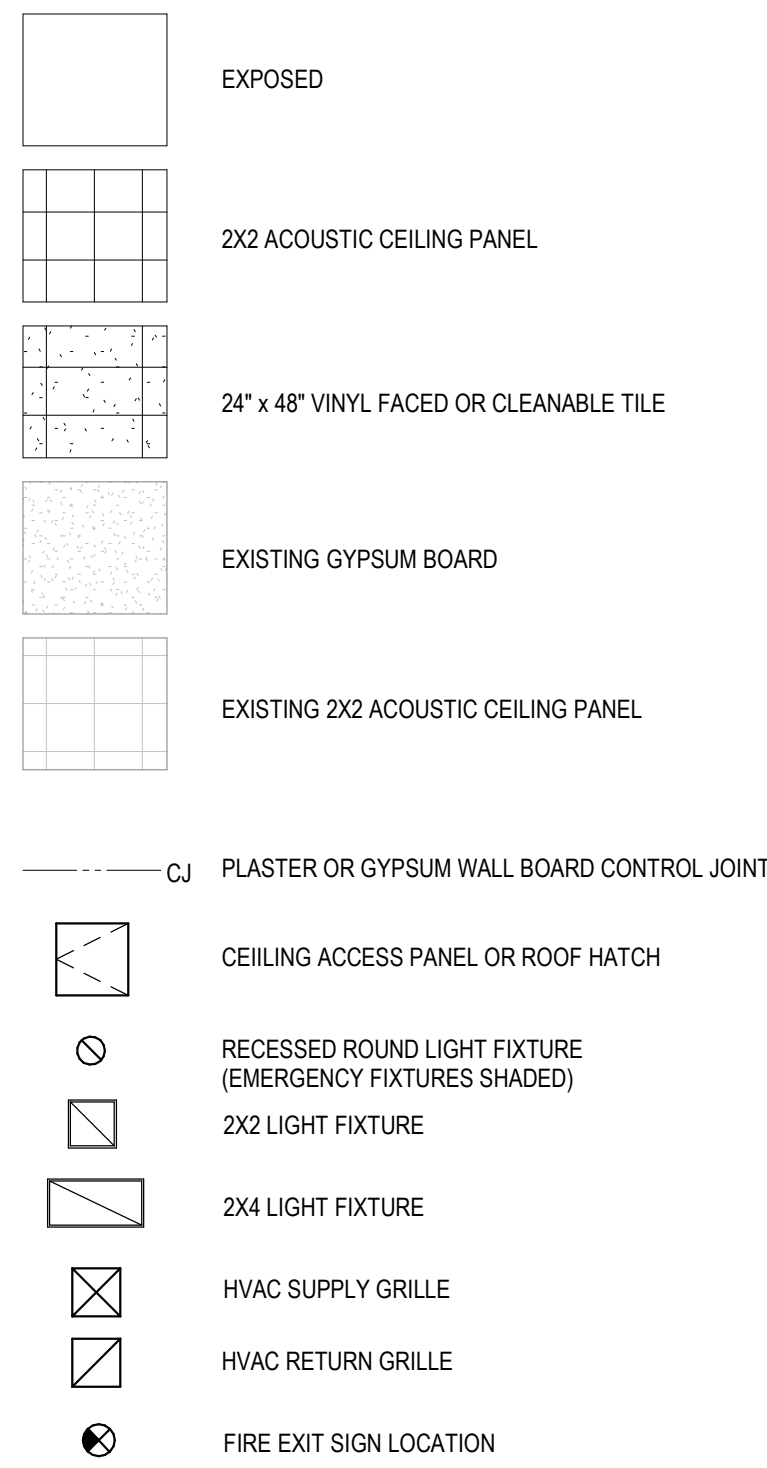
C3 EXTERIOR HOLLOW METAL FRAME
1 1/2" = 1'-0"



FIRST FLOOR REFLECTED CEILING PLAN
1/8" = 1'-0"

REFLECTED CEILING PLAN LEGEND

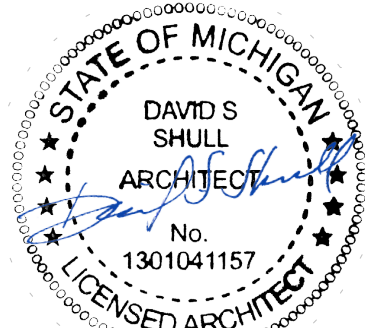
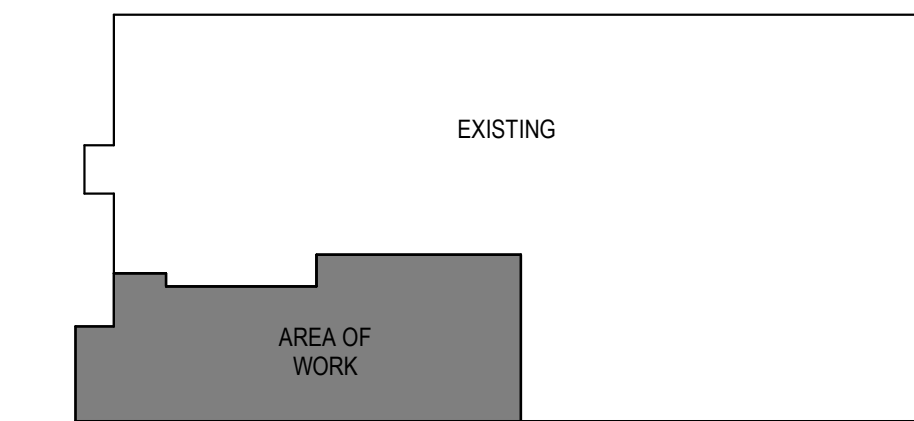
- ALL CEILING GRIDS ARE TO BE CENTERED IN ROOM / AREA OR ALIGNED WITH ADJACENT ROOM / AREA AS INDICATED, UNLESS NOTED OTHERWISE.
- CEILING HEIGHTS INDICATED ARE DIMENSIONED FROM THE FINISHED FLOOR BELOW.
- ALL LIGHT FIXTURES, SPRINKLER HEADS, RETURN AIR GRILLES AND SUPPLY AIR GRILLES ARE TO BE LOCATED IN THE CENTER OF THE CEILING PAD, UNLESS NOTED OTHERWISE.
- COORDINATE MECHANICAL, ELECTRICAL AND FIRE PROTECTION TO ASSURE PROPER CLEARANCES AND LAYOUT.
- MECHANICAL, ELECTRICAL AND FIRE PROTECTION CONTRACTORS TO PROVIDE ACCESS PANELS IN CEILINGS AS REQUIRED FOR MAINTENANCE OF EQUIPMENT. COORDINATE SIZE AND LOCATIONS OF ACCESS PANELS TO MINIMIZE QUANTITIES. CONTRACTOR IS REQUIRED TO PROVIDE LAYOUT TO ARCHITECT FOR REVIEW PRIOR TO INSTALLATION, UNLESS NOTED OTHERWISE.
- REFER TO FINISH SCHEDULE(S) FOR CEILING AND/OR EXPOSED STRUCTURE TO BE PAINTED.



KEYNOTES

NUMBER	NOTE
05 3100.01	STEEL ROOF DECK
07 8400.02	FIRESTOPPING BLANKET
07 9200.01	PERIMETER SEALANT
08 1113.01	HOLLOW METAL FRAME
09 2116.09	DEFLECTION TRACK
09 2116.14	5/8\"/>

KEY PLAN



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05/26/2021

ISSUANCE

FOR CONSTRUCTION
5/26/2021

REVISIONS

NO. DATE DESCRIPTION

FILE NUMBER 85710002
PROJECT MANAGER BJY
PROFESSIONAL
DRAWN BY
CHECKED BY

REFLECTED
CEILING PLAN,
DOOR
SCHEDULE, AND
DETAILS

A111

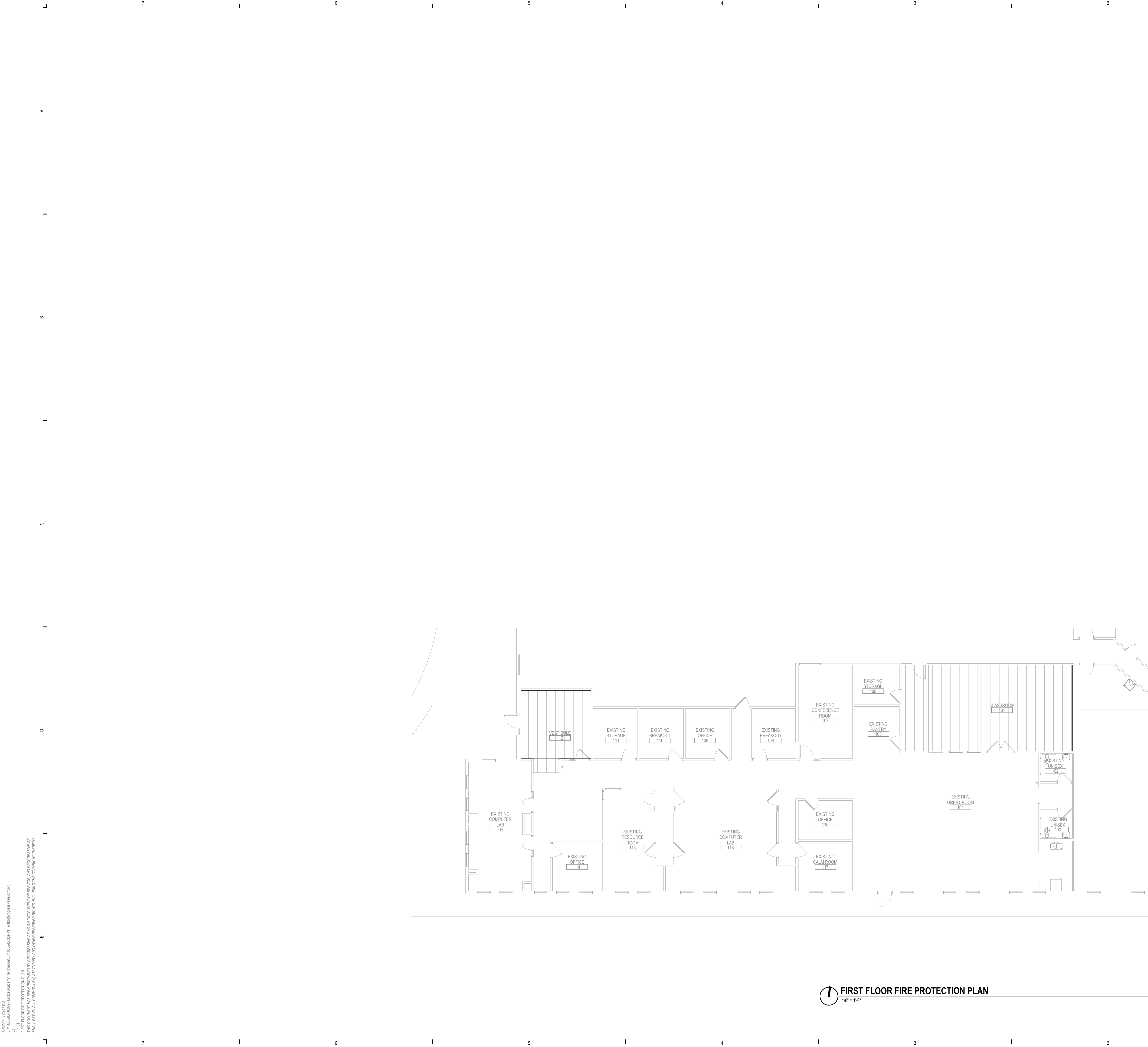
KINEXUS

BRIDGE ACADEMY RENOVATION

459 West Main St. Benton Harbor, MI 49022

progressive ae

1811 4 Mile Rd. NE, Grand Rapids, MI 49525 616.361.2664 | www.progressiveae.com



FIRE SPRINKLER DESIGN CRITERIA

CLASSIFICATION: LIGHT HAZARD
DENSITY: 0.10 GPM/SQ FT
TYPICAL OPERATING AREA: 1,500 SQ. FT.
TYPICAL SPRINKLER SPACING: 225 SQ. FT. MAX.
TEMPERATURE RATING: 165°F.

CLASSIFICATION: ORDINARY HAZARD
DENSITY: 0.15 GPM/SQ FT
TYPICAL OPERATING AREA: 1,500 SQ. FT.
TYPICAL SPRINKLER SPACING: 130 SQ. FT. MAX.
TEMPERATURE RATING: 165°F.

CLASSIFICATION: GROUP 1 EXTRA HAZARD
DENSITY: 0.30 GPM/SQ FT
TYPICAL OPERATING AREA: 2300 SQ. FT.
TEMPERATURE RATING: 165°F.

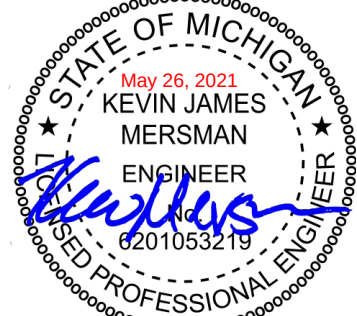
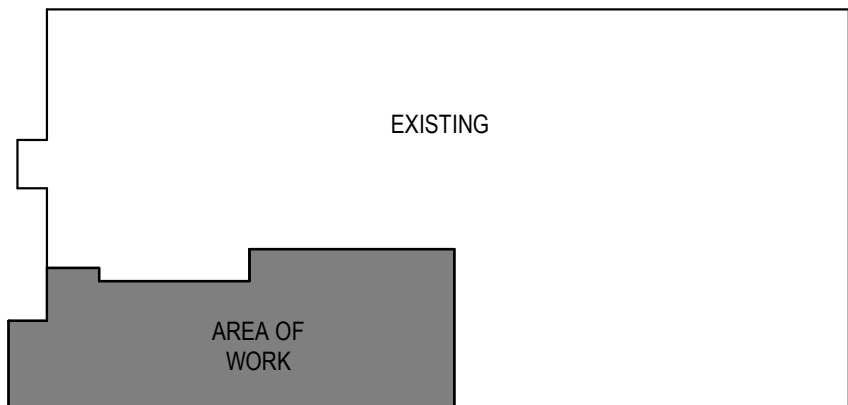
GENERAL INSTALLATION NOTES:
1. THE AWARDED FPC SHALL BE RESPONSIBLE TO ORDER A NEW WATER FLOW TEST IF EXISTING DATA TAKEN WITHIN THE LAST YEAR IS NOT AVAILABLE.
2. DESIGN CALCULATIONS FOR NEW SPRINKLERS SHALL ALLOW FOR 10 PERCENT SAFETY FACTOR.
3. EXISTING FIRE DEPARTMENT CONNECTIONS AND HOSE REELS SHALL REMAIN.
4. CLASSIFICATION PERTAINS TO BOTH NEW ADDITIONS AND REMODEL AREAS.

FIRE PROTECTION SCOPE - EXISTING AREAS WITH EXISTING SPRINKLERS TO BE REMOVED AND REPLACED AS REQUIRED FOR NEW LAYOUT.

FIRE SPRINKLER GENERAL NOTES

1. ALL ROOMS AREAS PART OF THIS REMODEL PROJECT ARE CURRENTLY SPRINKLED. THIS CONTRACTOR SHALL BE RESPONSIBLE TO MODIFY THE EXISTING FIRE SPRINKLER SYSTEM AS REQUIRED DUE TO CHANGES IN WALLS, CEILINGS, LIGHTING AND HVAC. ALL ROOMS AREAS WITHIN THE BOUNDARY OF THIS REMODEL SHALL BE SPRINKLED. ALL NEW WORK SHALL BE DESIGNED AND INSTALLED IN ACCORDANCE WITH NFPA 13, STATE CODES, LOCAL CODES AND LOCAL ORDINANCES. ALL COMPONENTS SHALL BE UL LISTED AND FM APPROVED.
2. ALL NEW SPRINKLERS SHALL BE QUICK RESPONSE TYPE.
3. EXISTING SPRINKLERS WILL REMAIN IF THEY ARE NOT REQUIRED TO BE MOVED. NEW SPRINKLER LOCATIONS WILL REQUIRE NEW SPRINKLER HEADS (NO REALLOCATIONS REQUIRING RE-THREADING HEAD INTO NEW DROP PIPE).
4. REFER TO "C" DRAWINGS AND TITLE SHEET "T" FOR CODE COMPLIANCE AND ADDITIONAL INFORMATION.
5. PROVIDE ALL NECESSARY OFFSETS, RAISES OR DROPS IN PIPING AND AUXILIARY DRAINS REQUIRED BY BUILDING CONDITIONS.
6. EXAMINE THE JOB CONDITIONS AND VERIFY ALL MEASUREMENTS, DISTANCES, ELEVATIONS, CLEARANCES ETC.
7. ARCHITECTURAL, HVAC AND ELECTRICAL BACKGROUND INFORMATION IS SHOWN FOR COORDINATION PURPOSES ONLY. REFER TO THE PROPER DRAWINGS FOR EXACT LOCATIONS, SIZES AND QUANTITIES OF OTHER TRADES' WORK.
8. AUTOCAD (DWG) OR MICROSTATION (DGN) COMPATIBLE FILES WILL BE MADE AVAILABLE TO THE SUCCESSFUL FIRE SPRINKLER CONTRACTOR IN ELECTRONIC FORMAT ON REQUEST.
9. SYSTEM MODIFICATIONS SHALL BE DESIGNED AND SIZED HYDRAULICALLY IN ACCORDANCE WITH NFPA 13, OWNERS INSURER, AND ALL STATE AND LOCAL CODES AS INTERPRETED BY THE AUTHORITY HAVING JURISDICTION.
10. ALL NEW SYSTEM PIPING SHALL BE INSTALLED TO ALLOW DRAINAGE BACK TO THE SYSTEM RISERS WHEN POSSIBLE. WHERE IMPRACTICAL, AUXILIARY DRAINS SHALL BE INSTALLED AND DRAINED TO AN ACCEPTABLE LOCATION AS AGREED TO BY THE OWNER AND ENGINEER. EXISTING DRAINS SHALL REMAIN.
11. COORDINATE SPRINKLER HEAD LOCATIONS AND PIPE ROUTING WITH OTHER TRADES TO AVOID INTERFERENCE. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS AND THE MECHANICAL AND ELECTRICAL PLANS FOR LOCATIONS OF CEILINGS, DIFFUSERS, LIGHTS AND OTHER CEILING ORNAMENTATION.
12. ALL MAINS RUNNING PARALLEL WITH BUILDING JOISTS/BEAMS SHALL BE HUNG USING HANGERS ATTACHED TO SUPPORTING STEEL SUPPORTED AT PANEL POINTS OF JOISTS AND IN ACCORDANCE WITH NFPA STANDARDS.
13. REFER TO GENERAL AND SUPPLEMENTAL CONDITIONS OF BID INSTRUCTIONS FOR CUTTING AND PATCHING OF WALLS AND ROOFS. THE FIRE PROTECTION CONTRACTOR IS RESPONSIBLE FOR ALL PENETRATIONS REQUIRED TO COMPLETE THE WORK. SEE MECHANICAL SPECIFICATIONS FOR PIPE SEALS, WATERPROOFING AND SLEEVES, AND ESCUTCHEON REQUIREMENTS.
14. REFER TO SPECIFICATION FOR SPRINKLER TYPES. WHERE CEILINGS ARE PRESENT, STANDARD SPRINKLER TO BE CONCEALED HEAD WITH WHITE ESCUTCHEON PLATE, CENTERED ON CEILING PAD, UNLESS OTHERWISE INDICATED ON PLANS OR IN SPECIFICATION.
15. ALL FIRE PROTECTION PIPING SHALL BE PROVIDED IN ACCORDANCE WITH NFPA 13, THREADING OF LIGHT WALL PIPING (LESS THAN SCHEDULE 40) SHALL BE PROHIBITED. OUTLETS AND TEES BEING APPLIED TO EXISTING PIPING MUST BE OF THE WELDED, THREADED OR GROOVED DESIGN. "TAP-ON" TYPE TEES THAT ARE NOT FULL CIRCUMFERENCE, RATED TYPE CONNECTIONS WILL NOT BE ALLOWED.
16. ALL SPRINKLERS SHALL BE UL LISTED AND FM APPROVED FOR THE INTENDED APPLICATION WHEN APPLIED IN ACCORDANCE WITH THE MANUFACTURERS LISTINGS. SPRINKLERS SHALL BE GLASS BULB TYPE AND SHALL COMPLY WITH THE REQUIREMENTS OF NFPA 13.
17. REFER TO ARCHITECTURAL DRAWINGS, SPECIFICALLY WALL SECTIONS AND REFLECTED CEILING PLANS. THE CONTRACTOR SHALL ROUTE NEW FIRE SPRINKLER PIPING AT ELEVATION EQUAL TO EXISTING, COORDINATING WITH NEW AND EXISTING DUCTWORK, PLUMBING AND ELECTRICAL CONDUIT. DESIGN INTENT IS FOR FP PIPING TO ROUTE AROUND EXISTING MECHANICAL CONDITIONS.

KEY PLAN



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ISSUANCE

FOR CONSTRUCTION
5/26/2021

REVISIONS

NO. DATE DESCRIPTION

FILE NUMBER 85710002
PROJECT MANAGER B.JY
PROFESSIONAL K.JM
DRAWN BY DEW
CHECKED BY K.JM

FIRST FLOOR
FIRE
PROTECTION
PLAN
FP101

ABBREVIATIONS - PLUMBING			
AC	AIR COMPRESSOR	LWT	LEAVING WATER TEMPERATURE
AC	ARCHITECTURAL CONTRACTOR	MB	MOP BASIN
ADA	AMERICANS WITH DISABILITIES ACT	MCA	MINIMUM CIRCUIT AMPS
AVS	ACID VENT STACK	MH	MANHOLE
AW	ACID WASTE	MOP	MAXIMUM OVERCURRENT PROTECTION
B	BOILER	NG	NATURAL GAS
BV	BALL VALVE	ORD	OVERHEAD DOOR
CB	CATCH BASIN	ORD	OVERFLOW ROOF DRAIN
CBS	COMBINATION BALANCE & SHUTOFF VALVE	PF	PUMP - FIRE PROTECTION
CIP	CAST IRON PIPE	PP	PUMP - PLUMBING
CO	CLEANOUT	PSI	POUNDS PER SQUARE INCH
COMP	COMPARTMENT	PSIG	POUNDS PER SQUARE INCH GAUGE
CS	CLINICAL SINK	RD	ROOF DRAIN, ROAD
CV	CHECK VALVE	RIO	ROUGH-IN ONLY
CW	COLD WATER	RPBP	REDUCED PRESSURE BACKFLOW PREVENTER
D&T	DRIP AND TRAP	RPM	REVOLUTIONS PER MINUTE
DB	DIALYSIS WASTE & SUPPLY BOX	RR	REST ROOM
DCP	DOMESTIC WATER CIRCULATING PUMP	RV	RELIEF VENT
DOR	DOMESTIC COLD WATER RETURN	S	SINK
DN	DISCHARGE NOZZLE	SAN	SANITARY
DSN	DOWNSPOUT NOZZLE	SCW	SOFT COLD WATER
DW	DISHWASHER	SD	STORM DRAIN
DWH	DOMESTIC WATER HEATER	SG	SPECIFIC GRAVITY
EWT	ENTER WATER TEMPERATURE	SH	SHOWER
FC	FLEXIBLE CONNECTION	SK	SINK
FCO	FLOOR CLEAN OUT	SNS	SANITARY SEWER
FD	FLOOR DRAIN	SPHD	SPRINKLER HEAD
FS	FLOOR SINK	SPKR	SPRINKLER
FSEC	FOOD EQUIPMENT SERVICE CONTRACTOR	SS	SERVICE SINK
G	GAS	SSK	SERVICE SINK
GLR	GROUND LOOP RETURN	ST	STORM
GLS	GROUND LOOP SUPPLY	TD	TRENCH DRAIN
HB	HOSE BIBB	THERM	100 CUBIC FEET OF NATURAL GAS
HO	HUB OUTLET	TOW	TOP OF WALL
HTP	HEAT PUMP	UR	URINAL
HW	HOT WATER	V	VENT
HWR	HOT WATER RETURN (DOMESTIC)	VS	VENT STACK
HYD	HYDRANT	VTR	VENT THROUGH ROOF
IE	INVERT ELEVATION	W	WASTE
IW	INDIRECT WASTE	WCO	WALL CLEANOUT
KVAR	KILOVOLT-AMPERES REACTIVE	WH	WALL HYDRANT
L	LAVATORY	WHTR	WATER HEATER
LAV	LAVATORY	WS	WASTE STACK
LEED	LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN	ZVB	ZONE VALVE BOX

ABBREVIATIONS - PLUMBING

PLUMBING SYMBOLS

	ANGLE RELIEF VALVE
	ANGLED STOP CHECK VALVE
	BALANCING VALVE
	BUTTERFLY VALVE
	BALL VALVE
	CHECK VALVE W/ARROW INDICATING FLOW
	GATE VALVE
	GLOBE VALVE
	LINEAR STOP CHECK VALVE
	GAS VALVE
	PLUG VALVE
	PRESSURE REDUCING VALVE
	PRESSURE RELIEF VALVE
	SOLENOID VALVE
	PRESSURE REGULATING VALVE - TWO WAY
	PRESSURE REGULATING VALVE - THREE WAY
	MOTORIZED CONTROL VALVE - 2-WAY
	MOTORIZED CONTROL VALVE - 3-WAY
	FLOW MEASURING DEVICE
	HOSE BIBB
	MANUAL AIR VENT
	PRESSURE INDICATOR
	TEMPERATURE INDICATOR
	THERMOMETER
	ANCHOR
	CAP
	CATCH BASIN
	END OF LINE, CLEANOUT
	FLOOR, CLEANOUT
	WALL, CLEANOUT
	EXPANSION COMPENSATOR OR EXPANSION JOINT
	FLEXIBLE PIPE CONNECTOR
	FLOOR DRAINS
	PIPE GUIDE
	MANHOLE
	MASTER GAS SHUT OFF
	PRESSURE REDUCING STATION
	REDUCED PRESSURE BACKFLOW PREVENTER
	STRAINER
	UNION

PLUMBING GENERAL NOTES

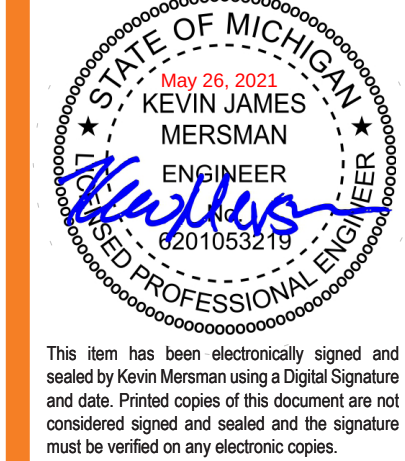
- COORDINATE ROUTING OF PIPING WITH ALL OTHER TRADES PRIOR TO INSTALLATION TO AVOID CONFLICTS.
- COMPLY WITH ALL APPLICABLE LOCAL AND STATE CODES.
- PROVIDE ROUGH-INS AND FINAL CONNECTIONS TO FIXTURES AND EQUIPMENT FURNISHED BY LAB EQUIPMENT CONTRACTOR. USE ONLY APPROVED EQUIPMENT AND FIXTURE SHOP DRAWINGS, FROM FSEC, FOR ROUGH-INS SIZES AND LOCATIONS.
- PROVIDE TRAP SEAL PROTECTION ON ALL FLOOR DRAINS, FLOOR SINKS AND HUB DRAINS SUBJECT TO EVAPORATION. INSTALL PER MANUFACTURERS RECOMMENDATIONS.
- PROVIDE ASSE 1070 MIXING VALVE AT ALL BARRIER FREE SINKS AND ALL HAND WASHING SINKS TO PROVIDE TEMPERED WATER TO HOT WATER SIDE OF FAUCET.
- PIPING INSTALLED IN THE WAY OF ACCESS OR MAINTENANCE TO EQUIPMENT SHALL BE RELOCATED AT THE EXPENSE OF THE INSTALLING CONTRACTOR.
- ALL PLUMBING WORK SHALL MEET MICHIGAN PLUMBING CODE 2015 REQUIREMENTS AS A MINIMUM UNLESS EXCEEDED BY PROJECT CONSTRUCTION DOCUMENTS. THE OWNER EXPECTS THE HIGHEST LEVEL OF WORKMANSHIP AND QUALITY STANDARDS.
- PROVIDE SHUTOFF VALVES AT ALL FIXTURES AND EQUIPMENT.
- COORDINATE LOCATIONS OF FLOOR DRAINS AND FLOOR SINKS WITH LOCATIONS OF EQUIPMENT AND EQUIPMENT HOUSEKEEPING PADS. COORDINATE WITH SLOPING OF FLOOR SO THAT RIM OF DRAIN IS FLUSH WITH FINISH FLOOR.
- COORDINATE HANGING AND SUPPORT OF PIPING WITH STRUCTURAL.
- PROVIDE PIPE SLEEVES WHERE PIPES PENETRATE WALLS.
- PROVIDE PIPE SLEEVES WHERE PIPES RUN BELOW FOOTING.
- INSTALL EXTERIOR CLEAN OUTS FLUSH WITH SURFACE.
- INSTALL PIPING IN AN ORGANIZED MANNER. DO NOT ROUTE IN FRONT OF WINDOWS.
- THE INSTALLATION OF ALL PIPING SHALL BE CLOSELY COORDINATED WITH NEW SHEET METAL, HVAC PIPING, ELECTRICAL AND STRUCTURAL CONDITIONS. NOT ALL REQUIRED OFFSETS AND FITTINGS ARE INDICATED, BUT SHALL BE PROVIDED. REFER TO ARCHITECTURAL AND STRUCTURAL PLANS FOR CLEARANCES. THE LOCATION OF SANITARY, STORM AND VENT LINES SHALL TAKE PRECEDENCE OVER HVAC AND FIRE PROTECTION PIPING AND ELECTRICAL CONDUIT AND CABLE TRAY.
- PROVIDE WATER HAMMER ARRESTORS PER FDI WH-201 AND UP STREAM OF ALL AUTOMATIC AND FAST CLOSING VALVES INCLUDING BUT NOT LIMITED TO SOLENOID VALVES.

PHASING



PLUMBING SYMBOLOGY

	COLD WATER
	HOT WATER
	HOT WATER RETURN
	SANITARY WASTE
	ACID WASTE
	STORM
	STORM (OVERFLOW DRAINAGE)
	ACID WASTE VENT
	COMPRESSED AIR
	NATURAL GAS
	NATURAL GAS, EMERGENCY POWER
	COIL CONDENSATE TO DRAIN
	COMPRESSED AIR



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ISSUANCE	
FOR CONSTRUCTION	
5/26/2021	
REVISIONS	
NO.	DATE DESCRIPTION

FILE NUMBER	85710002
PROJECT MANAGER	BJJ
PROFESSIONAL	KJM
DRAWN BY	DEW
CHECKED BY	KJM

GENERAL PLUMBING INFORMATION
P001

KINEXUS
BRIDGE ACADEMY RENOVATION

progressive

459 West Main St. Benton Harbor, MI 49022

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ALTE
1/8" = 1'-0"

A diagram showing a large rectangular area labeled "EXISTING" and a smaller, shaded rectangular area labeled "AREA OF WORK" located at the bottom left corner of the existing area.

REVISIONS		
NO.	DATE	DESCRIPTION

FILE NUMBER	85710002
PROJECT MANAGER	BJY
PROFESSIONAL	KJM
DRAWN BY	DEW
CHECKED BY	KJM

FIRST FLOOR
HVAC PLAN
ALTERNATE
MH101A

[illegible]

MAX

ITEM

DUCT SLEEVE

SD34, SD35, SD36, SD37, SD50, OR SD60
MULTIPLE BLADE LEAKAGE RATED DAMPER
INSTALLED WITHIN A DUCT OR SLEEVE
(SD50/SD60 SHOWN)

SHEETMETAL SYMBOLOGY		
	SA	STAINLESS STEEL
	HDS	HOT DECK SUPPLY AIR
	GDS	COLD DECK SUPPLY AIR
	RA	RETURN AIR
	EA	EXHAUST AIR
	LHEA	LAB HOOD EXHAUST AIR
	GHEA	GENERAL LAB HOOD EXHAUST AIR
	OA	OUTSIDE AIR
	REL	RELIEF AIR
	MA	MIXED AIR

	DUCT DIAMETER OR WIDTH IN THE PLANE OF TURN, WHERE SQUARE ELBOWS ARE SHOWN, INSTALL TURNING VANES. 14. DUCTS CONNECTED TO EQUIPMENT SHALL HAVE EQUAL EQUIPMENT CONNECTION SIZE UNLESS NOTED OTHERWISE. 15. MAXIMUM LENGTH ON FLEXIBLE DUCT SHALL BE 6'-0", UNLESS OTHERWISE NOTED ON DETAILS OR SPECIFICATION. 16. REFER TO ARCH REFLECTED CEILING PLANS FOR EXACT DIFFUSER LOCATIONS IN AREAS WITH A CEILING.
--	---

E1 FIRE DAMPER DETAIL
NOT TO SCALE

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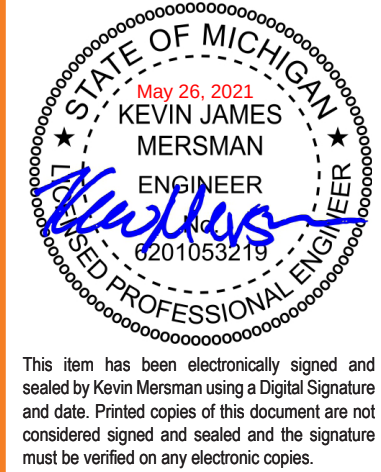
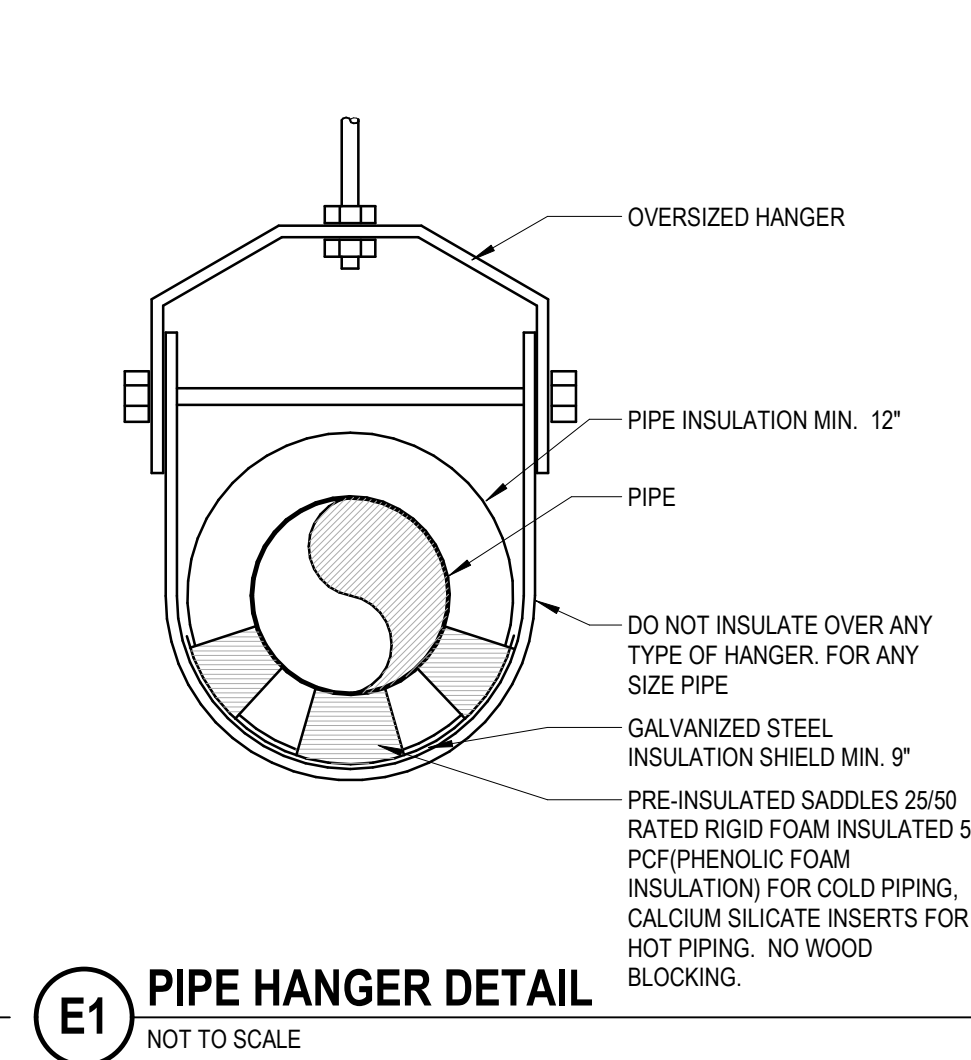
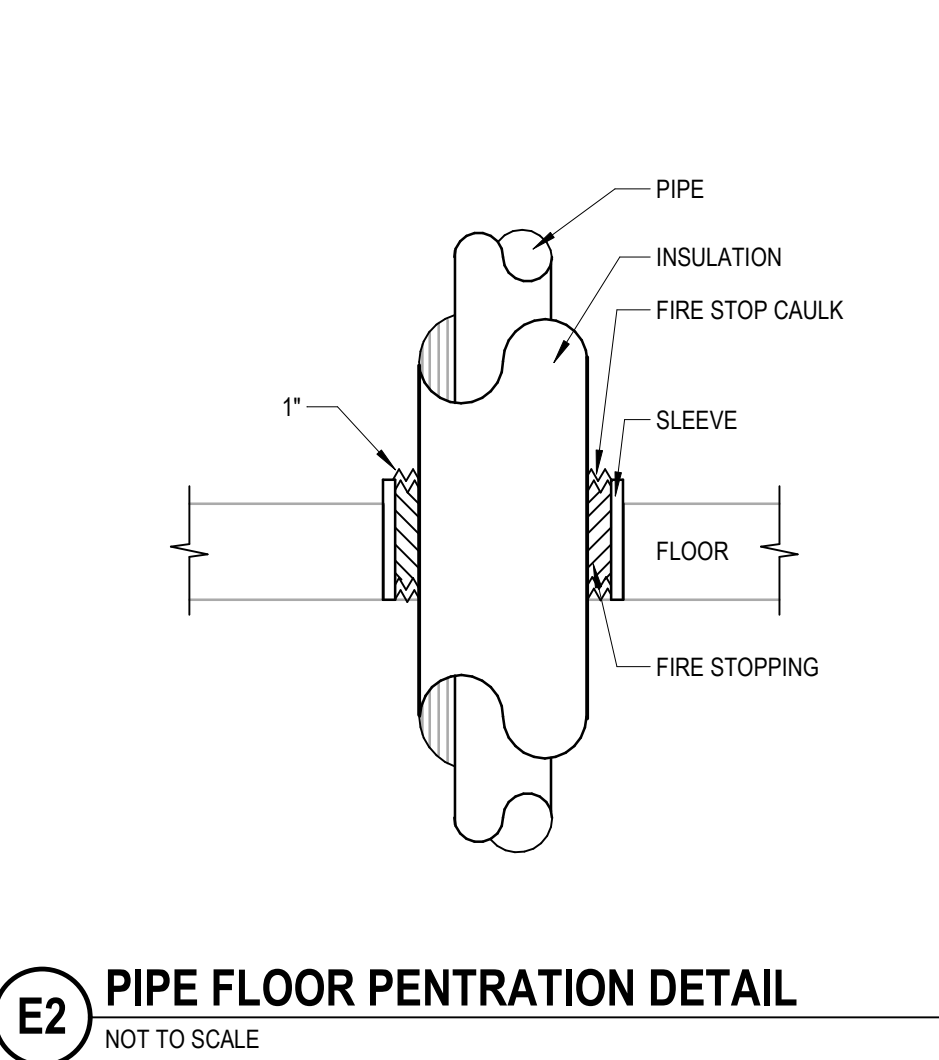
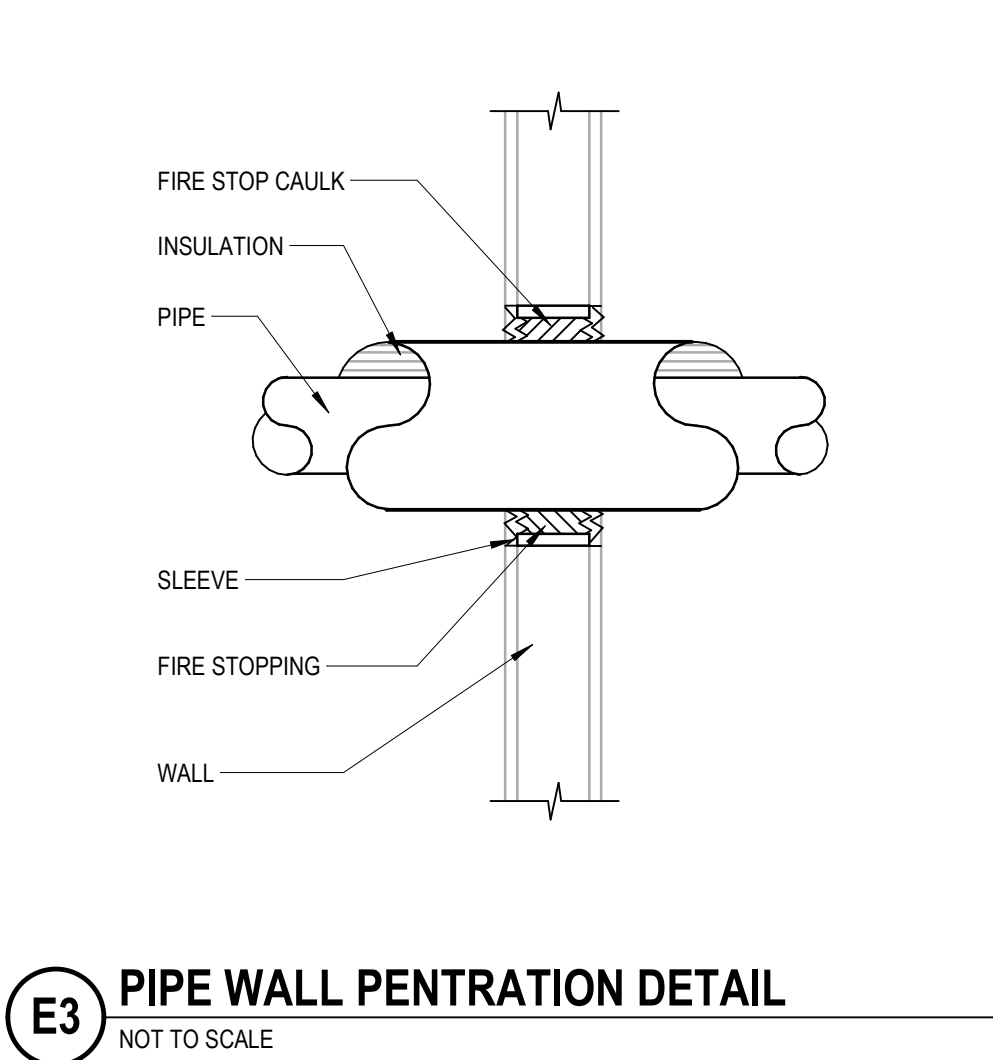
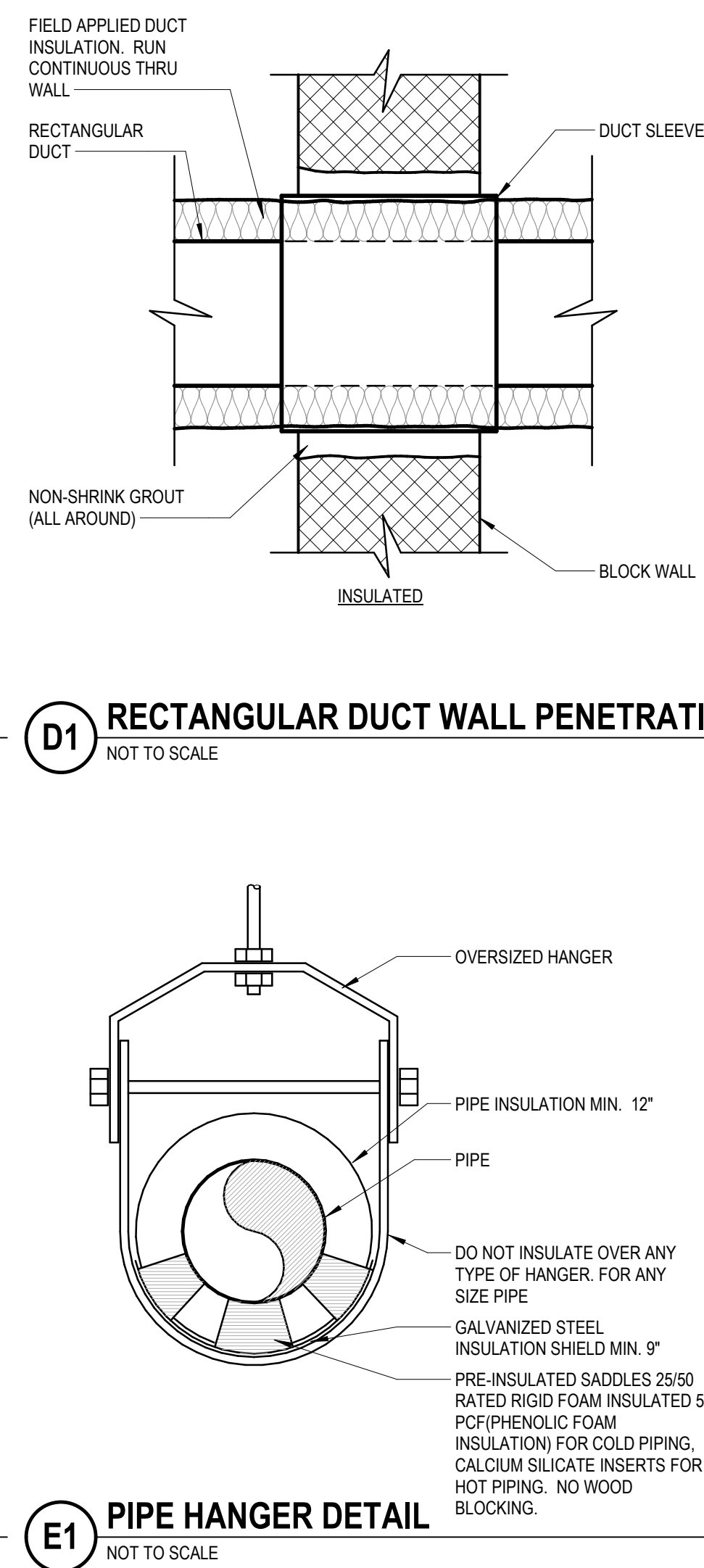
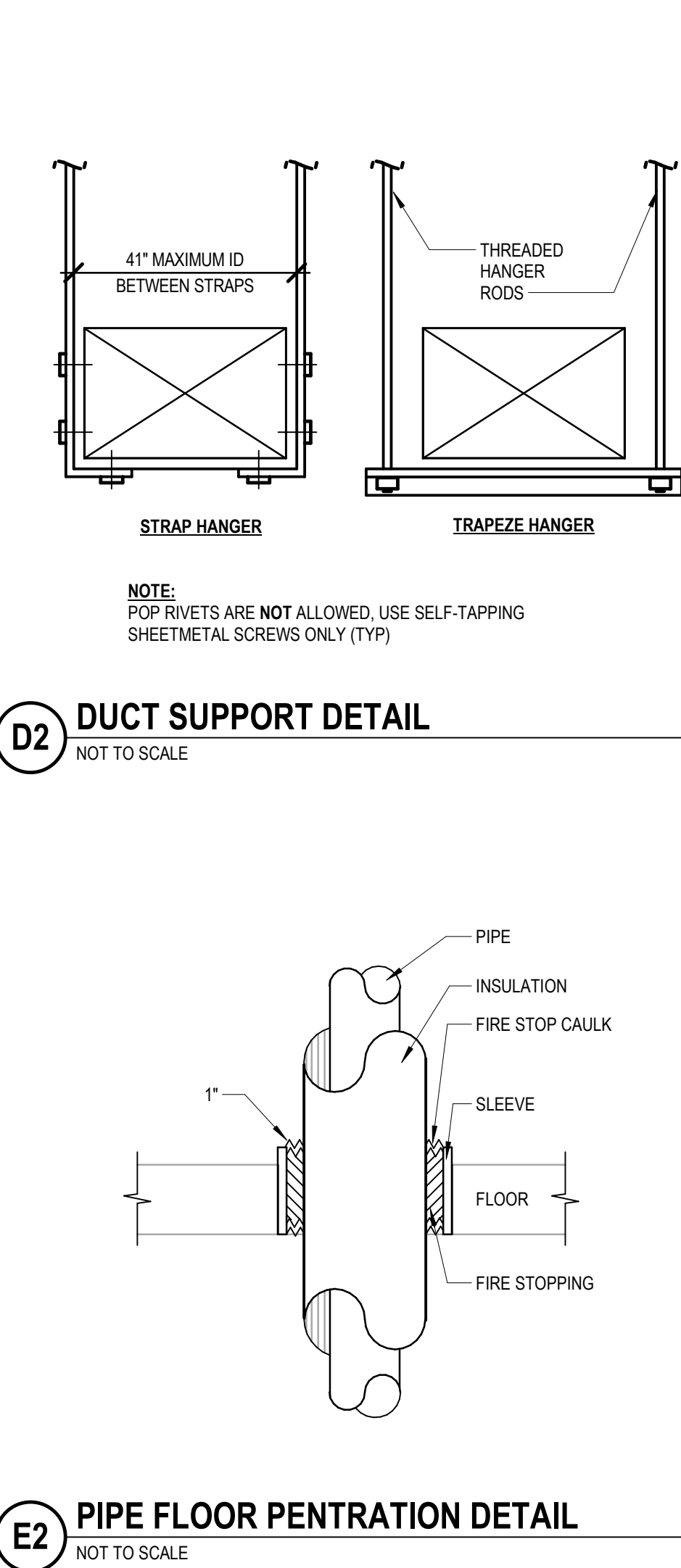
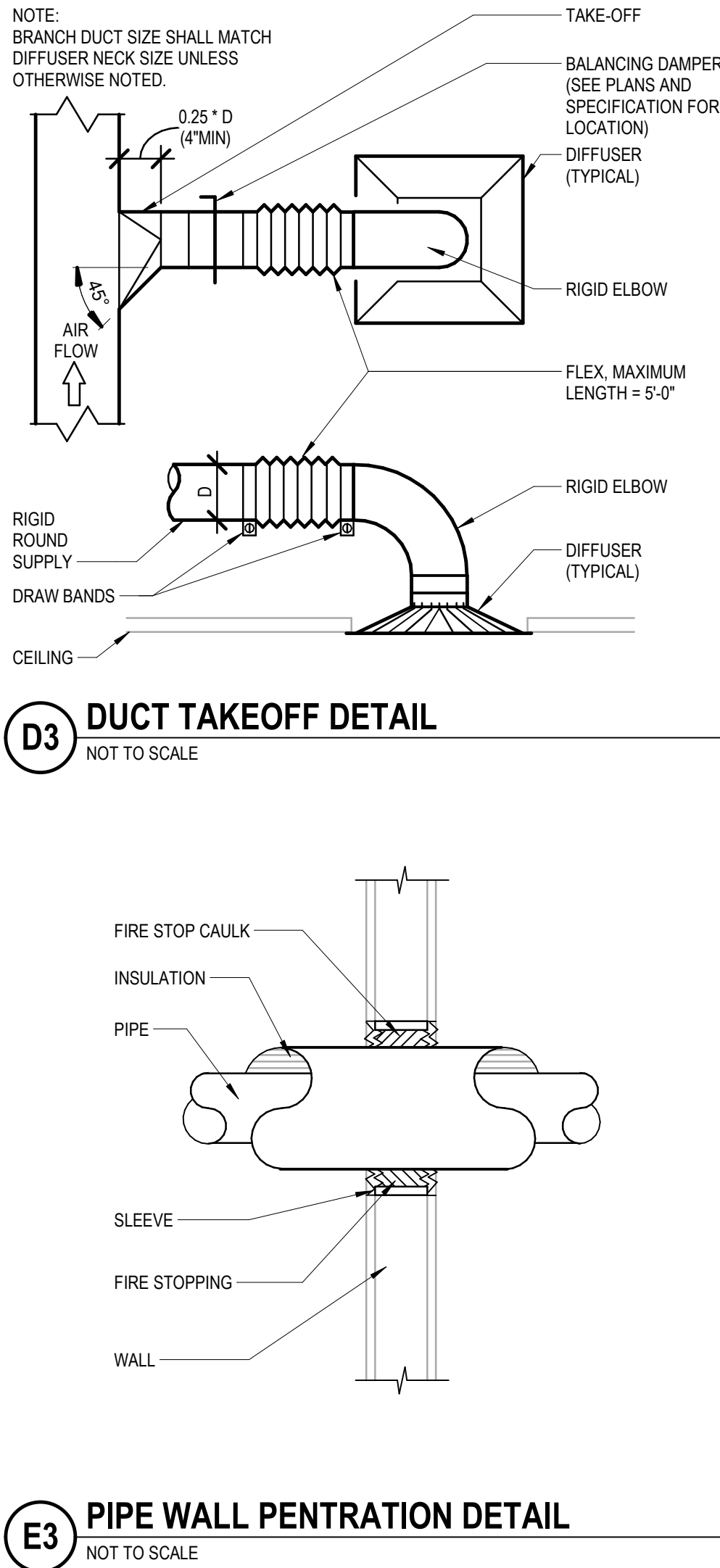
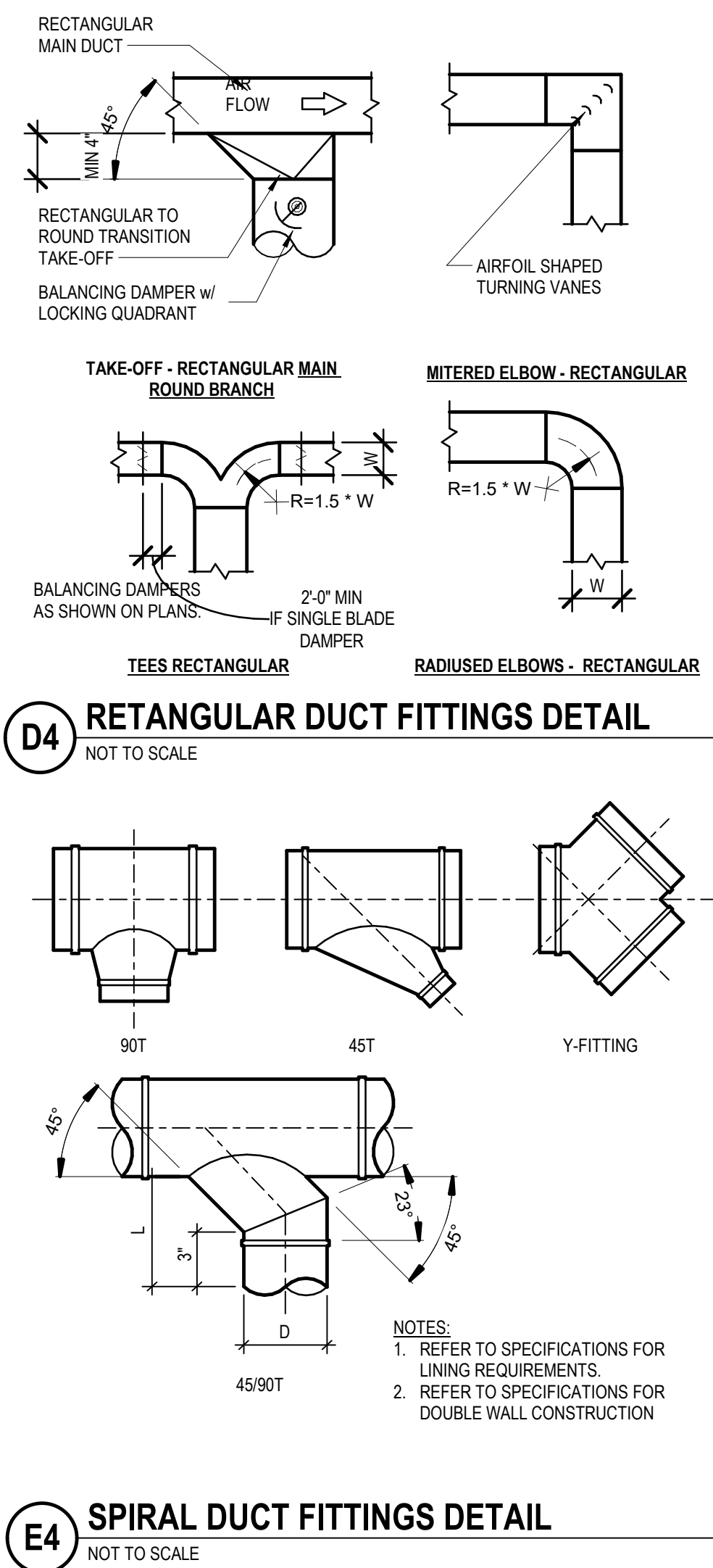
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88



ISSUANCE		
90% REVIEW		
5/24/2021		
REVISIONS		
NO.	DATE	DESCRIPTION

FILE NUMBER	85710002
PROJECT MANAGER	BJY
PROFESSIONAL	Designer
DRAWN BY	Author
CHECKED BY	Checker

MECHANICAL DETAILS M501

KINEXUS BRIDGE ACADEMY RENOVATION

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ELECTRICAL ABBREVIATIONS

A	AMPERES	KV	KILOVOLT
AAC	ABOVE ACCESSIBLE CEILING	KVA	KILOVOLT-AMPERES
AC	AIR COMPRESSOR	KVAR	KILOVOLT-AMPERES REACTIVE
ACU	AIR CONDITIONING UNIT	KWH	KILOWATTS
AD	ACCESS DOOR	LEED	KILOWATT-HOURS
ADD	AUTOMATIC DOOR OPENER	LP	LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN
AFG	ABOVE FINISH GRADE	LT	LIGHT POLE
AFI	ARC FAULT CIRCUIT INTERRUPTER	LTG	LITE, LIGHT
AHU	AUTHORITY HAVING JURISDICTION	LV	LIGHTING
AHU	AIR HANDLING UNIT	LV	LOW VOLTAGE
AL	ALUMINUM	MC	MOMENTARY CONTACT
AMPL	AMPLIFIER	MAX	MAXIMUM
ANNUN	ANNUNCIATOR	MCA	MINIMUM CIRCUIT AMPS
AP	ACCESS PANEL	MCB	MAIN CIRCUIT BREAKER
APPROX	APPROXIMATE	MCC	MOTOR CONTROL CENTER
AS	AMP SWITCH	MD	MOTORIZED DAMPER
AT	AMP TRIP	MO	MOTION DETECTOR
ATS	AUTOMATIC TRANSFER SWITCH	MDC	MAIN DISTRIBUTION CENTER
AUX	AUXILIARY	MDF	MECHANICAL
AWG	AMERICAN WIRE GAUGE	MDS	MAIN FUSED DISCONNECT SWITCH
B	BOLTER	MH	MANHOLE
BAS	BUILDING AUTOMATION SYSTEM	MIC	MICROPHONE
BATT	BATTERY	MLO	MAGNETIC DOOR LOCK
BF	BARRIER FREE	MMS	MAIN LUGS ONLY
BFG	BELOW FINISHED GRADE	MOA	MANUAL MOTOR STARTER
BMS	BUILDING MANAGEMENT SYSTEM	MOP	MULTIOUTLET ASSEMBLY
BOD	BOTTOM OF DEVICE	MS	MAXIMUM OVERCURRENT PROTECTION
BSMT	BASEMENT	MSB	MAGNETIC STARTER
C	CANAL	MSBD	MAIN SWITCH BOARD
CAB	CABINET	MT	MOUNT
CAP	CAPACITY	MTR	MOTOR, MOTORIZED
CATV	COMMUNITY ANTENNA TELEVISION	MTS	MANUAL TRANSFER SWITCH
CB	CIRCUIT BREAKER	NC	NORMALLY CLOSED
CCTV	CLOSED-CIRCUIT TELEVISION	NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
CF	CEILING FAN	NEF	NONFUSED
CFL	COMPACT FLUORESCENT	NFDS	NONFUSED DISCONNECT SWITCH
CH	CABINET HEATER	NL	NIGHT-LIGHT
CKT	CIRCUIT	NO	NORMALLY OPEN
CL	CENTERLINE	NOP	NORMAL POWER FACTOR
CLR	CLEAR, CLEARANCE	OH	OVERHEAD
CMFR	COMPRESSOR	OHD	OVERHEAD DOOR
COL	COLUMN	OL	OVERLOAD
COMB	COMBINATION	P	PUMP
CONC	CONCRETE	PA	PUBLIC ADDRESS
CONN	CONNECT, CONNECTED, CONNECTION	PB	PULL BOX
CONV	CONVECTORY	PE	PNEUMATIC ELECTRIC
CP	CIRCULATING PUMP	PERF	PERFORATE
CR	CARD READER	PF	PUMP, FIRE PROTECTION
CT	COOLING TOWER	PH	PHASE
CT	CURRENT TRANSFORMER	PIV	POST INDICATING VALVE
CU	COPPER	PNL	PANEL
DEPT	DEPARTMENT	PP	POWER POLE
DET	DETAIL	PRJ	PRIMARY
DISC	DISCONNECT	PROJ	PROJECTOR
DIST	DISTRIBUTION	PRV	POWER ROOF VENTILATOR
DL	DEAD LOAD	PTZ	PAN TILT ZOOM
DPR	DAMPER	PVC	POLYVINYL CHLORIDE
DS	DOOR SWITCH	PWR	POWER
DT	DOUBLE THROW	RA	RETURN AIR
DW	DISHWASHER	RAF	RETURN AIR FAN
DWH	DOMESTIC WATER HEATER	RECEPT	RECEPTACLE
EF	EXHAUST FAN	RIO	ROUGH-IN ONLY
EHC	ELECTRIC HEATING COIL	RMC	RIGID METAL CONDUIT
EIH	ELECTRIC INFARED HEATER	RNMC	RIGID NONMETALLIC CONDUIT
ELEC	ELECTRIC, ELECTRICAL	RT	RAINTIGHT
ELEV	ELEVATOR	RTU	ROOFTOP UNIT
EM	EMERGENCY	SIS	START/STOP PUSHBUTTONS
EMS	ENERGY MANAGEMENT SYSTEM	SA	SUPPLY AIR
EMT	ELECTRICAL METALLIC TUBING	SAF	SUPPLY AIR FAN
ES	ELECTRICAL STRIKE	SEC	SECONDARY
EWG	ELECTRIC WATER COOLER	SECT	SECTION
EWI	ELECTRIC WATER HEATER	FA	FIRE ALARM
EXP	EXPLOSION PROOF	FACP	FIRE ALARM CONTROL PANEL
F	FAHRENHEIT	FSD	FURNISHED BY OTHERS
FA	FIRE ALARM	FC	FLEXIBLE CONNECTION
FACP	FIRE ALARM CONTROL PANEL	FCU	FAN COIL UNIT
FSD	FURNISHED BY OTHERS	FDR	FEEDER
FC	FLEXIBLE CONNECTION	FDS	FUSED DISCONNECT SWITCH
FCU	FAN COIL UNIT	FXT	FIXTURE
FDR	FEEDER	FL	FLUORESCENT
FDS	FUSED DISCONNECT SWITCH	FLA	FULL LOAD AMPS
FXT	FIXTURE	FLEX	FLEXIBLE
FL	FLUORESCENT	FLR	FLOOR, FLOORING
FLA	FULL LOAD AMPS	FMC	FLEXIBLE METAL CONDUIT
FLEX	FLEXIBLE	FSS	FLAT SCREEN BOX
FLR	FLOOR, FLOORING	FU	FUSE
FMC	FLEXIBLE METAL CONDUIT	FURN	FURNISH, FURNISHED
FSS	FLAT SCREEN BOX	GALV	GALVANIZED
FU	FUSE	GEN	GENERATOR
FURN	FURNISH, FURNISHED	GFI	GROUND FAULT CIRCUIT INTERRUPTOR
GALV	GALVANIZED	GFP	GROUND FAULT CIRCUIT PROTECTOR
GEN	GENERATOR	GND	GROUND
GFI	GROUND FAULT CIRCUIT INTERRUPTOR	GRMC	GALVANIZED RIGID METAL CONDUIT
GFP	GROUND FAULT CIRCUIT PROTECTOR	HG	HOSPITAL GRADE
GND	GROUND	HOA	HAND-OFF AUTOMATIC
GRMC	GALVANIZED RIGID METAL CONDUIT	HP	HORSEPOWER
HG	HOSPITAL GRADE	HPF	HIGH POWER FACTOR
HOA	HAND-OFF AUTOMATIC	HSKP	HOUSEKEEPING PAD
HP	HORSEPOWER	HTG	HEATING
HPF	HIGH POWER FACTOR	HTP	HEAT PUMP
HSKP	HOUSEKEEPING PAD	HTR	HEATER
HTG	HEATING	HTR	HEATER
HTP	HEAT PUMP	HUM	HUMIDIFIER
HTR	HEATER	HV	HIGH VOLTAGE
HTR	HEATER	HWP	HYDRONIC WATER PUMP
HUM	HUMIDIFIER	IBC	INTERNATIONAL BUILDING CODE
HV	HIGH VOLTAGE	IC	INTERRUPTING CAPACITY
HWP	HYDRONIC WATER PUMP	IG	ISOLATED GROUND
IBC	INTERNATIONAL BUILDING CODE	IMC	INTERMEDIATE METAL CONDUIT
IC	INTERRUPTING CAPACITY	IR	INFRARED
IG	ISOLATED GROUND	JBOX	JUNCTION BOX
IMC	INTERMEDIATE METAL CONDUIT	KO	KNOCKOUT
IR	INFRARED	KS	KEY SWITCH
JBOX	JUNCTION BOX		
KO	KNOCKOUT		
KS	KEY SWITCH		

ELECTRICAL ABBREVIATIONS

KV	KILOVOLT
KVA	KILOVOLT-AMPERES
KVAR	KILOVOLT-AMPERES REACTIVE
KWH	KILOWATTS
LEED	KILOWATT-HOURS
LP	LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN
LT	LIGHT POLE
LTG	LITE, LIGHT
LV	LIGHTING
LV	LOW VOLTAGE
MC	MOMENTARY CONTACT
MAX	MAXIMUM
MCA	MINIMUM CIRCUIT AMPS
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MD	MOTORIZED DAMPER
MO	MOTION DETECTOR
MDC	MAIN DISTRIBUTION CENTER
MDF	MECHANICAL
MDS	MAIN FUSED DISCONNECT SWITCH
MH	MANHOLE
MIC	MICROPHONE
MLO	MAGNETIC DOOR LOCK
MMS	MAIN LUGS ONLY
MOA	MANUAL MOTOR STARTER
MOP	MULTIOUTLET ASSEMBLY
MS	MAXIMUM OVERCURRENT PROTECTION
MSB	MAGNETIC STARTER
MSBD	MAIN SWITCH BOARD
MT	MOUNT
MTR	MOTOR, MOTORIZED
MTS	MANUAL TRANSFER SWITCH
NC	NORMALLY CLOSED
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NEF	NONFUSED
NFDS	NONFUSED DISCONNECT SWITCH
NL	NIGHT-LIGHT
NO	NORMALLY OPEN
NOP	NORMAL POWER FACTOR
OH	OVERHEAD
OHD	OVERHEAD DOOR
OL	OVERLOAD
P	PUMP
PA	PUBLIC ADDRESS
PB	PULL BOX
PE	PNEUMATIC ELECTRIC
PERF	PERFORATE
PF	PUMP, FIRE PROTECTION
PH	PHASE
PIV	POST INDICATING VALVE
PNL	PANEL
PP	POWER POLE
PRJ	PRIMARY
PROJ	PROJECTOR
PRV	POWER ROOF VENTILATOR
PTZ	PAN TILT ZOOM
PVC	POLYVINYL CHLORIDE
PWR	POWER
RA	RETURN AIR
RAF	RETURN AIR FAN
RECEPT	RECEPTACLE
RIO	ROUGH-IN ONLY
RMC	RIGID METAL CONDUIT
RNMC	RIGID NONMETALLIC CONDUIT
RT	RAINTIGHT
RTU	ROOFTOP UNIT
SIS	START/STOP PUSHBUTTONS
SA	SUPPLY AIR
SAF	SUPPLY AIR FAN
SEC	SECONDARY
SECT	SECTION
FA	FIRE ALARM
SHT	SHEET
SM	SURFACE MOUNTED
SN	SOLID NEUTRAL
SP	SPARE
SPD	SURGE PROTECTIVE DEVICE
SPKR	SPEAKER
SS	STAINLESS STEEL
SSW	SELECTOR SWITCH
STA	STATION
STOR	STORAGE
SW	SWITCH
SWBD	SWITCHBOARD
SWGR	SWITCHGEAR
SYM	SYMMETRY, SYMMETRICAL
SYS	SYSTEM
TEL	TELEPHONE
TERM	TERMINAL
TL	TWIST LOCK
TOO	TOP OF DEVICE
TR	TAMPER RESISTANT
TTC	TELEPHONE TERMINAL CABINET
TU	TERMINAL UNIT
TV	TELEVISION
TVTC	TELEVISION TERMINAL CABINET
UV	UNIT VENTILATOR
UC	UNDER CABINET
UE	UNDERGROUND ELECTRICAL
UG	UNDERGROUND
UH	UNIT HEATER
UT	UNDERGROUND TELEPHONE
UV	ULTRA VIOLET
V	VOLTS
VA	VOLT-AMPERES
VDI	VIDEO DISPLAY TERMINAL
VFD	VARIABLE FREQUENCY DRIVE
W	WATTS
WG	WIRE GUARD
WH	WATER HEATER
WP	WEATHERPROOF
XFER	TRANSFER
XFMR	TRANSFORMER
Ø	PHASE

DATA SYMBOL LEGEND

BACKBOX & RACEWAY BY	DEVICE BY	INSTALLED BY	WIRED BY	SYMBOL	DESCRIPTION	HEIGHT TO MIDDLE OF DEVICE (U.N.O.)
E	E	E	E		DATAPHONE OUTLET, 3/4" TO ACCESSIBLE CEILING OR CABLETRAY	18"
E	E	E	E		ABOVE COUNTERTOP DATAPHONE OUTLET, MOUNT 4" ABOVE BACKSPASH OR	46"
E	E	E	E		MULTIOUTLET WIREMOLD ASSEMBLY, MOUNT 4" ABOVE BACKSPASH OR	46"
E	E	E	E		PROVIDE DATA OUTLETS AS SHOWN ON DRAWING	
E	E	E	E		FLOOR DATAPHONE OUTLET	
E	E	E	E		CEILING DATAPHONE OUTLET	
E	X	X	E		CEILING WIRELESS ACCESS POINT	
E	X	X	X		TELEVISION OUTLET	18"
E	E	E	E		CLOCK	84"
E	X	X	X		INTERCOM OUTLET LOCATION	46"
E	X	X	X		INTERCOM - AUDIO/VISUAL	46"
E	X	X	E		SPEAKER (WALL OR CEILING MT.)	84"
E	E	E	E		SOUND MASKING EMITTER (WALL OR CEILING MT.)	84"
E	X	X	X		VOLUME CONTROL	46"
E	X	X	X		MICROPHONE OUTLET	18"
E	X	X	X		PROJECTOR CONTROL OUTLET	18"
E	M	E	E		HUMIDISTAT	46"
E	M	M	E		THERMOSTAT	46"
E	X	X	X		OUTLET IN FLOOR (MICROPHONE SHOWN)	

FIRE ALARM SYMBOL LEGEND

BACKBOX & RACEWAY BY	DEVICE BY	INSTALLED BY	WIRED BY	SYMBOL	DESCRIPTION	HEIGHT TO MIDDLE OF DEVICE (U.N.O.)
E	E	E	E		WALL PULLSTATION DEVICE	46"
E	E	E	E		WALL AUDIO/VISUAL DEVICE (CANDELAS NOTED)	90"
E	E	E	E		WALL VISUAL DEVICE (CANDELAS NOTED)	90"
E	E	E	E		WALL AUDIO STATION	90"
E	E	E	E		CEILING AUDIO/VISUAL DEVICE (CANDELAS NOTED)	
E	E	E	E		CEILING VISUAL DEVICE (CANDELAS NOTED)	
E	E	E	E		CEILING AUDIO STATION	
E	E	E	E		WALL SMOKE DETECTOR	WITHIN 12" OF CEILING
E	E	E	E		WALL AUDIO/VISUAL SMOKE DETECTOR	WITHIN 12" OF CEILING
E	E	E	E		WALL COMBO SMOKE/CO DETECTOR	WITHIN 12" OF CEILING
E	E	E	E		WALL HEAT DETECTOR	90"
E	E	E	E		CEILING SMOKE DETECTOR	
E	E	E	E		CEILING AUDIO/VISUAL SMOKE DETECTOR	
E	E	E	E		CEILING COMBO SMOKE/CO DETECTOR	
E	E	E	E		CEILING HEAT DETECTOR	
E	E	E	E		DUCT SMOKE DETECTOR (RETURN SIDE)	
E	E	E	E		DUCT SMOKE DETECTOR (SUPPLY SIDE)	
E	X	X	E		SPRINKLER FLOW SWITCH	
E	X	X	E		SPRINKLER VALVE TAMPER SWITCH	
E	E	E	E		WALL MAGNETIC HOLD OPEN	80"
E	E	E	E		REMOTE TEST SWITCH	46"
E	E	E	E		FIRE FIGHTER TELEPHONE	46"
E	E	E	E		FIRE ALARM CONTROL PANEL	80"
E	E	E	E		FIRE ALARM ANNUNCIATOR PANEL	46"
E	E	E	E		FIRE ALARM NAC PANEL	46"

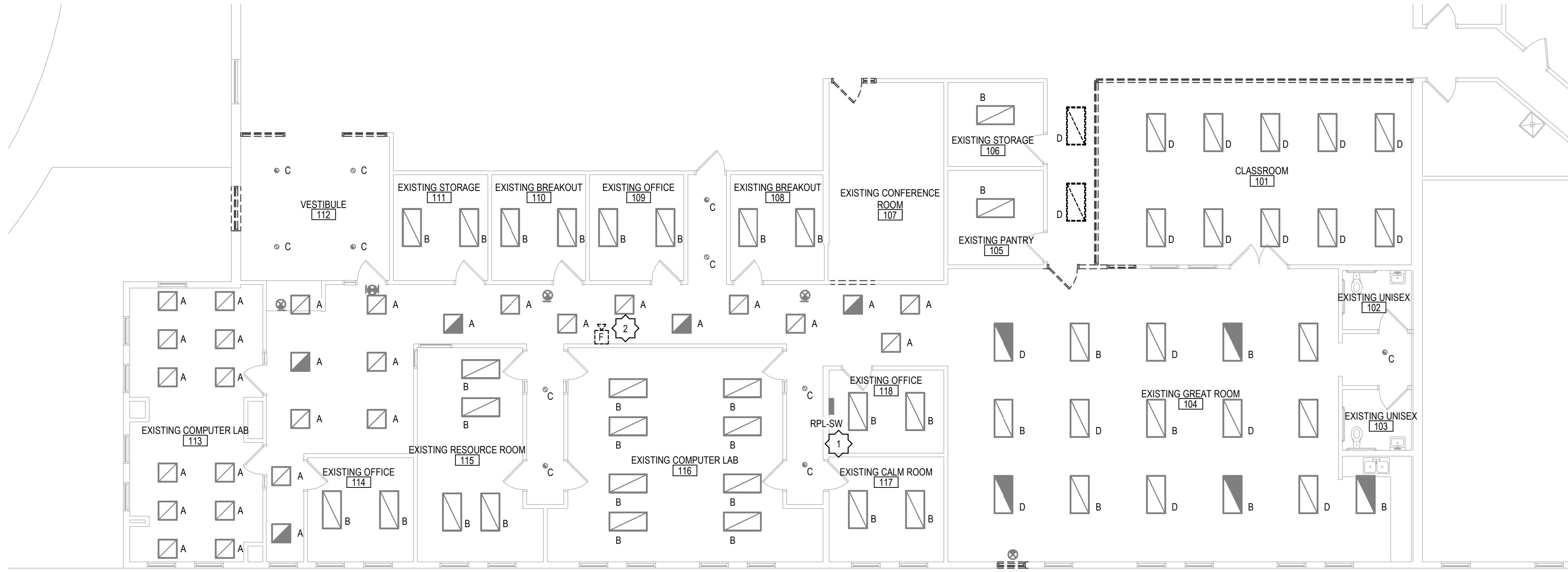
LIGHTING SYMBOL LEGEND

BACKBOX & RACEWAY BY	DEVICE BY	INSTALLED BY	WIRED BY	SYMBOL	DESCRIPTION	HEIGHT TO MIDDLE OF DEVICE (U.N.O.)
E	E	E	E		SINGLE POLE SWITCH	46"
E	E	E	E		3-WAY SWITCH	46"
E	E	E	E		4-WAY SWITCH	46"
E	E	E	E		DIMMER SWITCH	46"
E	E	E	E		OCCUPANCY SENSOR SWITCH	46"
E	E	E	E		MOMENTARY CONTACT SWITCH	46"
E	E	E	E		TIMER SWITCH	46"
E	E	E	E		COMBINATION: OCCUPANCY SENSOR / 0-10V DIMMER SWITCH	46"
E	E	E	E		COMBINATION: MOMENTARY CONTACT SWITCH / 0-10V DIMMER SWITCH	46"
E	E	E	E		COMBINATION: LIGHT SWITCH / CEILING FAN CONTROLLER	46"
E	E	E	E		LIGHTING CONTROL SYSTEM PUSH BUTTON STATION	46"
E	E	E	E		DUAL RELAY OCCUPANCY SENSOR SWITCH	46"
E	E	E	E		KEYED SWITCH	46"
E	E	E	E		GENERATOR TRANSFER DEVICE	
E	E	E	E		CEILING OCCUPANCY SENSOR - DUAL TECHNOLOGY TYPE	
E	E	E	E		CEILING LIGHT LEVEL SENSOR	
E	E	E	E		PHOTOCELL	
E	E	E	E		POLE MOUNTED LIGHT (TYPE DENOTED)	PER SCHED
E	E	E	E		WALL MOUNTED LIGHT (TYPE DENOTED)	AS NOTED
E	E	E	E		RECESSED LIGHT (TYPE DENOTED)	
E	E	E	E		SURFACE LIGHT (TYPE DENOTED)	
E	E	E	E		SUSPENDED OR PENDANT LIGHT (TYPE DENOTED)	
E	E	E	E		INDUSTRIAL LIGHT (TYPE DENOTED)	
E	E	E	E		TRACK AND TRACK LIGHT (TYPES DENOTED)	AS NOTED
E	E	E	E		EMERGENCY DOUBLE HEAD WALL LIGHT (TYPE DENOTED)	96"
E	E	E	E		EXIT SIGN (TYPE DENOTED)	
E	E	E	E		LIGHT FIXTURE ON (EM) LIFE SAFETY OR CRITICAL BRANCH	AS NOTED

POWER SYMBOL LEGEND

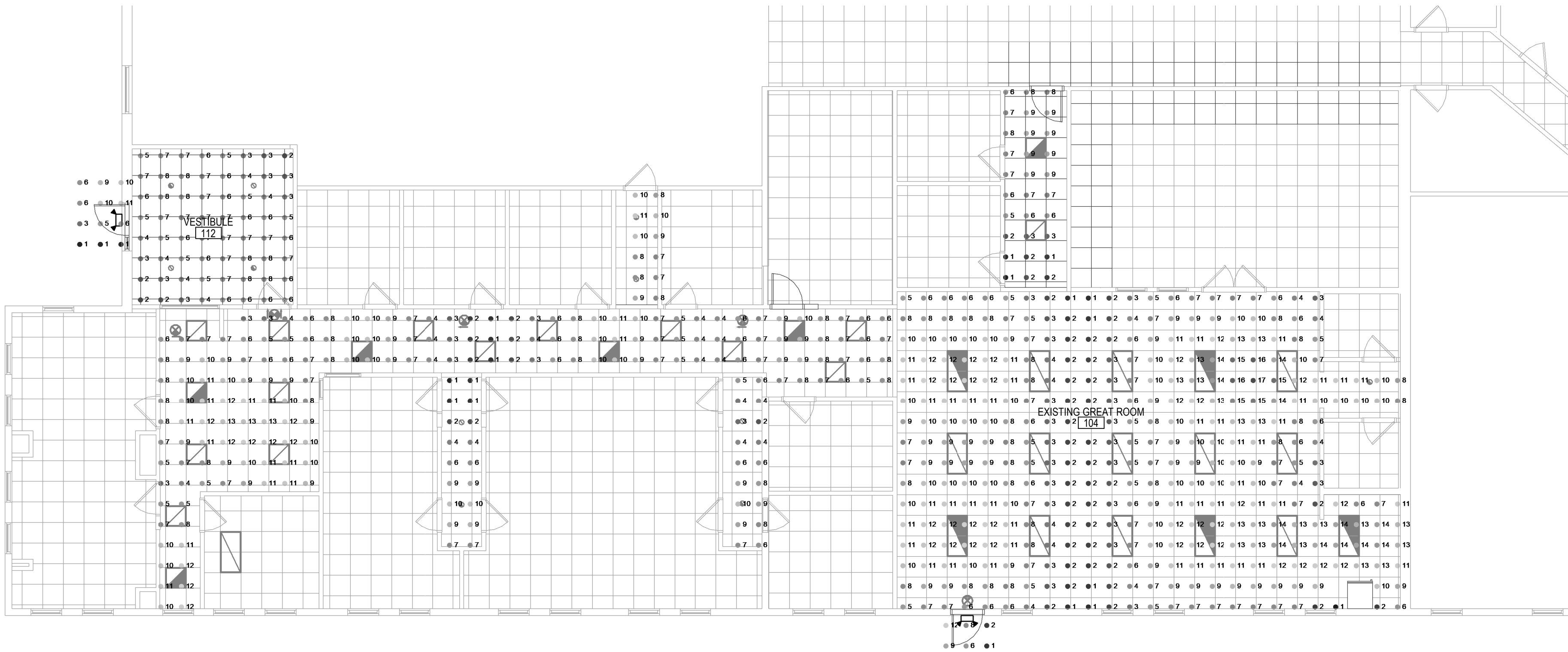
BACKBOX & RACEWAY BY	DEVICE BY	INSTALLED BY	WIRED BY	SYMBOL	DESCRIPTION	HEIGHT TO MIDDLE OF DEVICE (IN/CM)
E	E	E	E		SINGLE RECEPT ("EM" = EMERGENCY, "HG" = HOSPITAL GRADE, "TR" = TAMPER RESISTANT)	18"
E	E	E	E		GFCI RATED SINGLE RECEPT	18"
E	E	E	E		ISOLATED GROUND SINGLE RECEPT	18"
E	E	E	E		SWITCHED SINGLE RECEPT	18"
E	E	E	E		DUPLEX RECEPT ("EM" = EMERGENCY, "HG" = HOSPITAL GRADE, "U" = CONNECTED TO UPS)	18"
E	E	E	E		GFCI RATED DUPLEX RECEPT	18"
E	E	E	E		ISOLATED GROUND DUPLEX RECEPT	18"
E	E	E	E		SWITCHED DUPLEX RECEPT (SPLIT-WIRE)	18"
E	E	E	E		USB/DUPLEX RECEPT	18"
E	E	E	E		ABOVE COUNTERTOP DUPLEX RECEPT, MOUNT 4" ABOVE BACKSPASH OR 44"	
E	E	E	E		FOURPLEX RECEPT ("EM" = EMERGENCY, "HG" = HOSPITAL GRADE, "U" = CONNECTED TO UP)	18"
E	E	E	E		GFCI RATED FOURPLEX RECEPT	18"
E	E	E	E		ISOLATED GROUND FOURPLEX RECEPT	18"
E	E	E	E		SWITCHED FOURPLEX RECEPT (SPLIT-WIRE)	18"
E	E	E	E		ABOVE COUNTERTOP FOURPLEX RECEPT, MOUNT 4" ABOVE BACKSPASH OR 44"	
E	E	E	E		SPECIAL RECEPT OR CONNECTION, PROVIDE DIRECT POWER CONNECTION OR MATCHING RECEPTACLE AS REQUIRED, COORDINATE W/ EQUIPMENT MANUFACTURER	18"
E	E	E	E		MULTIOUTLET WIREMOLD ASSEMBLY, MOUNT 4" ABOVE BACKSPASH OR PROVIDE POWER RECEPTS AS SHOWN ON DRAWING	46"
E	E	E	E		FLOOR RECEPT (DUPLEX SHOWN)	
E	E	E	E		CEILING RECEPT (DUPLEX SHOWN)	
E	X	X	X		JUNCTION BOX (FLOOR, WALL, CEILING SHOWN)	AS NOTED
E	E	E	E		PUSH BUTTON STATION	46"
E	E	E	E		MOTOR HORSEPOWER RATED SWITCH	46"
E	E	E	E		FUSED SWITCH	46"
E	E	E	E		SAFETY DISCONNECT SWITCH (FUSED)	72"
E	E	E	E		COMBO MOTOR STARTER/DISCONNECT SWITCH (FUSED)	72"
E	EM	EM	E		VARIABLE FREQUENCY DRIVE	
E	EM	EM	E		SINGLE PHASE MOTOR (SEE SCHEDULE)	
E	EM	EM	E		THREE PHASE MOTOR (SEE SCHEDULE)	
E	E	E	E		CIRCUIT BREAKER PANEL	72"
E	E	E	E		POWER OR DISTRIBUTION PANEL	72"
E	E	E	E		SPECIAL CABINET (TYPE DENOTED)	72"
E	E	E	E		TRANSFORMER (TYPE DENOTED)	
E	E	E	E		GENERATOR (KVA DENOTED)	

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FIRST FLOOR DEMOLITION PLAN
1/8" = 1'-0"

LIGHTING EM EGRESS CALCULATIONS					
Calculation Points Name	Average	Maximum	Minimum	Avg/Min	Max/Min
104 GREAT ROOM	8 fc	17 fc	1 fc	14.6	31.4
112 VESTIBULE	6 fc	8 fc	2 fc	3.0	4.3
112 VESTIBULE EXIT	6 fc	11 fc	1 fc	7.8	14.9
104 GREAT ROOM EXIT	6 fc	12 fc	1 fc	4.6	6.7



FIRST FLOOR EMERGENCY LIGHTING CALCULATIONS PLAN
1/8" = 1'-0"

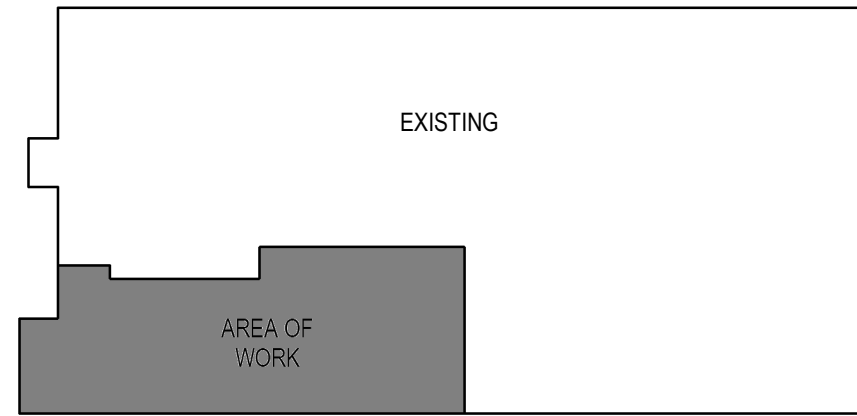
DEMOLITION GENERAL NOTES

- SEE ARCHITECTURAL DRAWINGS AND SPECIFICATIONS FOR PHASES OF DEMOLITION AND CONSTRUCTION. COORDINATE WITH GENERAL CONSTRUCTION.
- DISCONNECT AND REMOVE ALL ELECTRICAL DEVICES AND LIGHTING FIXTURES IN DEMOLITION AREAS UNLESS NOTED OTHERWISE.
- DISCONNECT AND REMOVE ALL ELECTRICAL DEVICES IN WALLS TO BE DEMOLISHED. WALLS TO BE DEMOLISHED ARE SHOWN DASHED. DISCONNECT AND REMOVE ASSOCIATED CONDUIT AND WIRE BACK TO LAST REMAINING DEVICE. FURNISH AND INSTALL CONDUIT AND WIRE AS NECESSARY FOR CONTINUITY OF CIRCUIT(S) TO ANY EXISTING DEVICES TO REMAIN. COORDINATE AND VERIFY REQUIREMENTS WITH NEW WORK IN AREA.
- FURNISH AND INSTALL CONDUIT AND WIRE AS NECESSARY FOR CONTINUITY OF ANY FEEDERS OR BRANCH CIRCUITS ORIGINATING OUTSIDE THE DEMOLITION AREA THAT SERVES ANY ELECTRICAL EQUIPMENT OR DEVICES TO REMAIN AFTER DEMOLITION. MODIFY OR REPLACE AS REQUIRED.
- FURNISH AND INSTALL CONDUIT AND/OR COMMUNICATIONS/DATA WIRING AS NECESSARY FOR CONTINUITY OF ANY WIRING ORIGINATING OUTSIDE THE DEMOLITION AREA THAT SERVES ANY COMMUNICATIONS/DATA EQUIPMENT OR DEVICES TO REMAIN AFTER DEMOLITION. MODIFY OR REPLACE AS REQUIRED.
- DISCONNECT AND REMOVE LIGHT SWITCHES IN DEMOLITION AREAS AS NECESSARY TO ACCOMMODATE NEW DOOR CONFIGURATIONS.
- DISCONNECT AND REMOVE ANY EXISTING ELECTRICAL DEVICES AND BACK BOXES AS NECESSARY WHERE NEW WALL CONSTRUCTION WILL INTERSECT AN EXISTING WALL. FURNISH AND INSTALL CONDUIT AND WIRE AS REQUIRED FOR CONTINUITY OF CIRCUIT(S).
- FURNISH AND INSTALL BLANK COVER PLATES OVER ALL EXISTING UNUSED OPENINGS.

DEMOLITION KEYNOTES

- EXISTING ELECTRICAL PANEL TO REMAIN. SHOWN FOR REFERENCE ONLY.
- EXISTING FIRE ALARM DEVICE TO BE REMOVED AND ELIMINATED FROM EXISTING SYSTEM. NEW DEVICE TO BE INSTALLED IN THE SAME LOCATION TO THE NEW SYSTEM BEING ADDED FOR THE SCHOOL AREA.

KEY PLAN



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BRIDGE ACADEMY RENOVATION

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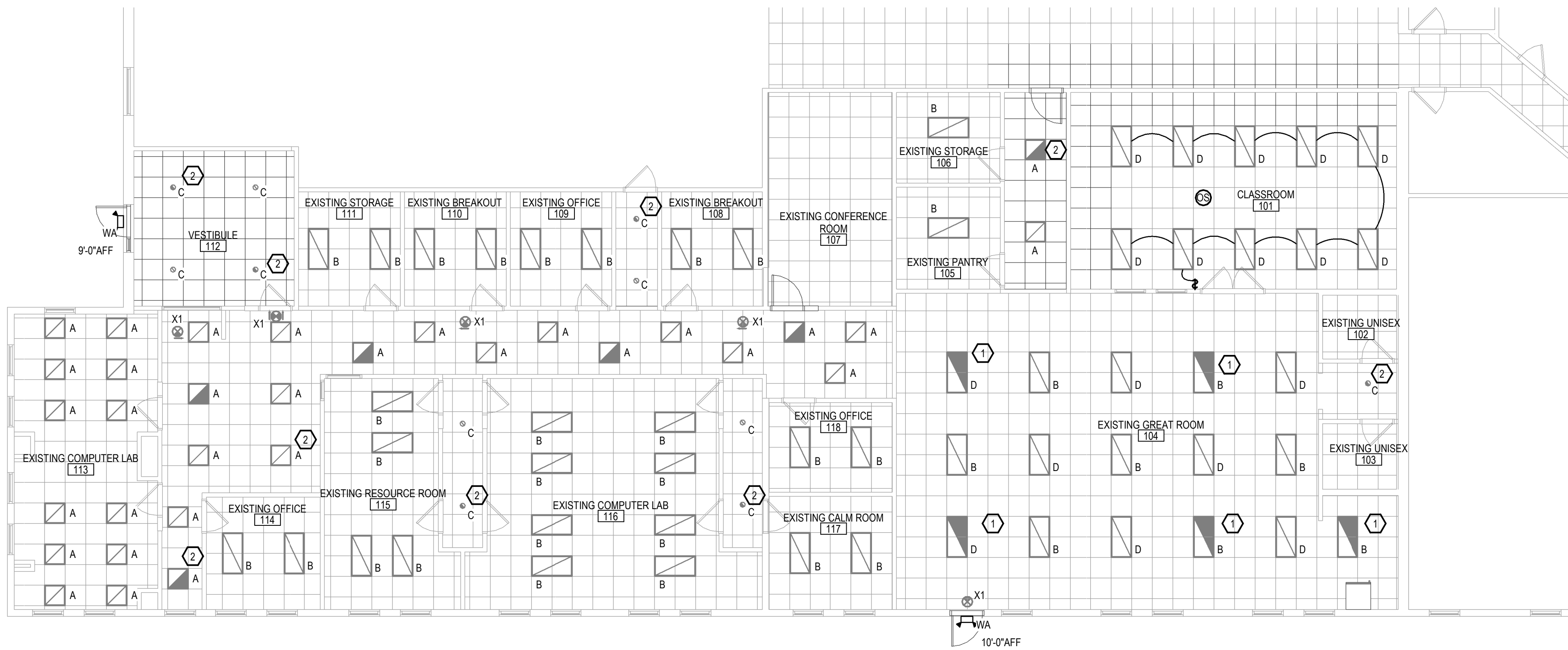
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PROJECT MANAGER BJY
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**FIRST FLOOR
DEMOLITION
PLAN**

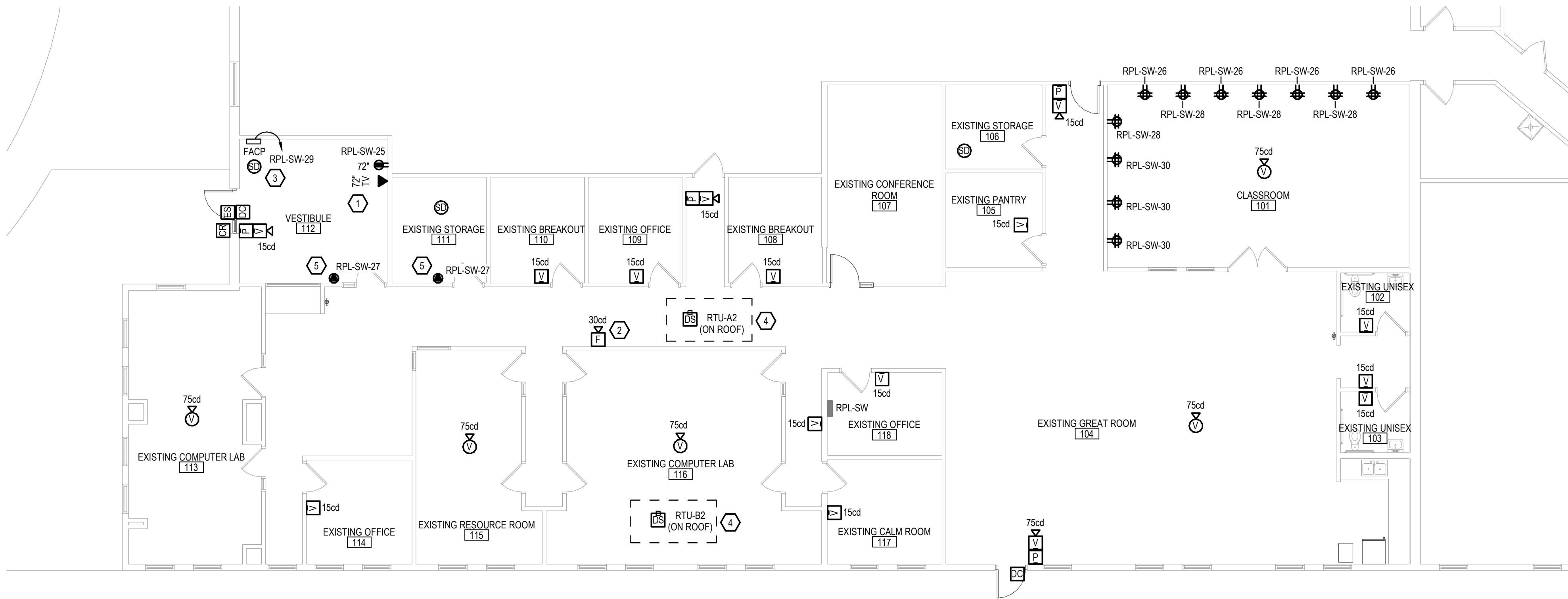
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FIRST FLOOR LIGHTING PLAN
1/8" = 1'-0"



FIRST FLOOR POWER PLAN
1/8" = 1'-0"

LIGHTING GENERAL NOTES

- ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR WIRING ALL ELECTRICAL ITEMS SHOWN ON THIS DRAWING.
- ALL RECESSED LIGHTING FIXTURES IN LAY-IN CEILINGS SHALL BE INSTALLED WITH 6' LONG FLEXIBLE METAL CONDUIT.
- ALL MOUNTING HEIGHTS FOR LIGHTING FIXTURES ARE TO THE BOTTOM OF THE FIXTURES UNLESS INDICATED OTHERWISE.
- SEE ARCHITECTURAL EXTERIOR ELEVATIONS FOR MOUNTING HEIGHTS OF EXTERIOR LIGHTING FIXTURES.
- CIRCUIT WIRING IS NOT SHOWN EXCEPT FOR SWITCHING INTENT OF FIXTURES AND CONTROL OF DEVICES.
- PROVIDE PROPER NUMBER OF CONDUCTORS TO ACHIEVE CIRCUITING AND SWITCHING SHOWN.
- CIRCUIT NUMBERS AT DEVICES CORRESPOND TO PANELBOARD BREAKERS (SEE PANELBOARD SCHEDULE). BRANCH CIRCUITS SHALL BE SIZED ACCORDING TO THE CIRCUIT BREAKER RATING, UNLESS INDICATED OTHERWISE ON THE ELECTRICAL EQUIPMENT SCHEDULE.
- USE #10 AWG CONDUCTORS FOR 20 AMPERE, 120 VOLT BRANCH CIRCUITS LONGER THAN 75 FEET, UNLESS SPECIFICALLY INDICATED OTHERWISE. THIS SHALL BE REQUIRED FOR THE ENTIRE LENGTH OF THE CIRCUIT.

LIGHTING KEYNOTES

- PROVIDE EMERGENCY BATTERY BACK-UP FOR EXISTING FIXTURE WITH SEPARATE HOT FEED FOR MONITORING OF NORMAL POWER. BATTERY SHALL PROVIDE 1100 LUMENS FOR EMERGENCY LIGHTING.
- PROVIDE EMERGENCY BATTERY BACK-UP FOR EXISTING FIXTURE WITH SEPARATE HOT FEED FOR MONITORING OF NORMAL POWER. BATTERY SHALL PROVIDE 700 LUMENS FOR EMERGENCY LIGHTING.

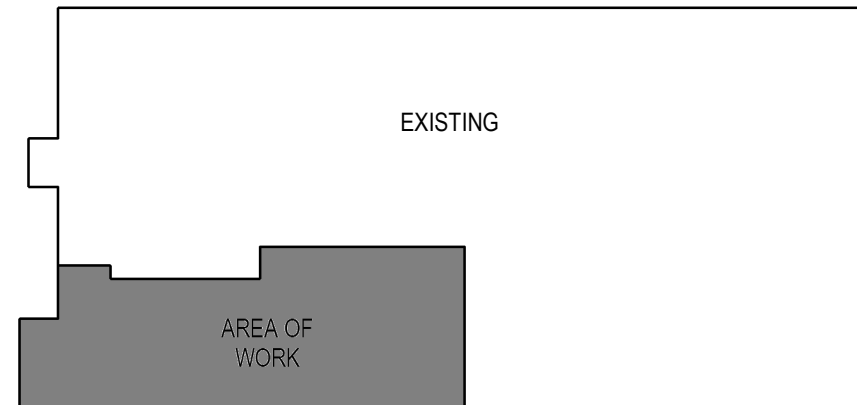
POWER GENERAL NOTES

- ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR WIRING ALL ELECTRICAL ITEMS SHOWN ON THIS DRAWING.
- WHERE CONNECTED TO A 20A BRANCH CIRCUIT SUPPLYING AN INDIVIDUAL RECEPTACLE (SIMPLEX OR DUPLEX), THE RECEPTACLE SHALL BE RATED AT 20A.
- VERIFY LOCATIONS AND ROUGH-IN REQUIREMENTS OF ALL OWNER FURNISHED EQUIPMENT PRIOR TO ROUGH-IN.
- PROVIDE HOUSEKEEPING PADS FOR ALL FLOOR MOUNTED AND GRADE MOUNTED ELECTRICAL EQUIPMENT. MINIMUM REQUIREMENTS: 4" HIGH, 4% AIR ENTRAINED, POLYESTER REINFORCED CONCRETE, 4" WIDER AND 4" LONGER THAN EQUIPMENT TO BE PLACED ON IT. REFER TO ELECTRICAL DETAIL DRAWINGS FOR TRANSFORMER, GENERATOR, OR SWITCHGEAR PADS THAT MAY EXCEED THESE REQUIREMENTS.
- CONDUIT AND WIRE SHALL NOT BE INSTALLED BELOW FLOOR SLAB UNLESS INDICATED ON PLAN BY DASHED CONDUIT.
- ANY MODIFICATIONS TO THE NUMBER, SIZE, AND TYPE OF WIRES OR CONDUITS FROM THOSE INDICATED ON THIS DRAWING ARE PROHIBITED.
- CIRCUIT WIRING IS NOT SHOWN EXCEPT FOR SWITCHING INTENT OF FIXTURES AND CONTROL OF DEVICES.
- PROVIDE PROPER NUMBER OF CONDUCTORS TO ACHIEVE CIRCUITING AND SWITCHING SHOWN.
- CIRCUIT NUMBERS AT DEVICES CORRESPOND TO PANELBOARD BREAKERS (SEE PANELBOARD SCHEDULE). BRANCH CIRCUITS SHALL BE SIZED ACCORDING TO THE CIRCUIT BREAKER RATING, UNLESS INDICATED OTHERWISE ON THE ELECTRICAL EQUIPMENT SCHEDULE.
- USE #10 AWG CONDUCTORS FOR 20 AMPERE, 120 VOLT BRANCH CIRCUITS LONGER THAN 75 FEET, UNLESS SPECIFICALLY INDICATED OTHERWISE. THIS SHALL BE REQUIRED FOR THE ENTIRE LENGTH OF THE CIRCUIT.

POWER KEYNOTES

- UTILIZE EXISTING CIRCUIT IN WALL FOR EXTENDING TO DISPLAY RECEPTACLE.
- EXISTING FIRE ALARM DEVICE TO BE REMOVED AND ELIMINATED FROM EXISTING SYSTEM. NEW DEVICE TO BE INSTALLED IN THE SAME LOCATION TO THE NEW SYSTEM BEING ADDED FOR THE SCHOOL AREA.
- PROVIDE NEW FIRE ALARM PANEL FOR THE SCHOOL AREA. PROVIDE PULL STATIONS AT ALL EXITS AND AUDIO VISUAL DEVICES FOR PROPER NOTIFICATION. THE SYSTEM SHALL CONNECT TO THE EXISTING BUILDING FIRE ALARM PANEL FOR MONITORING AND REPORTING BETWEEN AREAS.
- VERIFY THE CFM OF ROOF TOP UNITS AND PROVIDE DUCT DETECTORS IN THE SUPPLY SIDE FOR GREATER THAN 2000CFM AND RETURN & SUPPLY FOR GREATER THAN 15,000CFM.
- SMOKE DAMPER ACTUATORS. PROVIDE 2812-G-1/2"C. CONNECT TO FIRE ALARM PANEL.

KEY PLAN

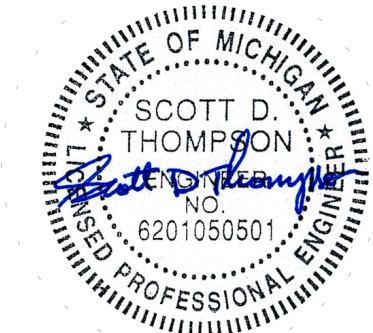


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PROJECT MANAGER B.J.Y.
PROFESSIONAL
DRAWN BY
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**FIRST FLOOR
LIGHTING &
POWER PLANS
E101**

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BRIDGE ACADEMY RENOVATION



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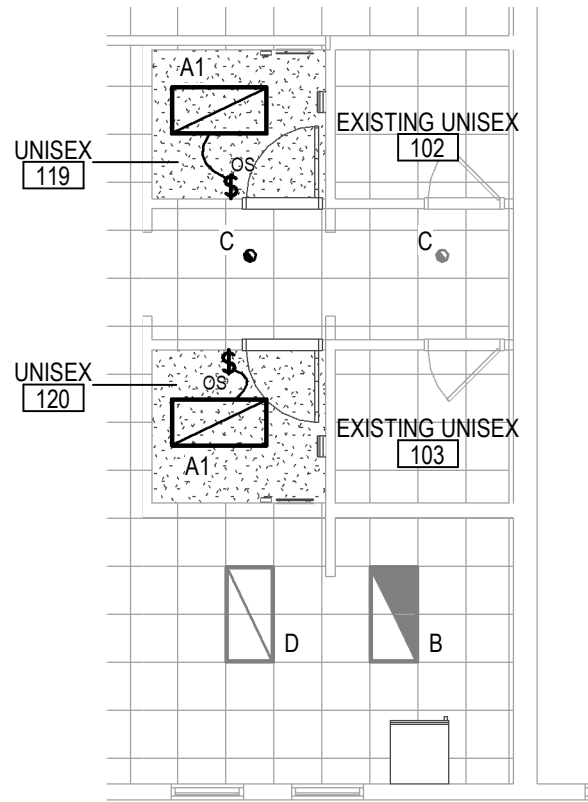
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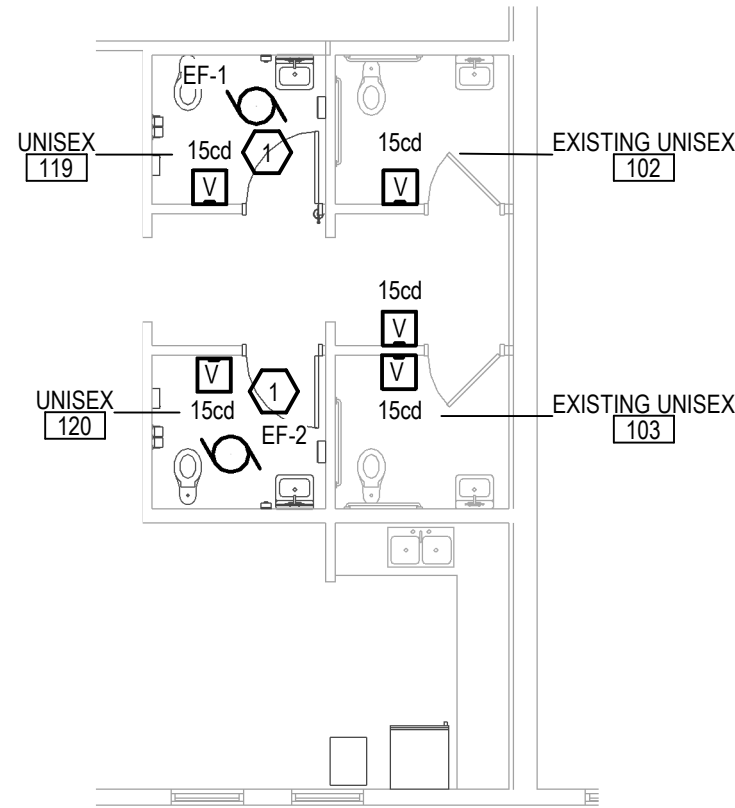
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FIRST FLOOR LIGHTING PLAN - ALTERNATE
1/8" = 1'-0"

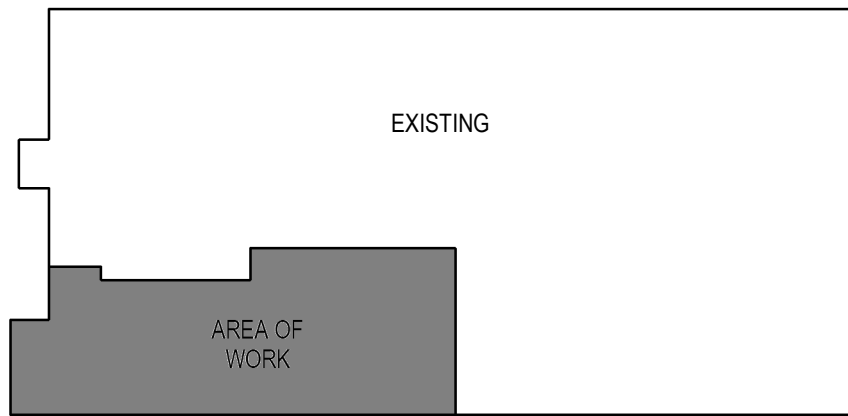


FIRST FLOOR POWER PLAN - ALTERNATE
1/8" = 1'-0"

POWER KEYNOTES

1. INTERLOCK CONTROL OF EXHAUST FAN WITH TOILET ROOM LIGHTING CONTROLS.

KEY PLAN



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PROJECT MANAGER B.J.Y.
PROFESSIONAL Designer
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**FIRST FLOOR
ALTERNATE
LIGHTING &
POWER PLANS
E101A**

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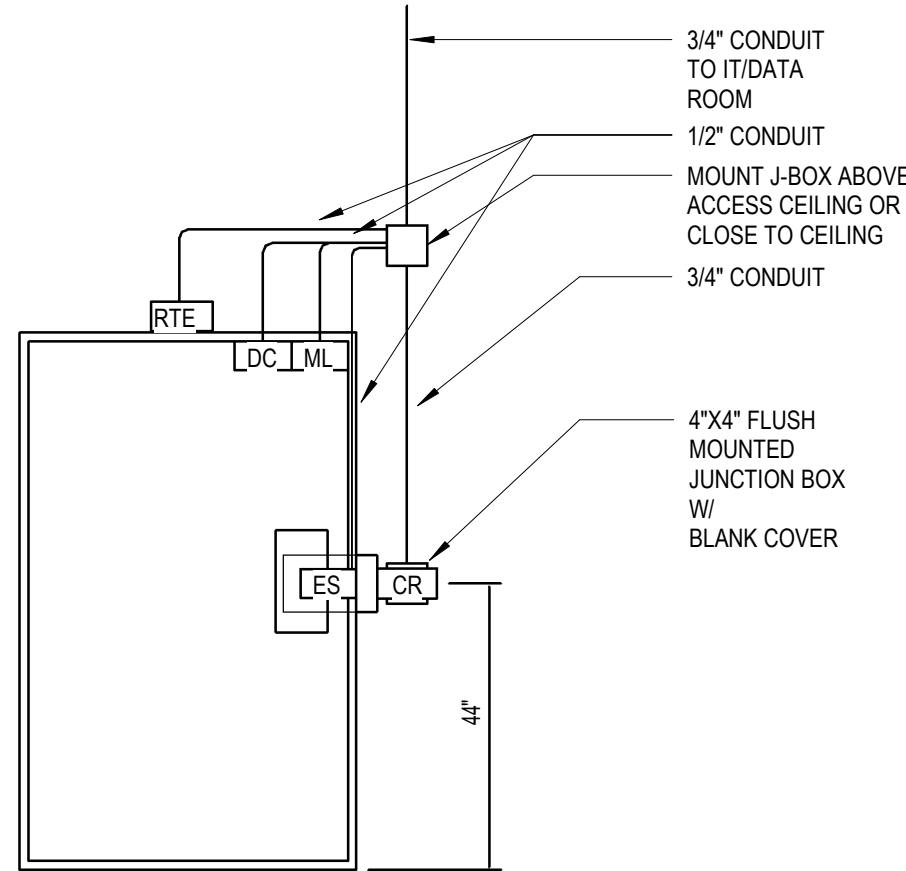
LUMINAIRE SCHEDULE									
TYPE	DESCRIPTION	MOUNTING	LAMP	VOLT	WATT	MANUFACTURER	CATALOG NUMBER	APPROVED EQUAL	NOTE
A	EXISTING 2x2 RECESSED TROFFER	RECESSED	LED	120 V	50 W				
A1	2x4 RECESSED TROFFER	RECESSED	LED	120 V	50 W	NULITE	L2D4-30-L35-U-D-W		
B	EXISTING 2x4 RECESSED TROFFER	RECESSED	LED	120 V	50 W				
C	EXISTING 4" RECESSED DOWNLIGHT	RECESSED	LED	120 V	18 W	EXISTING			
D	EXISTING 2x4 RECESSED TROFFER	RECESSED	LED	120 V	50 W				
WA	WALL PACK	WALL	---	120 V	21 W	DUAL LITE	PG-Z-HTR		
X1	EXISTING EXIT	PENDANT	LED	120 V	3 W	EXISTING			
GENERAL NOTES: A.									
SCHEDULE NOTES: 1.									

MECHANICAL EQUIPMENT CONNECTION SCHEDULE									
TAG	DESCRIPTION	POWER	VOLTAGE	PHASE	FEEDER	DISCONNECTING MEANS	DISC FURNISH/INSTALL		NOTES
EF-1	Exhaust Fan	24 VA	120 V	1	2#12-G-3/4"C	ROOM LIGHTING CONTROL	DIV. 26 / DIV. 26		
EF-2	Exhaust Fan	24 VA	120 V	1	2#12-G-3/4"C	ROOM LIGHTING CONTROL	DIV. 26 / DIV. 26		
STARTER TYPES: FVR FULL VOLTAGE NON-REVERSING FVR FULL VOLTAGE REVERSING 2-SPD TWO SPEED VFD VARIABLE FREQUENCY DRIVE RVS REDUCED VOLTAGE COMBINATION DISCONNECT TYPES: FS FUSED SWITCH NFS NON-FUSED SWITCH MCP MOTOR CIRCUIT PROTECTOR CB CIRCUIT BREAKER CONTROL DEVICES: H/A HAND-OFF-AUTO SWITCH RP RED (RUN) PILOT LIGHT GP GREEN (POWER) PILOT LIGHT O/O ON-OFF SELECTOR SWITCH S/S STOP-START PUSHBUTTONS									
NOTES: 1. INPUT AND OUTPUT CONDUCTORS TO AND FROM VFD'S SHALL BE INSTALLED IN SEPARATE RACEWAYS, INDEPENDENT FROM ANY OTHER CONDUCTORS, AND SHALL NOT PASS THRU ANY COMMON WIREWAY OR RACEWAY.									

PANELBOARD: RPL-SW														
LOCATION: EXISTING OFFICE 118 MOUNTING: SURFACE NEMA1 FED FROM: FEEDER: SEE ONE-LINE DIAGRAM							PANEL TYPE: VOLTAGE: 208Y/120V / 3 ø / 4W BUS AMPS: 225 AMPS MAIN DEVICE: 225 A MLO A.I.C. RATING: 10,000 AMPS SYMMETRICAL SPECIAL:							
LOAD DESCRIPTION	LTS	RCPTS	MTRS	OTHER	P	BKR AMP	CIRCUIT	BKR AMP	P	OTHER	MTRS	RCPTS	LTS	LOAD DESCRIPTION
RM 117, 118 RCPTS		1080			1	20 A	1	2	20 A	1		1260		RM 109, 110 RCPTS
RM 114, 115 RCPTS		1080			1	20 A	3	4	20 A	1		1260		RM 107, 108 RCPTS
RM 112, 113 RCPTS		1080			1	20 A	5	6	20 A	1		900		RM 106 RCPTS
CORR COPPER RCPT		1500			1	20 A	7	8	20 A	1		1500		CORR COPPER RCPT
CORR COPPER RCPT		1500			1	20 A	9	10	20 A	1		1500		CORR COPPER RCPT
RM 120, 137 RCPTS		1440			1	20 A	11	12	20 A	1		1260		RM 121, 122 & 123 RCPTS
RM 126, 138 CUBICAL RCPTS		1200			1	20 A	13	14	20 A	1		1200		OFFICE CUBICAL RCPTS
RM 126, 138 CUBICAL RCPTS		1000			1	20 A	15	16	20 A	1		1200		OFFICE CUBICAL RCPTS
RM 126, 138 CUBICAL RCPTS		1000			1	20 A	17	18	20 A	1		1200		OFFICE CUBICAL RCPTS
RM 126, 138 CUBICAL RCPTS		1000			1	20 A	19	20	20 A	1		900		OFFICE CUBICAL RCPTS
RM 126, 138 CUBICAL RCPTS		1000			1	20 A	21	22	20 A	1		900		OFFICE CUBICAL RCPTS
RM 126, 138 CUBICAL RCPTS		1000			1	20 A	23	24	20 A	1		900		OFFICE CUBICAL RCPTS
LOBBY 103, CORR 104 RCPTS		360			1	20 A	25	26	20 A	1		720		CLASSROOM 106 - RCPT
SMOKE DAMPER ACTUATORS		360			1	20 A	27	28	20 A	1		720		CLASSROOM 106 - RCPT
FACEP PANEL					180	1	20 A	29	30	20 A	1	540		CLASSROOM 106 - RCPT
OFFICE CUBICAL	1685				1	20 A	31	32	20 A	1	48		900	CORR LIGHTING
OFFICE CUBICAL	1500				1	20 A	33	34	20 A	1			1330	LIGHTING RMS
RM 103,120,122,123 & 137	1280				1	20 A	35	36	20 A	1			240	LIGHTING RMS
							37							
							39							
							41							
							42							
PANEL TOTALS														
LOAD CLASSIFICATION		CONNECTED		DEMAND FACTOR		CALCULATED								
Lighting		6935 VA		100.00%		6935 VA								
Motor		48 VA		100.00%		48 VA		CONNECTED LOAD: 37723 VA						
Other		180 VA		100.00%		180 VA		EST. DEMAND LOAD: 27443 VA						
Receptacle		30560 VA		66.36%		20280 VA								
								CONNECTED CURRENT: 105 A						
								EST. DEMAND CURRENT: 76 A						
NOTES:														

CONDUIT AND WIRE SCHEDULE							
FEEDER TYPE	COPPER CONDUCTORS		CONDUIT SIZE				
	Ø & N	GND	2Ø+N-GND	3Ø+GND	3Ø+N-GND	3Ø+2N+2GND	
20	#12	#12	(1/2")	(1/2")	(1/2")	(3/4")	
30	#10	#10	(1/2")	(1/2")	(3/4")	(3/4")	
40	#8	#10	(3/4")	(3/4")	(1")	(1")	
55	#6	#10	(1")	(1")	(1")	(1")	
70	#4	#8	(1 1/4")	(1 1/4")	(1 1/4")	(1 1/4")	
85	#3	#8	(1 1/4")	(1 1/4")	(1 1/4")	(1 1/2")	
95	#2	#8	(1 1/4")	(1 1/4")	(1 1/2")	(1 1/2")	
110	#1	#6	(1 1/2")	(1 1/2")	(1 1/2")	(2")	
150	#1/0	#6	(1 1/2")	(1 1/2")	(2")	(2")	
175	#2/0	#6	(2")	(2")	(2")	(2 1/2")	
200	#3/0	#6	(2")	(2")	(2")	(2 1/2")	
230	#4/0	#4	(2")	(2")	(2 1/2")	(2 1/2")	
255	250 kCM	#4	(2 1/2")	(2 1/2")	(2 1/2")	(3")	
285	300 kCM	#4	(2 1/2")	(3")	(3")	(3")	
310	350 kCM	#3	(3")	(3")	(3")	(3 1/2")	
335	400 kCM	#3	(3")	(3")	(3")	(4")	
380	500 kCM	#3	(3")	(3")	(3 1/2")	(4")	
510	(2) 250 kCM	(2) #1	(2) (2 1/2")	(2) (2 1/2")	(2) (3")	(2) (3")	
570	(2) 300 kCM	(2) #1	(2) (2 1/2")	(2) (2 1/2")	(2) (3")	(2) (3 1/2")	
620	(2) 350 kCM	(2) #1	(2) (3")	(2) (3")	(2) (3")	(2) (3 1/2")	
760	(2) 500 kCM	(2) #1/0	(2) (3")	(2) (3")	(2) (3 1/2")	(2) (4")	
1005	(3) 400 kCM	(3) #2/0	(3) (3")	(3) (3")	(3) (3")	(3) (3 1/2")	
1240	(4) 350 kCM	(4) #3/0	(4) (3")	(4) (3")	(4) (3")	(4) (3 1/2")	
1260	(3) 600 kCM	(3) #3/0	(3) (3 1/2")	(3) (3 1/2")	(3) (4")	(3) (5")	
1675	(5) 400 kCM	(5) #4/0	(5) (3")	(5) (3")	(5) (3 1/2")	(5) (4")	
1680	(4) 600 kCM	(4) #4/0	(4) (3 1/2")	(4) (3 1/2")	(4) (4")	(4) (5")	
2010	(6) 400 kCM	(6) 250 kCM	(6) (3")	(6) (3")	(6) (3 1/2")	(6) (4")	
2100	(5) 600 kCM	(5) 250 kCM	(5) (3 1/2")	(5) (3 1/2")	(5) (4")	(5) (5")	
2520	(6) 600 kCM	(6) 350 kCM	(6) (3 1/2")	(6) (3 1/2")	(6) (4")	(6) (5")	
2660	(7) 500 kCM	(7) 350 kCM	(7) (3 1/2")	(7) (3 1/2")	(7) (3 1/2")	(7) (5")	
3040	(8) 500 kCM	(8) 400 kCM	(8) (3 1/2")	(8) (3 1/2")	(8) (3 1/2")	(8) (5")	
4275	(8) 750 kCM	(8) 500 kCM	(8) (4")	(8) (4")	(8) (5")	(8) (5")	
EQ	EQUIPMENT FEEDER - REFER TO ELECTRICAL EQUIPMENT SCHEDULE						
GENERAL NOTES: A. THE ABOVE FEEDER SCHEDULE IS A SCHEDULE OF TYPICAL FEEDERS AND SOME SIZES MAY NOT BE UTILIZED. B. ALL CONDUCTOR AMPACITIES ARE BASED ON TABLE 310.15(B)(16) OF THE NEC FOR COPPER CONDUCTOR TYPE THW/THWN. C. FEEDER SIZES SHOWN ON THE RISER DIAGRAM INDICATE FEEDER AMPACITIES AND DO NOT NECESSARILY CORRESPOND TO CIRCUIT BREAKER AMPACITIES. CERTAIN FEEDERS MAY BE SIZED FOR THE DERATION FACTORS REQUIRED BY CODE AND/OR ARE OVERSIZED FOR VOLTAGE DROP. D. WHERE MULTIPLE CONDUITS AND CONDUCTORS ARE INDICATED FOR A SINGLE FEEDER, EACH CONDUIT SHALL CONTAIN 1 PARALLEL PHASE, NEUTRAL, AND GROUND CONDUCTORS INDICATED. E. CONDUITS SIZED LARGER THAN INDICATED SHALL BE PERMITTED FOR RUNS WITH UP TO (4) 90° ELBOWS, OR FOR PULLING LONGER RUNS.							

111 CONDUIT AND WIRE SCHEDULE
NOT TO SCALE



1 ACCESS CONTROLS - SINGLE DOOR1
NOT TO SCALE

ISSUANCE		
FOR CONSTRUCTION		
5/26/2021		
REVISIONS		
NO.	DATE	DESCRIPTION

FILE NUMBER	85710002
PROJECT MANAGER	BJY
PROFESSIONAL	
DRAWN BY	
CHECKED BY	